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Content

Keynote Lectures

Monitoring the correctness of our own knowledge: Subjective Confidence and its accuracy

Asher Koriat
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Confidence judgments have been used in many research domains, in part as a tool to aid in modelling cognitive processes. But what is the basis of subjective confidence in our knowledge and judgments? Why are confidence judgments generally accurate in discriminating between correct and wrong responses? These questions have concerned philosophers and psychologists. A self-consistency theory will be presented for the basis of confidence judgments and their accuracy. It assumes that the process underlying subjective confidence in general-knowledge questions and perceptual judgments has much in common with that underlying statistical inference about the outside world. Participants behave like intuitive statisticians who attempt to reach a conclusion about a population based on a small sample of observations drawn from memory. Reliability is used as a basis of validity and therefore metacognitive accuracy depends heavily on cognitive accuracy: The confidence / accuracy correlation is positive only when people's cognitive performance is largely correct, but is negative when people are largely in error. Results consistent with the theory were obtained across many domains, and the theory was shown to have implication for several issues including social conformity, group decisions, and the wisdom of crowds.

Transparent research practices:
Past roots, present revolution, and future prospects

Eric-Jan Wagenmakers
University of Amsterdam, Netherlands

In the past few years, psychological science has undergone a paradigmatic revolution. This revolution is the direct consequence of a "crisis of confidence", the increasing realization that many published findings may be fiction rather than fact. The first part of this presentation provides some historical background and describes the defining events that have caused the revolution ("the straws that broke the camel's back"). The middle part of this presentation discusses the current changes and initiatives that seek to promote openness and align the incentives for the field ("truth-finding") with those for individual researchers ("publish, not perish"). The final part of this presentation outlines a vision for the future, illustrated with a hypothetical example: the perfect experiment.

Experimental evidence for major emotion theories: A comparative survey

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The field of emotion has been, and still is, beset by the large number of competing theories (by some counts – several hundreds), generating endless conceptual and methodological difficulties, not the least being the problem of agreeing on a common definition of what an emotion is. Even more serious is the problem of agreeing on what constitutes sufficient evidence that supports a particular theory, justifying to continue paying attention to it. This situation is rendered even more problematic by the fact that most theories do not propose clear predictions or hypotheses that lend themselves to empirical operationalization, let alone to systematic experimental testing. In this keynote, I will attempt to survey some of the major theories in the field with respect to the amount of experimental evidence (in the wider sense) it has generated and discuss the issue of whether all theories are created equal with respect to experimental testability. In so doing, I will specifically focus on the issues of lawful mechanisms and different types of cause-effect relationships.

Contributions

Collaborative memory revisited: Does collaboration at test always decrease recall?

Magdalena Abel & Karl-Heinz T. Bäuml

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Recall is reduced in collaborating groups compared to nominal groups, in which the nonredundant responses of individually working subjects are cumulated to simulate a group`s potential. This effect, termed collaborative inhibition, is attributed to the disruption of idiosyncratic retrieval strategies when one is exposed to other responses during collaboration, similarly to how presentation of part of a previously studied list as retrieval cue results in memory impairment. Yet, recent studies suggest that exposition to such part-list cues may not always be detrimental, but can in fact be beneficial for memory performance – at least in situations in which access to the original encoding context is impaired and needs to be reinstated. In two experiments, we investigated whether collaborative remembering always results in collaborative inhibition, or whether being exposed to other participants` responses may, in parallel to part-list cueing, also be beneficial under certain circumstances. In both experiments, subjects recalled lists of unrelated items either individually or in collaborating triads. In Experiment 1, context access was manipulated by applying short and long retention intervals; in Experiment 2, a directed forgetting task was applied instead, in which subjects are asked to remember or forget a previously studied list. When context access was intact (after a 5 min delay in Exp. 1 and a remember cue in Exp. 2) recall was impaired in collaborative compared to nominal groups. However, when access to the encoding context was impaired (after a 24 h delay in Exp. 1 and a forget cue in Exp. 2) no such collaborative inhibition emerged. The results indicate that collaborative remembering does not always result in collaborative inhibition. Moreover, the data suggest that there may be certain parallels (but also differences) between part-list cueing and collaborative remembering.

Adaptive advice taking? Seeking and using advice in different information ecologies

Fabian Ache & Mandy Hütter

Eberhard-Karls-Universität Tübingen

Advice taking constitutes an important aspect of human adaptive decision making. Previous research demonstrated egocentric discounting. That is, people underweight advice when revising their judgment and thereby fail to realize optimal gains. One account of this phenomenon assumes people to possess more knowledge in support of their own as compared to other people's judgments. However, previous research never provided people with the opportunity to compensate for these skewed information samples, for instance by consulting additional advisory estimates. We expand this approach by assuming that, (1) given the opportunity, people will sample additional information, (2) this sampling is sensitive to features of the information ecology, and (3) people will be sensitive to the sampled information when

revising their judgment, relying more strongly on advice that was supported by additional information. To test these assumptions, we expanded the classical research paradigm by a sampling phase that allowed participants to sample any number of advisory estimates. Two studies show that (1) participants sample substantial amounts of additional advice, (2) that the sampling frequency increases when advice diverges from their initial judgments, and (3) that sampling frequency increases the degree of advice utilization. A third study replicated these findings even when advice was costly to obtain. Strikingly, costly as compared to free advice even increased participants' sensitivity to the information ecology. The sampling approach's implications for our understanding of advice taking and its consequences for theorizing will be discussed.

Strategic sexual signals: Women's display and avoidance of the color red depends on the attractiveness of an anticipated interaction partner

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The color red has special meaning in mating-relevant contexts. Wearing red can enhance perceptions of women's attractiveness and desirability as a potential romantic partner. Building on recent findings, the present study examined whether women's choice to display the color red is influenced by the attractiveness of an expected opposite-sex interaction partner. Results indicated that female participants who expected to interact with an attractive man displayed red (on clothing, accessories, and/or makeup) more often than did participants who expected to interact with a rather unattractive man or participants in a naturalistic baseline condition. Moreover, women expecting to interact with a rather unattractive man displayed red less often than did women in the baseline condition. Findings are discussed with respect to evolutionary and cultural perspectives on mate evaluation and selection. Moreover, we attend to exploratory analyses regarding possible hormonal influences on women's display of red as a subtle behavioral indicator of communicating romantic interest.

Variations in cholinergic and dopaminergic genes influence nicotine effects on attention processes

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Reorienting of attention and distractor processing can be modulated by administration of the cholinergic agonist nicotine, although interindividual variability is quite high. We therefore investigated whether genetic differences in cholinergic and dopaminergic receptors can account for this variability. Subjects were genotyped for single nucleotide polymorphism (SNP) rs1044396 in the gene coding for the nicotinic acetylcholine receptor subunit a4 (CHRNA4) and

SNP rs6277 within the dopamine receptor type d2 gene (DRD2). In two double-blind within-subject pharmacogenetic studies we administered a 7 mg nicotine patch or placebo patch to healthy nonsmokers 1 hour prior to performing different attention tasks. First in a behavioural study, distractor processing was investigated in a selective attention paradigm ("Lavie task") in 58 subjects and in a second MRI study reorienting was tested in 50 participants with a Posner paradigm. We found in both cohorts a synergistic effect of CHRNA4 and DRD2 genotype on the nicotine effect with one combination (CHRNA4 CC/CT & DRD2 CC) showing enhancement in performance. In addition subjects could be classified into genotype groups based on brain activity in pulvinar, striatum, frontal cortex, precuneus and middle temporal gyrus using a partial least squares discriminant analysis. Our findings point out that variations in cholinergic and dopaminergic transmitter systems account for interindividual variability of nicotine effects.

Statistical learning for psychologists

Johannes Albert-von der Gönna

Ludwig-Maximilians-Universität München

The collection and retrieval of information in ways as described in this symposium will inevitably lead to ever increasing data sets for psychologists to deal with. Fairly recent developments in statistics and computer science, collectively known as machine/statistical learning or predictive modeling, provide novel means to gain insights from such data (e.g. Bishop, 2008; Hastie, Tibshirani & Friedman, 2008).These modeling techniques not only aim for accuracy in prediction, but can also provide valuable information on the relevance of certain predictors (or features) in a given context. The former is generally achieved by not only fitting a model on a given data set, but by using different resampling methods (e.g. cross-validation, bootstrapping) to validate (and generalize) a model`s scope (Bischl, 2012; Simon, 2007). Typically, several competing models are fitted and evaluated this way (Kuhn & Johnson, 2013), some of them more familiar to psychologists (e.g. regression models) than others (e.g. random forests, support vector machines). The role of particular predictors may, amongst other strategies, be evaluated by reducing model complexity applying regularization and shrinkage methods. Several such techniques have been introduced extending the least squares regression estimate usually fairly well known by psychologists, namely ridge regression (Hoerl, 1970), the lasso (Tibshirani, 1996) and the elastic net (Zou & Hastie, 2008).This talk will provide an introductory overview of these modeling techniques and general statistical learning procedures like resampling. A moderately sized data set of some 700 occupational trainees will be used to highlight the need for and inherent value of statistical learning approaches by revisiting the use of detailed measurements of individuals for employee selection.

An exemplar-based random walk model for quantitative estimation

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Many judgment tasks include quantitative estimations of a criterion given multiple cues. For example, estimations of house prices may depend on the quality of a neighborhood or the number of rooms. Past research proposed that people retrieve similar exemplars from memory to make such quantitative estimations. Exemplar models have been shown to predict participants' judgments well in tasks with a non-linear dependency between cues and criterion, however they are silent in terms of response times. One solution to this limitation is sequential sampling models, which do quite well in explaining choices and response times in two-alternative forced-choice tasks. In contrast, quantitative estimation requires participants to consider and select an estimate from a large number of possible values that often have a metric interpretation. Our solution is a modification to an exemplar-based random walk model. The model assumes that evidence is accumulated by sequentially retrieving exemplars from memory. Each exemplar presents evidence for a specific criterion value. This evidence is added to an accumulator corresponding to the specific criterion value, but also contributes to neighboring accumulators. The degree of contribution is determined by a Gaussian kernel centered over the criterion value of the retrieved exemplar. The random walk stops once an accumulator reaches a threshold. The model predicts response times and accuracy as a function of the exemplars stored in memory. Judgments are more accurate, if the criterion values of similar exemplars are close to the correct criterion. Further, people respond faster the more similar exemplars have been encountered with the same criterion value. In addition, the model predicts an inverted U-shaped curve over the response scale, with estimates being faster and more accurate on the edge of the scale. Statistical analyses of the model show a high correlation with human estimation errors and response times.

The cost of awareness: Attentional blink or awareness blink?

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Conscious perception of an event has long been associated with favorable processing of that event. However, recent findings from our lab has shown that conscious perception may also come at a price for subsequent stimulus. Under the exact same stimulus conditions, observers are much slower at responding to a target when a cue that precedes it is consciously perceived than when it is not. We suggest that this cost reflects a processing limitation that is unrelated to an attentional bottleneck or a response selection limitation but instead emerges in the aftermath of the conscious perception of an event. Here, we demonstrate that this cost reflects a perceptual limitation that is independent of attention. We show that when one experiences an event consciously, perceiving a second event is impaired if it follows the first event by less

than half a second or so – even if this event occurs at an unattended location. Relying on the similar time courses of the two costs, we suggest that attentional blink findings may be accounted for (at least in part) as an “awareness cost” rather than as an attentional limitation.

Binocular rivalry: From emotion to psychopathology

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University of Mannheim

Preferential perception of emotional cues will help an individual to respond quickly and effectively to relevant events. The preferential perception of visual emotional cues is particularly impressive under conditions where different cues compete for perceptual dominance. When two incompatible pictures are presented to one eye each, this competition results in a perceptual alternation between the pictures, such that only one picture is visible while the other is suppressed. This so called binocular rivalry involves different stages of early visual processing and is thought to be relatively independent from intentional control. Several studies from our laboratory showed that emotional stimuli predominate over neutral stimuli in binocular rivalry. In healthy participants, emotional facial expressions as well as pictures of emotional scenes predominate over neutral ones. We used probes to control for possible reporting biases and conditioned cues to control for possible differences in physical features. In patients with a specific phobia (spiders), phobia-related material dominates over neutral content more than in non-phobic control participants. Lastly, we will report on mixed results with disorder-specific word stimuli. Taken together, data from this paradigm demonstrates that emotional pictures are perceived more intensively and that psychopathology can influence preferential perception.

The role of the evaluative information ecology for social comparison processes

Hans Alves, Alex Koch & Christian Unkelbach

Universität zu Köln

We identify to crucial properties of evaluative information environments, namely diversity and frequency. First, negative information is more diverse than positive information. In person perception for example, there are many more ways to be disliked than to be liked which is why liked persons are perceived as highly homogenous (Alves, Koch, & Unkelbach, in press). Second, positive information occurs more frequently than negative information. In person perception, as most people behave according to the norms (positively) most of the time, people's mental representation of their social world is predominantly positive as well. Both principles, the larger diversity of negative information, and the higher frequency of positive information have intriguing implications for social comparison processes. One important implication is that similarities amplify, while differences attenuate positivity. That is, people’s shared features are more positive than their unshared features (Alves, Koch, & Unkelbach, in prep). In general, what

people have in common is strongly positive, while negative attributes make people unique. As a result, cognitive processes which build on similarities such as integration/inclusion lead to more positive evaluations than cognitive processes which build on differences such as differentiation/exclusion. For example, as choices can only be made based on differences, the overall evaluation of choice options might suffer from the decision process itself. Further, as stereotypes are formed to distinguish social groups, they typically highlight groups' unshared attributes, i.e. their differences. If differences are necessarily more negative, the negativity of stereotypes and intergroup bias in general might arise from the need to distinguish groups within a predominantly positive world that displays a large diversity of negativity. We present data from three lines of research that tested the role of the information ecology for social comparison processes.

Research Assistant - A mobile data collection and analysis framework

Ionut Andone

Rheinische Friedrich-Wilhelms-Universität Bonn

In recent times, mobile technology has evolved at an astonishing pace and has permeated into all the aspects of our lives. Unfortunately it still has not been adopted at a large scale in certain areas of research, such as psychology and other human behavioral fields. Data is usually collected in these areas by interviewing participants or by self-reporting. These methods consume a lot of time from the interviewers, capture only a small fraction of the participants' lives or are prone to error or bias due to the human nature. The number of participants is limited by the resources available and in the case of few participants, may also introduce selection bias. In order to reach a wider population range, a better method of data gathering, and a faster information retrieval and analysis cycle, there needs to be a different approach. We have developed a framework for data collection and analysis that is easily deployable and cost-effective to operate. Since smartphones are ubiquitous in our lives and are full of data collection sensors, our solution takes advantage of this by being deployed as a mobile application. The reduced control over the participants in the experiment is traded-off for a larger sample of the population and data. The application is customizable to the researchers' needs and is made freely available through the mobile platforms' marketstore (Google Play Store, Apple Store). Data collection starts, once the participants install the app and register for the experiment, and then it is transmitted securely to our servers. Researchers can download the data into their preferred format and they can also analyze it on our platform by leveraging different programming languages (R, python, etc.). The project will follow specific IRB/IEC/ERB/REB requirements of the researchers' projects. By providing this framework we hope to advance all the fields of research where data collection and faster analysis could be improved by it.

An explorative case study of representational change in problem solving

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From our everyday experience we know that both, the initial construal of a problem and the ongoing search for better representations are non-trivial processes. Yet, many tasks employed in problem solving research are rather easily understood and reasoned about – the problems' straight-forward structure preempting the subjects first having to find adequate representations. Consequently, we still do not know a lot about how task and problem representations come about and change. Since the highly idiosyncratic dynamics of these processes make it difficult to investigate them with standard methodology, we conducted an extensive, exploratory case study, gathering verbal protocols with a carefully designed introspection method. In this study it was investigated how a subject construed an underspecified description of a complex imagery manipulation task (paper folding), how they came up with a first representation and how their representations evolved over multiple daily sessions. The task was chosen to allow a wide variety of representing problem states, goals and operators, while still having well-defined solutions. The task complexity was chosen to keep cognitive load on a level where the subject is compelled to look for better representations. We present preliminary results from protocol analysis and discuss the relative merit of three theoretical frameworks for analysis and theory formation: Classical problem space theory based on Newell & Simon's work (1972), DiSessa et al.s "Knowledge in Pieces" approach (1988), and Wiener's psychology of thought (Eder & Raab, 2015).

Time on task and pause effects on theta and alpha power

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The ability to maintain attention during prolonged periods of cognitive activity is of great importance in everyday life. However, such prolonged periods of cognitive activity may lead to a state of mental fatigue, which is associated with deterioration in task performance and a general aversion to continue the activity. As a psychophysiological marker of mental fatigue, a greater power in the lower frequency bands of the EEG has been reported. In order to investigate the temporal dynamics of the spectral power in the lower frequency bands a group of younger and a group of older adults performed a Simon task for about 3 hours in an EEG study. The experiment also included pauses, so that time on task effect on the one hand and effects of pauses on the other hand could be observed. The results show an increase of frontal theta and alpha power as a function of time on task and a decrease of theta and alpha power as an effect of pauses. The effects of pauses seem to be of transient nature, just being present immediately after the pause. A significant pause effect could also be found for event related spectral dynamics (ERSPs) for frontal theta, where post-pause ERSP was higher than pre-pause ERSP. Frontal midline theta is associated with cognitive control mechanisms and an increase in frontal theta power has been linked to an increase in cognitive demands and higher mental

effort. Therefore the effects of time on task may be interpreted as a manifestation of higher demands due to either a depletion of cognitive resources or a decline in motivation. The fact that time on task and pause effects were more pronounced in the group of older adults compared to younger adults suggests that the underlying mechanism is more likely to be a depletion of cognitive resources.

Acoustic speech learning without phonemes: Identifying words isolated from spontaneous speech as a validation for a discriminative learning model for acoustic speech learning

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In the current study, we trained a naive discriminative learning model to discriminate words based on acoustic cues from spontaneous speech. As a resource, we used the German Conversation Database (GECO v1.0). The corpus contains roughly 20 h of spontaneous speech and provides an automatic word annotation for each audio file. There are roughly a 250 000 words labeled in the corpus. For every single word in the corpus, we created discretized acoustic cues. Our model learned the associations between these cues and the words. Being used as an identifier, it identified 20.6% of the words correctly. To evaluate the performance of the model, we had 500 randomly sampled items from the corpus judged by adult native speakers of German in a listening task. Subject responded whether they actually heard a German word (yes/no) and provided in written form what item they heard. For the latter, we calculated letter distances between the label as provided by the corpus and the subject´s actual answer. We furthermore collected response times for both, the yes/no task as well as the written answer. Subjects were able to identify 29.3% of the words according to the labels in the corpus. 44.9% of the responses have a distance of 1 or less to the label. Model parameters like a word´s activation and rank show significant correlations with the behavioral data like reaction times and letter distances. We summarize that our approach shows great potential given the small amount of language experience the model has compared to 18+ years of each of our subjects.

Empirical validation of the diffusion model for recognition memory and a comparison of parameter-estimation methods

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The diffusion model has been applied to many binary decision tasks including recognition memory. Various parameters describe aspects of memory quality and response bias. In three recognition-memory experiments, the validity of the model was tested experimentally and analyzed with three different programs: fast-dm, EZ, and DMAT. Each of three central model parameters was targeted via specific experimental manipulations. All manipulations affected mainly the corresponding parameters, thus supporting the convergent validity of the measures.

There were, however, smaller effects on other parameters, showing some limitations in discriminant validity.

Creativity depends on regulatory focus and, more strongly, on regulatory-focus shift

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Heidelberg University

Going beyond mere replication, the present research aims at systematic validation of the relationship between regulatory focus and creativity. Although uncontested at the theoretical level, empirical evidence for higher creativity under promotion than under prevention focus is less than compelling. For a systematic empirical test, we include a battery of four different measures of creativity, and we develop a new manipulation of regulatory focus, controlling its effectiveness in a manipulation check. Consistent with theory, creative performance was clearly higher under promotion focus than under prevention focus. This basic result was however moderated in a twofold way. First, the impact of the independent variable, both on the manipulation check and on creativity, was most pronounced after a dynamic shift in regulatory focus, compared to a static regulatory focus state manipulation. Second, this effect was mostly due to generative measures of creativity, consistent with the notion that promotion focus facilitates elaborative and assimilative functions of creativity.

Similarities and differences in eye movements during valuation and choice

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Eye-tracking is a popular tool for tracing the attentional processes involved in decision making. While eye-movements have been shown to be predictive of both valuations and choices, little is known about the similarities and differences in attentional allocation that might exist within individuals faced with these two types of decisions. The current work fills this gap by investigating the direction and role of attentional allocation in valuation and choice on the level of the individual, allowing for a careful examination of the similarities and differences existing between these two common decision frameworks. Using eye-tracking methodologies we compared individual's eye-movements during valuations of, and choices between, risky prospects consisting of monetary gains and losses. We predicted that valuations would involve greater information search (more fixations and greater decision times) than choices. We also predicted that biases in eye-movements (fixating longer on higher relative to lower outcomes) would impact both valuations and choices, but that the predictive power of such biases would be greater for valuations. Lastly, we predicted that differences in eye-movements (the prevalence of within vs. between option saccades, and a differential focus on outcomes relative to probabilities) during valuation and choice would predict the extent to which bid-choice preference reversals were observed. We found that valuations resulted in greater information

search, and were impacted to a greater extent by biases in attentional allocation, than choices were, suggesting a clearer (more direct) role of attention in valuation than in choice. In addition, we found that bid-choice preference reversals were greatest for individuals who showed different information search patterns during valuation and choice, indicating that at least one common disparity between valuation and choice might be readily explained by differences in information seeking.

Adaptive memory: Animacy processing enhances young children`s retention

Alp Aslan

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Recent work with adults has found superior memory for information associated with animate properties than information associated with inanimate properties, a finding that has been explained in evolutionary terms. The present study examined the development of this animacy-processing effect in children. Kindergartners, and younger and older elementary school children were presented with pronounceable nonwords associated with properties characteristic of either humans (e.g., "METU has many friends"), animals (e.g., "PUTI has claws"), and inanimate objects (e.g., "BULA has four corners"), and were asked to rate whether each presented nonword represented a living or nonliving thing. After a retention interval, a surprise recognition test for the nonwords was conducted. Results revealed significantly better recognition of nonwords associated with human and animal properties than nonwords associated with inanimate objects (performance for human and animal nonwords did not differ). Importantly, the size of the animacy-processing effect was equivalent across the three age groups, suggesting no development of the effect beyond kindergarten age. The results are consistent with a functional-evolutionary view on children`s memory, indicating that already young children show prioritized processing of animate entities.

The revelation effect depends on task difficulty and placement

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In recognition experiments, response criteria are more liberal when a task precedes the recognition probe compared to a condition without task—the “revelation effect.” For example, participants are more likely to claim that a stimulus is familiar directly after solving an addition task (e.g., 234 + 381 = ?) compared to a condition without addition task. According to the discrepancy-attribution hypothesis (DAH) the revelation effect occurs because participants process the preceding task less fluently than the recognition probe, causing a perceived fluency discrepancy. Participants then attribute the discrepancy to familiarity with the probe. In the present work, we tested two predictions derived from the DAH. According to the first prediction, participants should process hard preceding tasks less fluently than easy preceding

tasks, increasing the chance for a discrepancy and, consequently, the revelation effect. In several experiments, participants completed hard or easy preceding tasks, including anagrams (Experiment 1), letter typing (Experiment 2), and the typing of specific arrow-key sequences (Experiments 3 and 4). Consistent with the DAH, hard preceding tasks produced larger revelation effects than easy preceding tasks. According to the second prediction, the discrepancy should disappear if participants have to work on the preceding task while judging the recognition probe. In Experiments 5 and 6, the revelation effect occurred when the preceding task ended before the appearance of the recognition probe. However, the revelation effect was absent when the preceding task appeared during the recognition judgment. Our results support the DAH but pose problems for other hypotheses and formal models of recognition memory.

A summed-similarity account of false recognition in short-term memory

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False recognition of items and events is a robust phenonemon often accompanied by strong subjective feelings of confidence. Research on false recognition has informed the study of the structure and processes of episodic memory (Brainerd & Reyna, 2005; Gallo, 2006). Recent research suggests false memories can also be elicited in short-term memory (Atkins & Reuter-Lorenz, 2008; Coane, McBride, Raulerson III & Scott, 2007; Flegal & Reuter-Lorenz, 2014). In episodic memory, false remembrance has been attributed to different processes such as semantic gist as well as interitem associations. It is unclear whether false recognition in short-term memory is due to the same mechanisms that operate in long-term memory. To address this question, we conducted a short-term memory experiment employing word and image stimuli and adopted a model-based approach to investigate the differences and similarities of false recognition in episodic and short-term memory. In a first step, we applied the Conjoint Recognition Model (e.g., Stahl & Klauer, 2008), a common measurement model of false recognition in episodic memory, to assess false recognition effects as indexed by the gist memory parameter. Based on our previous finding that false recognition in episodic memory can be accounted for by global matching memory models (Araujo, Aust & Stahl, 2015), we then used a summed-similarity model to account for the observed effects. Specifically, we tested whether short-term false memory phenomena in response probabilities, as well as RT, can be explained by an adapted exemplar-based random walk model (Nosofsky & Palmeri, 1997; Nosofsky, Little, Donkin & Fific, 2011; Nosofsky, Cox, Cao & Shiffrin, 2014) or a ballistic variant thereof (Brown & Heathcote, 2005; Donkin & Nosofsky, 2012).

Drama therapy improves social skills in children with attention deficit hyperactivity disorder

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Children with Attention Deficit Hyperactivity Disorder (ADHD) suffers from many problems including hyperactivity, impulsivity and inattention as well as problems in social relationships. Although medicine alleviates many ADHD symptoms, it rarely solves the social relationship problems. We experimentally and clinically studied the effect of drama therapy on improvement of the social relationships in 32 children aged 7 to 11 with ADHD. Children were classified randomly into control and experimental groups. The experimental group received two 75 minutes intervention of drama therapy sessions per week and the treatment process continued for six weeks. We used Social Skills Rating System of Gresham-Elliott (SSRS) to assess social skills for both pre/post treatment evaluations. The results illustrates that there are significant differences in improvement of the social skill between control and experimental groups. The significant difference were seen for all subscales of social skill including assertiveness, cooperation, and self-control as well as for total score of social skill. A three-month follow up assessment replicated the findings. Our study suggest that dram therapy can be used along with other current and medical intervention to improve the social relationships of children with ADHD.

The picture superiority in free recall: The effects of semantic association and age

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According to the picture superiority effect (PSE), items studied as pictures are better remembered than items studied as words. One explanation is that pictures receive more extensive semantic processing than words, resulting in deeper levels of processing. While the PSE has frequently been demonstrated with regard to single items, only few studies have investigated the PSE in recognition of associated picture-picture items. In the present study, the assumption was tested that in a free recall task the PSE depends on the semantic associations between the picture-picture pairs. In addition, as the PSE seems to follow developmental trajectories, we investigated whether children, younger and older adults show comparable PSE effects with respect to associative recollections. Participants (59 children, 40 younger and 22 older adults) first studied a total of 60 word pairs that were presented in pure lists of either 20 word-word pairs, 20 word-picture pairs or 20 picture-picture pairs. In each list half of the pairs were strongly semantically associated (e.g., house-roof) whereas in the other half they were non-associated (e.g., e.g. pot-bus). After each block, participants were asked to recall and write down as many pairs as possible from the previously studied list. The percentage of correctly recalled pairs was used as the dependent variable. In line with our assumption, a PSE was only found for semantically associated picture-picture pairs. Moreover, the decrease in recall between associated and non-associated picture-picture pairs was greatest for older adults. The results point out to the significance of semantic processing for the PSE in associated

picture-picture pairs.

Dynamics of user experience and trust in websites

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User experience (UX) and trust are important factors for the user's subjective evaluation of technical systems and their usage behavior. In two laboratory experiments (N1 = 20, N2 = 40) the usability of a web site has been manipulated. The user's subjective experience (emotions and UX) as well as trust over time were assessed. It turned out that the valence dimension of emotional experience changed over time and reflected general assessment processes of the website and the trustworthiness of the website. The dynamic curves of the emotional activation and experience, as well as the bivariate correlations with UX and trust dimensions illustrate the importance of the dynamic assessment of experience in the context of digital systems.

Evaluative conditioning for objectively supraliminal, but subjectively subliminal CSs

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Evaluative conditioning (EC) refers to the phenomenon that initially neutral stimuli (CSs) are evaluated more positively (negatively) after repeated co-occurrence with positive (negative) stimuli (USs). EC has been demonstrated to occur both with and without awareness of the CS-US pairing, with operational criterions of awareness varying widely between pertinent studies. One branch of research addresses the issue of "EC without awareness" in terms of an undetected CS-US contingency under clearly supraliminal presentation of both CS and US. In these studies, EC effects occurring without contingency-awareness (if present at all) are typically somewhat smaller than those occurring with contingency-awareness. Another approach to the investigation of "EC without awareness" seeks to obscure the systematic CS-US pairing by presenting CSs for durations at (or below) the threshold for conscious perception. Empirical evidence for such subliminal EC effects suffers from both scarcity as well as insufficient control for fully subliminal presentation of CSs. In a series of studies, combining the aforementioned approach to "subliminal EC" with a rigorous trial-based visibility check, we did not find EC effects for briefly presented and masked CSs. In other words, no EC was found for CSs presented below the objective perceptual threshold (i.e. when CS identification was at chance level). A new study focuses on the possibility that some CSs, while objectively supraliminal (i.e., correctly identified at above-chance level), may remain below a (higher) subjective awareness threshold (i.e., are accompanied by a lack of subjective awareness), and on the issue of whether subjectively unaware EC effects can be found for these stimuli.

The influence of odor on attentional control: Insights from a trial-by-trial modulation

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It has recently been suggested that specific task-irrelevant odors have an effect on the allocation of attention in time (Colzato et al., 2014). The attentional control is modulated depending on the nature of the aromas (arousing vs. calming) presented during the attentional blink paradigm. Arousing aromas were found to yield a larger attention blink. However, it is still unclear what mechanisms are modulating the effect of odors on attentional control. More specifically, one could address the question as to whether the way of presenting the odors matters. Here, one can discriminate between a tonic, continuous presentation and a phasic, transient one. The present study aimed at investigating the effect of phasic presentation of task-irrelevant odors on the attentional blink. We used an attentional blink paradigm with an arousing odor (peppermint) and a calming odor (lavender) similar to the task used in the recent study by Colzato et al. In contrast to their experiment, we applied a trial-by-trial-presentation of the task-irrelevant odors using an olfactometer. Participants were asked to respond to two digits presented in a rapid stream of letter distractors. The task-irrelevant odors modulated the attentional blink effect supporting the idea that odors influence the allocation of attention in time. More precisely, our preliminary results provide evidence for the idea that odors have a transient impact on attentional control.

Facial attractiveness and the cone of gaze

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In this study we show that the perceived cone of gaze of a person is related to their attractiveness. We found that for men and women (n = 40), average looking female faces were associated with wider gaze cones than attractive and unattractive faces, in a within-subjects design. When the data was analysed for attractiveness of the onlookers, the correlation only persisted for subjects that described themselves as average looking. For subjects who rated themselves as very attractive the difference disappeared. These findings partly contradict the previous theory that the width of the gaze cone is correlated with the attractiveness of the stimulus in terms of a linear relationship. As an alternative explanation we posit a comfort zone that is related to a wide gaze cone. This is in line with the matching hypothesis, which proposes that we are most interested in people that are similar to us in real-life interactions.

We call it "DIRTI" (Disgust-RelaTed Images) – Development and validation of a picture set for disgust

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Aim: Disgust is an unpleasant basic emotion elicited by objects such as rotten food, body excretions etc. It has been implicated in the development and maintenance of psychological disorders such as obsessive compulsive disorder or phobias. A validated picture set to evoke disgust in experimental research is lacking, resulting in researchers' use of unvalidated stimuli from various sources. It was our aim to generate a validated picture set, which contains stimuli of varying degrees of disgust and will be available to researchers as DIsgust RelaTed Images (DIRTI). Method: Freely available pictures in the categories rotten food (FO), animals (AN), wounds/infections (WI), body excretions (EX), lack of hygiene (HY) and death (DE) were selected in a multi-stage process. The final picture set consisted of 300 pictures: 40 pictures in each category and 60 related neutral pictures (N). All pictures were edited to 1024 x 768 pixel (landscape) and picture parameters adjusted to ensure a reasonably even colour tone, contrast and lighting. They were rated by 200 participants (43.6 ± 18.0 years, range 18 - 75; 102 women) with regard to disgust, fear, valence and arousal on 9-point scales from 1 to 9. Results: Category means for disgust (1 = no disgust and 9 = very strong disgust) were: EX 4.4 ± 1.2, (range 1.6 - 6.9); DE 4.5 ± 0.9 (2.3 - 6.2); FO 4.7 ± 0.6 (3.4 - 5.8); AN 3.3 ± 0.6 (2.2 - 4.6); WI 3.7 ± 1.0 (1.8 - 5.5); HY 3.6 ± 1.0 (1.3 - 6.4); and N 1.1 ± 0.1 (1.0-1.4). Age and disgust ratings were unrelated (r = -0.02). Conclusion: For each picture, we supply ratings for men and women. The pictures in each category vary from medium to strong disgust, enabling researchers to choose the appropriate degree of disgust. We hope that the validated stimulus material will prove useful to experimental researchers in the area of disgust and help to improve the comparability between studies.

Assumptions of the process-dissociation procedure are violated in applications to sequence learning

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It is debated whether implicit learning phenomena can be dissociated empirically from explicit learning. In serial reaction time tasks (SRTT), for instance, participants respond faster when the sequence of responses is predictable than when it is random. Research on implicit learning in the SRTT has used the process-dissociation procedure (PDP) to disentangle implicit and explicit knowledge, and results have supported the existence of implicit learning. However, the interpretation of PDP results depends on assumptions that may not be met when applied to the SRTT. We investigated the validity of the PDP when applied to sequence learning. Specifically, we examined the invariance assumptions for both the dominant and the non-dominant process utilizing standard ANOVA and multinomial modeling analyses. In three experiments, participants worked on a SRTT with different types of random or probabilistic materials. Afterwards, explicit

sequence knowledge was manipulated and participants worked on a generation task under inclusion and exclusion instructions. Across all three experiments, we found that invariance was violated to a considerable extent. This violation may lead to erroneous conclusions regarding the respective contributions of implicit and explicit processes to sequence learning. We discuss how tests of the underlying assumptions can be integrated into applications of the PDP to sequence learning.

Comfort inside an aircraft – A mixture of methods

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A mixture of 3 methods is used to experience more about the comfort in an aircraft cabin. In a first inquiry, 10 pictures of aircraft cabin are presented in the combination of pairs in order to find first determinants of comfort with the method of multidimensional scaling. In a second inquiry in interviews students of business psychology are asked about the number of flights, of destinies and airlines. Then nouns and adjectives about the comfort in an aircraft cabin have been associated. Most people answered first “space”, concerning the comfort in an aircraft cabin which is often connected with the term leg room. In a third inquiry, questionnaires are filled out of passengers at Hamburg Airport as a basis of proving hypothesis of the factors of comfort in an aircraft cabin. At Hamburg Airport 301 air travelers filled out questionnaires about their comfort inside aircraft cabins. On a five point scale, they were asked how satisfied they felt from very bad to very well. Using factor component analysis, the 24 items conducted out of the interviews were reduced to 5 dimensions. “Physical factors” are temperature, noise, air quality. Psychological factors are the feeling of safety, the friendliness and competence of the crew. Physiological conditions as the amount and quality of food and drinking are identified in this dimension. And as a last dimension, organizational influences as timeliness and a cost-benefit perspective are part of the questionnaire. Independent factors as the length of the flight, the fear of flying and the comfort of the flight are examined in order to discover the influence of different groups.

Wahl ohne Qual – Der Einfluss von Farben auf die Entscheidungsfindung

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Jeder Mensch trifft täglich eine Vielzahl von Entscheidungen, häufig ohne lange darüber nachzudenken. Gerade bei spontanen Entscheidungen lassen wir uns dabei von Gefühlen leiten (vgl. Schwarz, 2012 „feeling as information“). Dabei kann unser Gefühl leicht durch situative Reize beeinflusst werden, z.B. mittels Priming. Die vorliegende Studie hatte das Ziel, eine Auswahlentscheidung mittels Farbstimuli unbemerkt in Richtung der dargebotenen Farbe zu beeinflussen. Unter dem Vorwand der Teilnahme an einem Quiz wurden hierzu

Versuchspersonen unauffällig rote (n=47) bzw. blaue (n=50) Farbreize dargeboten. Einer Kontrollgruppe (n=22) wurden keine besonderen Farbreize dargeboten. Zur Belohnung entschieden sich die Versuchspersonen anschließend zwischen roter und blauer Schokolade. Den Farbreizen ausgesetzte Versuchspersonen wählten die vorher dargebotene Farbe deutlich häufiger, ohne sich dessen bewusst zu sein. In der Kontrollgruppe war die Farbpräferenz gleich verteilt. Somit zeigt der Versuch, dass die Voraktivierung eigentlich irrelevanter Eigenschaften eines Produkts, die Produktwahl unbemerkt beeinflussen kann. Eine mögliche Erklärung könnte sein, dass durch die Voraktivierung einer Farbe die visuelle Verarbeitung des Produkts leichter fällt. Die dabei erlebte Verarbeitungsleichtigkeit („processing fluency“ – vgl. Reber, Schwarz & Winkielman, 2004) wird als angenehm empfunden und dieses Gefühl auf das bewertete Produkt übertragen. Das funktioniert v.a. bei erfahrbaren Reizen („experiental attributes“ - Brakus, Schmitt & Zhang, 2014), wie z.B. der Farbe eines Produkts. Eine alternative Erklärung wäre, dass die Aufmerksamkeit durch das Priming auf gleichfarbige Produkte gelenkt wird und die Probanden sich für das dem Priming entsprechend farbige Produkt entscheiden.

Names of novel tools elicit mu-rhythm suppression over sensory-motor cortices

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The conceptual representation of objects is thought to be grounded in those sensory-motor brain areas that were active during the forming of the object’s concept in semantic memory. In the last decade, fMRI and ERP studies investigated the role of object-related sensorimotor experience in object representations by focusing on the neural correlates of conceptual knowledge acquisition. Altogether, the results of these studies showed an involvement of sensorimotor areas elicited by the post-training confrontation with trained objects, reflecting the object-related learning experience during acquisition. A still unanswered question is how conceptual information is accessed through novel names of novel objects (i.e. verbally, in the absence of the denoted novel objects). The current event-related de-/synchronisation (ERD/ERS) study investigated, if learned object names also elicit motor cortex activation when associated with novel tool-like objects. Healthy, right-handed subjects learned object names during three training sessions, in which objects were actively manipulated, visually explored or did not appear at all (verbal training). In a subsequent test session, we recorded EEG in response to the object names. The lower mu-rhythm (8-10 Hz) ERD over C3/C4 showed a significant main effect of the training condition after 200 to 400 ms, with the highest mu-rhythm ERD for visually trained object names. This higher ERD could reflect more effective imagery processes for names of objects that were visually explored compared to the actively manipulated and verbally trained object names. The results show that different kinds of experience can form different object concepts after a short training period.

More than just positive or negative: How the interaction between evaluative and semantic relatedness shapes latencies in two sequential priming paradigms

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The malleability of early semantic encoding processes by evaluative information has been subject to debate for over twenty years (Herring et al., 2013). The issue has been investigated in sequential priming paradigms using the evaluative decision task (EDT) and the Pronunciation Task (PT), among others. In a series of experiments, we have revisited the hypothesis that irrelevant evaluative information can influence subsequent semantic encoding processes, at least if attention is directed towards the evaluative dimension (e.g., Klauer, Becker, & Spruyt, in press). In the course of this project, we observed that both EDT and PT studies vary noticeably on how strongly primes and targets are semantically related (independently of evaluative relatedness, henceforth called "semantic relatedness"). While a host of studies have examined the different facets of evaluative relatedness (see Wentura & Degener, 2010), the interaction between the evaluative and semantic relatedness of prime-target pairs in the EDT has to the best of our knowledge not been formally studied, nor compared with results of the PT. The current experiments were modeled after a study by De Houwer, Hermans, and Spruyt (2001). Participants were shown prime-target pairs that were completely crossed regarding their semantic relatedness (semantically related vs. unrelated) and their evaluative relatedness (evaluatively congruent vs. incongruent). Half of the participants were presented with degraded targets, the other half were presented with undegraded targets. They then had to evaluatively categorize (experiment 1, N=60; EDT) or pronounce the targets (experiment 2, target N=180; PT). The results of these studies inform the debate on the relationship of evaluative and semantic information in memory and should sensitize researchers to be aware of the influence of semantic relatedness on evaluative priming. They may also advance the debate on the existence of evaluative priming effects in the PT.

Look into my eyes! Exploring the effect of addressing in multimedia learning

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Since the concept of parasocial interaction was defined almost 60 years ago, plenty studies were conducted to investigate how recipients get affected by personae, the fictional or nonfictional characters in multimedia. However, there is a lack of research concerning the connection between parasocial processes and learning performances. This study aims to investigate the influence of addressing in an educational video on learning performance. Videos showing a lecture on statistics in an auditorium were produced prior to the experiment. Addressing was operationalized by manipulating how the lecturer was presented in these videos. The presentation was varied in terms of proximity (near vs. far) and orientation (frontal, eye contact vs. lateral, no eye contact). All videos were filmed simultaneously in order to use the same audio track for all videos. We conducted an experiment with 88 participants who were

randomly assigned to one of the four experimental groups (near frontal vs. near lateral vs. far frontal vs. far lateral). Results revealed a large significant orientation effect for retention performance. Although cognitive load was not reduced, frontal orientation led to increased learning outcomes. Proximity did not influence learning outcomes. Results were interpreted suggesting emotional interest and perceived parasocial interaction. Both variables were increased significantly in the conditions with frontal orientation and high proximity. The findings of this study suggest that learning is fostered when personae in educational learning environments give learners the impression to be addressed directly through eye contact. Therefore, parasocial influences in the context of multimedia learning are promising areas for future research.

Do you like being annoyed? Positive effects of disruptive advertising on consumer preferences

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Advertisers are trying to get customers to love products, but they often do this by annoying them with unwelcome and disruptive advertisements. Is it psychologically plausible that ads have positive effects on consumer preferences even when they are perceived as being disruptive and annoying? On the one hand, theories of evaluative conditioning and distractor devaluation suggest that disruptive advertising should result in decreased rather than increased preferences. On the other hand, mere exposure has often been found to result in increased liking of previously ignored information. In the present study, we examined the effects of ads that were deliberately designed to be disruptive and annoying. Participants played the popular computer game Tetris and were disrupted by ads that blocked the view of the game. In a subsequent 2-AFC test, participants were shown two brands of chocolates (an advertised one and a new one), and were required to select the one they preferred. They knew that they would receive one of the selected brands at the end of the experiment. Even though the ads were subjectively perceived as annoying, they still had (small) positive effects on consumer preferences. Disruptive advertisement may be undesirable from a consumer perspective, but it can be effective.

Brain oscillatory signatures of voluntary resource allocation in working memory

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Working memory (WM) consists of various cognitive processes and maintains and manipulates information no longer available in the environment. Individual processes are co-ordinated by a central monitoring component ensuring their efficient interaction. This central component is strongly linked to top-down attention processes. On cortical level, frontal-midline theta (FMT, a slow EEG frequency found in prefrontal brain areas) was found to be a prime candidate for

serving as such attention/monitoring component. FMT has been shown to orchestrate local activity as well as distant brain areas in visual WM by synchronising fast oscillations (gamma, 30-80 Hz) in posterior brain areas into specific phases of the FMT cycles. This mechanism has been shown to be sensitive to task demands (the more demanding the task the closer to the excitatory phase of the FMT cycle) and causally linked to behavioural performance. The current study investigates whether this fronto-parietal theta-gamma synchronisation reflects voluntary executive control in WM. We designed a dual-task delayed-match-to-sample EEG experiment where participants retained visuospatial and figural information simultaneously. Most importantly, they were instructed to either prioritise the visuospatial or the figural information in alternating blocks. We found that in brain areas sensitive to visuospatial information gamma activity was locked to the excitatory phase of FMT when participants prioritised visuospatial information. In contrast, when participants prioritised figural information the visuospatial-sensitive areas locked gamma to the inhibitory FMT phase. Our results suggest that FMT-phase acts as a central relay orchestrating distributed neuronal activity according to the subjective importance of task specific information to be retained in WM.

The role of cortical space and inhibition in low-level visual cortex for limiting visual working memory

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The human brain has enormous processing power, but despite this, working memory storage is severely limited. The question of which neurophysiological factors influence these limitations has led to much debate in the past few years. As models of visual working memory (VWM) have stressed the importance of both cortical space and inhibition for representing mnemonic stimuli, here we looked at how the neuroanatomy and the degree of cortical inhibition in primary visual cortex (V1) shape the strong limitations in VWM. Using an individual differences approach, we find that individuals with a larger V1 tend to have greater VWM storage. In addition, we find that a larger V1 is linked to a higher concentration of the inhibitory neurotransmitter GABA in this area. However, the level of V1 cortical inhibition does not seem to be directly linked to VWM storage. Taken together, our results illustrate how the basic anatomy of low-level visual cortex shapes higher cognitive functioning, acting like a bottleneck to what we can actively hold and manipulate in mind.

Reaction times and their relation to positive and negative compatibility effects in response priming with motion primes

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In a response priming variant using moving directional stimuli as clearly visible primes, a robust pattern of positive compatibility effects (PCE) with short stimulus onset asynchronies (SOA) and negative compatibility effects (NCE) with longer SOAs was found (Bermeitinger, 2013). There is evidence that NCEs with static primes are limited to slower responses. Additionally, it might be that participants adopt different response strategies in the shorter vs. longer SOA conditions. Perhaps they might respond generally slower in the longer SOA condition, thereby driving the NCE. Thus, we conducted a standard response priming experiment with moving row-of-dots primes and static arrow targets as used in previous experiments. Participants worked through a block with a short SOA of 147 ms as well as a block with a longer SOA of 360 ms. First of all, participants were generally faster in the longer compared to the shorter SOA condition. Second, correlations of mean reaction time (RT) and compatibility effects revealed that the NCE in the longer SOA was smaller with increasing RTs (there was no relation of mean RT and the compatibility effect in the shorter SOA). Third, when splitting responses by their response time (200-300 ms, 301-350 ms, 351-400 ms, 401-450 ms, 451-500 ms, 501-600 ms), we also found the largest NCEs – as well as the largest PCEs – in the shortest reaction time range. These results clearly contradicted the hypothesis of a response strategy with slowed responses in the longer SOA condition that might lead to an NCE with motion primes. We discuss the pattern of results against the background of findings and theories on the NCE as well as on findings and theories on other reaction time depending paradigms and effects.

The influence of sentential context on embodied meaning representations: Investigations by means of an anagram-solving task

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According to the experiential-simulations view of language processing, words automatically activate multi-modal experiential traces that stem from the readers interactions with their referents. In the present study we investigated whether activating certain experiential traces (in this case related to vertical position) facilitates lexical access of associated words, and if so, whether the sentential context has the potential to modify these effects. We presented participants with simple sentences ending with an adjective-noun construction. While all the adjectives were by themselves neutral regarding their associated vertical position, the nouns were either associated with an upper or lower position in vertical space (e.g. up-noun: “helicopter” vs. down-noun: “cellar”). The sentences as a whole then either maintained or altered the associated vertical position of the noun (e.g., maintaining: “Michael sees the Russian airplane”; altering: “Michael inspects the worn-out helicopter”). The last word of each sentence (i.e., the up or down-noun) was shown as an anagram (hlcpeoriet for helicopter) either at the

top or at the bottom of the screen. The rest of the sentence was presented in the middle of the screen. Participants solved the anagrams as fast as possible. The results were clear cut: Anagram solution times depended on the compatibility between presentation location and the position in vertical space as implied by the sentence as a whole. Thus, solution times for up-nouns presented in up-sentences were faster for anagrams presented at the top of the screen, whereas solution times for down-nouns presented in down-sentences or up-nouns presented in down-sentences were faster for anagrams presented at the bottom of the screen. Implications with respect to the experiential-simulations view of language processing will be discussed.

The role of attention in processing of visual stimuli in metacontrast masking

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By analyzing individual data, Albrecht and colleagues found qualitative inter-individual differences in studies with metacontrast masking, appearing in phenomenological perception as well as in discrimination performance (Albrecht & Mattler, 2012a, 2012b). They used the metacontrast paradigm, where two stimuli are presented sequentially and the visibility of the first stimulus (target) is reduced due to the appearance of the second stimulus (mask). The visibility is a function of the stimulus-onset-asynchrony (SOA). Participants differ in that respect whether the visibility of the target increases with increasing SOA (type A) or whether it is U-shaped (type B). These differences in the objective performance correlate with differences in the phenomenological experience (apparent motion vs. negative afterimage) as well as in the response criteria. A first ERP study also indicated differences in the sensory neural processing. This study aims to clarify whether these neural differences reflect either a different intentional attention on experimental stimuli (top-down) or a different bottom-up processing. For this, participants attended two sessions. In the first session metacontrast stimuli were presented but they had to focus the fixation point and detect an occasionally appearing color change (condition “without attention”). The experimental design in the second session was identical to the first, but participants had to focus their attention on the metacontrast stimuli and to discriminate the shape of the target (condition “with attention”). We expect to find group differences between type A and type B participants in the condition “with attention” and replicate data of the first ERP study. Finding these differences in the condition “without attention” as well would indicate a bottom-up processing; no differences would indicate a different top-down processing.

The influence of the color red on the perceived attractiveness of individuals depending on their ethnicity

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According to previous research, individuals are perceived as more attractive when presented

together with the color red (Elliot et al., 2010; Guéguen, 2012; Roberts, Owen, & Havlicek, 2010). We tested if the red-effect is moderated by the ethnicity of target and observer. Previous research showed that ethnicity plays an important role in the mating context; people for example prefer engaging in a relationship with partners belonging to the same ethnic group (Fisman et al., 2008). In two experiments, Caucasian females judged male targets either belonging to the same or a different ethnic group (Study 1: Asian, Study 2: Afro-American), who were presented together with the color red vs. blue. The results show that the Caucasian targets were rated as more attractive under red vs. blue chromatic conditions. As expected, there was no difference between red and blue, when the target had a different ethnicity (than the observer).

Switching within working memory: An event-related brain potential study

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Attention switching to changes in the sensory input is mirrored in the human event-related brain potential by a frontally distributed positive component. It has been demonstrated that this switching-related positivity (SP) is also obtained in an object switching working memory task. This finding suggests that attention switching within working memory and between different aspects of the sensory input relies on the same neuro-cognitive processes. In order to further evaluate this hypothesis, the present study tested whether the SP reflects working memory switching in general. This was tested in two types of continuous working memory updating tasks. In both tasks, cues indicated which item (i.e., digit) of a 4-items memory list has to be updated. On a trial by trial basis, the relevant item either was repeated (no-switch) or a switch from one to another item was required (object-switch). The conditions differ with regard to the updating rule: In the replacement condition the memory item has to be replaced by a newly presented item while in the processing condition the new memory item has to be computed by adding or subtracting one from the original item. In both conditions, an enhanced SP was obtained in object-switch trials compared to no-switch trials. In contrast, no effect of task instructions was obtained. These findings support the notion that orientation of attention in working memory and in the sensory environment share common processes.

Lies, memory and metamemory: The contribution of experience-based and theory-based processes to memory predictions about lying

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Manipulations that induce more disfluency during encoding generally produce lower memory predictions for the more disfluent condition (e.g. perceptual fluency, retrieval fluency) Similar to other manipulations of disfluency, lying generally takes longer and requires more mental effort, because individuals have to suppress the truth and find a plausible alternative response while

lying. However, the effects of lying on metamemory have not been investigated systematically, even though it has practical implications, especially in forensic contexts. In a series of three experiments, participants told the truth or generated plausible lies to general knowledge questions and made item-by-item predictions about their subsequent memory performance during encoding, followed by a free recall test. In Experiment 1, participants were given the questions and instructed to tell the truth or generate lies. In Experiment 2, participants were asked to fill in word-stems for the truth or the lies rather than generating the answers. Across the two experiments, the manipulation yielded crossed double dissociations between predicted and actual memory performance: Participants predicted that the truth would be better recalled, despite better actual memory for the lies. In Experiment 3, when participants were asked to choose the appropriate answer from a two-choice forced test that constituted of the truth and a lie, the superior memory performance for the lies disappeared. However, participants still gave higher memory predictions for the truth than lies. The findings demonstrate that lying might be similar to other manipulations of fluency, with the more disfluent condition producing lower memory predictions. The results will be discussed in light of theory-based and experience-based processes that contribute to metamemory for lying.

Recognition of spatial information from topographic maps - An eye-tracking study using heat-map analyses

Anne-Kathrin Bestgen, Dennis Edler, Frank Dickmann & Lars Kuchinke

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To orientate in a new environment or navigate from A to B using spatial information provided by a topographic map is a complex task. A topographic map is a complex media that involves a set of different kinds of visual stimuli, e.g. shapes, colors and different objects, their spatial relationships and distances between them. Beyond the pure topographic information with its different complexities, often grids are added to topographic maps as artificial space structuring elements. A map user has to perceive, filter and combine all of these map information in order to orientate and to memorize the relevant information. Previous studies revealed that specific map information can either be advantageous or disadvantageous (in form of stored distortion errors) depending on context or function. Two studies using recognition memory paradigms combined with eye-tracking were conducted to examine the processing and memory performance for different types of map information (map complexity and artificial space structuring elements). One study was designed to examine whether observed distortion errors are based on perceptual processing or on biased memory representations. A heat-map analyses were conducted in these studies using iMAP software to examine the map readers' viewing behavior based on fixation data on a map during encoding and recognition. Behavioral results of both studies replicate the expected pattern of a modulation of memory performance due to different type of map information. Eye-tracking data reveal a specific processing of map complexity and squared grids during the encoding of relevant map information, while heat-map analyses provide a more complex pattern. Heatmap analyses reveal a shifted attentional focus towards relevant object locations and their close spatial neighborhood triggered by the

availability of grids as space structuring elements on a topographic map as a whole.

Olfaction and emotion

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With only two synapses between sensory olfactory neurons and the amygdala, there is a very close and strong link between olfaction and emotion. The amygdala is the core brain region for emotion processing and emotional memory. Thus, it comes as no surprise that recent studies on olfaction and emotion confirm this special link on the basis of the specific anatomical property. Odor-evoked memories are experienced as more emotional compared to verbal, visual and tactile stimuli. Moreover, odors can evoke discrete emotions and are known to be related to emotions such as happiness, disgust and anxiety. In this talk, behavioral as well as fMRI findings on the influence of odor emotionality on cognition will be discussed in relation to emotional effects evoked by other sensory modalities on odor cognition. The influence of odor emotionality on cognition was examined in two studies by analyzing odor naming and odor object knowledge. Both studies point to an effect of odor emotionality on odor processing with activations in the amygdala and visual areas. The emotional effect of stimuli from other sensory modalities on odor cognition on the other hand was examined by using emotional facial expressions as visual primes. The behavioral results as well as the fMRI data suggest that perception of odors can be primed by the emotionality of visual stimuli. Seeing emotional faces can shift the valence perception of an odor towards the emotional quality of that facial expression.

Mentalizing processes in aesthetic appreciation of conceptual art

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In some aesthetic episodes, theory of mind (ToM) processing may be an important or even essential sub-process. Further elaboration on thoughts about the artist‘s mental state could enhance the depth and comprehensiveness of the beholder’s aesthetic experience when aesthetically appreciating artistic objects like paintings or natural landscapes. Such mentalizing processes may even be necessary for an aesthetic experience to occur when appreciating a work of conceptual art. Recent electrophysiological research has accounted for differences both in preparation for and during the aesthetic appreciation of visual abstract art stimuli when adopting a ToM perspective in contrast to a nonToM perspective. We assume that ToM processing modulates the aesthetic appreciation and the subsequent aesthetic judgment of artworks. So far, it is not clear yet in which way and for which kind of artistic objects this modulation arises. We therefore investigated the role of ToM processes in aesthetic appreciation of conceptual art. Participants were presented with artistic descriptions of genuine

conceptual artworks. Those descriptions were designed to involve either ToM processing or no such processing. Afterwards a photograph of the corresponding artwork was displayed and participants were asked to indicate whether they liked or disliked the artwork using a Likert scale. We will present key findings of this study offering valuable clues to the above raised questions.

Spotting lesions in a split of a second - Neural mechanisms behind radiological expertise

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Theoretical accounts assume that experienced radiologists have acquired vast knowledge of normal and abnormal radiological images, also called schemas. Once they encounter a new image, they automatically compare it with available schemas, quickly making a global impression of the image. This first impression leads immediately and directly to suspicious regions. Less experienced radiologists lack this knowledge and have in turn much harder time identifying suspicious regions. While these cognitive mechanisms are well known, their brain implementation remains a mystery. Here I tackle the neural underpinnings of radiological expertise using the functional magnetic resonance imaging (fMRI). Radiologists were expectedly much better than medical students (ms) in spotting lesions in thorax X-rays presented for only 200 msec. However, their performance suffered significantly when the X-rays were presented in the inverted position. This indicates that holistic processes based on acquired knowledge play a crucial role in radiological expertise. Both radiologists and ms activated a number of brain areas to a similar extent. The differences were, however, especially pronounced in the inferotemporal areas around the fusiform gyrus. Experts showed pronounced activation in this area whereas novices almost lacked any significant activation within the area. Radiologists are rather good on spotting abnormalities in thorax X-Rays even when they were given only a split of a second. Their performance is based on a gestalt- like holistic process based on their accumulated knowledge about normal and abnormal X-Rays. The fMRI results indicate that the fusiform gyrus is a possible neural basis of this remarkable skill. The fusiform gyrus is an important region for visual expertise and it hosts the Fusiform Face Area (FFA) that is responsible for face recognition. Face perception requires holistic processing just as thorax X- Rays and it seems that the same area is responsible for both skills.

The effect of stimulus expectancy on duration estimation: Evidence from self-generated expectations in a temporal bisection task

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Previous studies have shown that the duration of unlikely stimuli is judged to be longer than the duration of likely stimuli. This effect has been attributed to stimulus expectancy. One drawback

of this traditional approach is that it implicitly presupposes that stimulus probability affects only expectation but no other processes. Here we introduce a novel paradigm that isolates the effect of stimulus expectation on perceived duration. To this end, participants were instructed to vocalize their stimulus expectation at the beginning of each trial. In a temporal bisection paradigm, blue and yellow disks of varying duration (280 - 920 ms) were presented and the temporal task of the participants was to rate each stimulus as rather short or long. Additionally, participants gave a vocal response prior to each stimulus presentation, indicating the color they expected to appear in the given trial (the colors appeared equally likely and independently from the predictions). Previous studies have shown that this method of "self-generated expectations" is a potent way of capturing expectancy. To measure perceived duration, separate bisection points were estimated for trials in which the presented stimulus color matched the expectation (expected condition) and trials in which the presented color did not match the expectation (unexpected condition). We expected to observe significantly different bisection points in the two conditions if stimulus expectancy per se influences perceived duration. Indeed, the analysis of preliminary data (N = 20) revealed a lower bisection point in the expected than in the unexpected condition indicating that participants judged expected stimuli to be longer – instead of shorter – than unexpected stimuli. These findings indicate that expectancy does indeed influence duration estimation, but actually prolongs perceived duration. Thus, the present results challenge the traditional explanation of the probability effect on perceived duration.

Doing is for feeling

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For decades researchers considered stimulus-stimulus (S-S) learning as the way individuals acquire (dis-)likes in the environment although this theory has been received indirect support at best. By contrast, we show in two experiments that preferences can be formed through stimulus-response (S-R) learning and without the direct contact of a neutral stimulus and an evaluated event. S-R links are constitutional parts of the perceptuomotor system controlling many daily life behaviors (e.g., car-driving or bicycle riding) and have been the main focus of research in action control. However, the relevance of such S-R links for explaining the microgenesis of an evaluative R has been largely ignored. We hypothesized and found that the formation of an evaluative R is dependent on the execution of a response in the context of an affective stimulus. Once acquired, these arbitrary evaluative motor responses can subsequently be associated with neutral stimuli resulting in corresponding changes of the stimuli's evaluation.

Learning and forgetting of(f) the curve: Assessing and improving learning curve knowledge with a free production technique

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We aim at assessing and improving what is learned about learning- and forgetting curves which are displayed in introductory psychology courses. The curves suggest large amounts of learning (and forgetting) early on followed by smaller changes at later times. They are a primary example to demonstrate that psychology can aim for quantitative descriptions and can use theories that imply quantitative predictions of behavior. Furthermore, presentations of such curves in teaching material might have motivational consequences. In the current study, we developed a free production technique to assess and quantify student knowledge about learning and forgetting curves. We used vignettes with fixed start and endpoint and had students (N=82) draw a hypothetical curve in a coordinate system with time on the x-axis and performance on the y-axis. Different from multiple choice testing, we offered no further hints on what the time course might be. Yet key aspects of free production answers could be quantified in a way that would allow for automated feedback in online teaching tools. For instance, learning which decelerates over time implies a curve above the diagonal while decelerated forgetting implies a curve below the diagonal. Results suggest poor consistency in knowledge. Students drawing a deceleration in learning were not more likely to also draw a deceleration in forgetting. Reports were improved by (as a pre-task) first asking students to indicate how the amount of practice per day should develop across days in order to obtain a linear learning curve.

Catching eyes: Attention capture by sudden direct gaze and its modulation by eye visibility, head orientation and facial expression

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Direct eye contact and motion onset constitute powerful cues that capture attention. Recent research from our group suggests that (social) gaze and (non-social) motion onset influence information processing in parallel, even when combined as sudden onset direct gaze cues (i.e., faces suddenly establishing eye contact). Specifically, participants classified targets appearing on one of four faces. Initially, two faces were oriented towards and two faces were oriented away from participants. Simultaneous to target presentation, one averted face suddenly moved to become directed and one directed face became averted. This 2x2 factorial design yielded independent influences of the two cues and greatest attention capture for the face that suddenly established eye contact. A first set of subsequent studies investigated the role of eye visibility by presenting faces with closed eyes (disrupting eye visibility), faces wearing sunglasses (preserving the expectation of eyes to be open) and inverted faces with open eyes (disrupting integration of eyes and face). Results showed attention capture by the direct face only when faces wore sunglasses (hence, eyes could be expected to be open), but not when eyes were visibly closed or couldn't be integrated with the face. This pattern suggests that visibility of eyes

is neither necessary nor sufficient for the sudden direct face effect. A second set of studies disentangles the role of eye and head movements by depicting direct and averted gaze on both direct and averted faces. Results of these experiments revealed that attention capture by sudden direct gaze is preserved and independent of head orientation. Finally, we probed the role of emotional expressions on attention capture by sudden direct gaze, revealing differential effects of fearful and angry faces.

Resultant (moral) luck: Post hoc decision evaluation as dependent on belief truth, belief justification, and outcome in moral and prudential situations

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It is a common assumption that moral evaluation is only possible when the action in question was under the agent's control (e.g. Nelkin, 2008). The doctrine of moral luck (Nagel, 1979), however, showed that this is virtually never the case; luck pervades all of our actions. This study investigates the case of resultant (moral) luck: How do belief truth, belief justification and outcome influence the post hoc evaluation of a risky decision? Outcome effects have been shown numerous times (e.g. Walster, 1966; Burger, 1981; Robbennolt, 2000), often termed 'outcome bias' due to the use of a posteriori information for the evaluation of an a priori decision or action (e.g. Alicke, Davis, & Pezzo, 1994; Gino, Shu, & Bazerman, 2010; Mazzocco, Alicke, & Davis, 2004). In their study on moral luck, aiming to analyze the effects of agent knowledge, Young, Nichols, and Saxe (2010) have added the agent's true or false belief to the equation, but fail to properly distinguish between belief truth and belief justification—the major components of the classical philosophical concept of knowledge (e.g. Ichikawa & Steup, 2012). This study, using a vignette design, independently manipulates belief truth, belief justification and decision/action outcome in both a situation of prudential and a situation of moral importance. First, all three factors independently affected the post hoc evaluation. Second, confirming expectations, the most important factor determining decision evaluation was belief truth in the prudential case, and outcome in the moral case. Contrary to hypotheses, belief truth was more important than belief justification to the decision evaluation only in the prudential situation, whereas in the moral situation there was no difference between their effects. On the whole, moral and prudential situations show differing patterns, and decision evaluations depend on the factors under consideration to varying degrees.

The dynamics of film-induced affect and its effect on the interaction with mobile devices

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Affective states have become a crucial part of human-computer interaction (HCI) research. Many studies have analysed the impact of the technology on the user´s affective states as a part

of what is called user experience (UX). We consider the impact of antecedent affective states on interaction with a technological artefact. We induced positive and negative affective states using film clips. Then, we analysed the impact of affects on the subsequent interaction with a tablet PC. Results show that positive and negative affects have different emotional activation patterns. Positive affect was more sensitive for changes in tasks and experimental setting. In addition, these activation patterns affected peoples´ behaviour for a short time only. These findings are discussed against the background of research regarding UX dynamics, dynamics of affect, and user-centred design research.

Is the driver´s traditional outside view still necessary to ensure situation awareness in high speed/ automated train operation?

Niels Brandenburger

German Aerospace Center (DLR)

When considering the introduction of high speed (up to 400 kilometres per hour), ECTS level 3 control and automatic train operation (ATO) functionality to long distance passenger train operation, central questions concerning the changing tasks of the train driver are being raised. Basically, the attentional focus of the driver will be required monitor the displays within the cabin. One reason for this change of attentional focus is the fact that the driver´s ability to clearly perceive the track ahead is decreasing due to the high speed. The information in the trackside environment that is important in nowadays railway operations will become less relevant in guiding the driver's behaviour in highly automated high speed rail traffic of the future because of the sluggish reaction of the train to driver input. Additionally, ETCS in cabin signaling and ATO functionality direct the driver´s attentional resources towards monitoring the information provided within the cabin rather than outside as well. Based on a task analysis that determined the allocation of tasks between train driver and technical ATO components, it is planned to investigate the main research question whether minimized outside view and ATO functionality interfere with the train driver´s situation awareness and driving performance. In order to approach this question a high fidelity simulator study is set up within the facilities of the German Aerospace Centre (DLR e.V.). Subjective, objective, and physiological measures from train drivers will be collected in a two and a half hours lasting experimental setting, to assess the impact of a minimized outside view and ATO functionality on the driver´s situation awareness, performance, fatigue and workload. Measures will include Situation Present Assessment Method (SPAM), gaze-pattern analysis through eye tracking, pupillometry, NASA-TLX, and Stanford Sleepiness Scale.

Modulating the weighting of reference frames in bimanual coordination through mirror feedback of finger movements

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The principles that guide bimanual coordination can be investigated using rhythmic index finger movements. Symmetrical movements bring the fingers of both hands in- and outwards at the same time, whereas parallel movements coordinate the fingers toward the left and right in space. Modulation of hand posture shows that performance in this task is partly guided by perceptual principles: symmetrical movements are executed with greater precision than parallel movements, independent of whether homologous muscles of both hands are used or not. It is under debate which type of perceptual information, such as visual or proprioceptive, is at the heart of this advantage for external over anatomical movement coding. Here, we aimed at characterizing the role of immediate visual feedback in the emergence of the symmetry bias. Human participants made rhythmic, symmetrical and parallel, bimanual finger movements with both hands oriented palm down, or one hand palm up and one palm down. Additionally, we manipulated visual feedback by placing a mirror between the hands, occluding vision of the right hand and creating the impression of symmetrical bimanual movement independent of the right hand´s true movement. This experimental design allowed disentangling the type of visual information processed for movement: feedback about the performed movement, about hand posture, and about the involved muscles. Symmetrical movements were generally performed with greater precision than parallel movements. Crucially, seeing symmetrical movements through mirror feedback impeded parallel bimanual movements, independent of hand posture and involved muscles. Conversely, symmetrical movements were further improved through symmetrical mirror feedback though this was only a statistical trend. These results suggest that immediate visual feedback about ongoing movement plays a critical role in the emergence of the symmetry bias.

A new global matching explanation for the revelation effect

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The revelation effect in recognition memory refers to an increased probability of an old judgment for test items immediately following a problem-solving task compared to test items not preceded by such a task (e.g. Watkins & Peynircioglu, 1990). Though this effect is rather robust its theoretical explanation is still controversial. An early global matching account to this phenomenon assumed that the problem-solving task activates memory traces. This activation temporarily persists and adds to the following test word in the recognition test (Westerman & Greene, 1998). However, this approach was rejected, mainly because the revelation effect was shown to be independent of the type of problem-solving task. We propose a different account, in which the effect is predicted mainly due to the fact that participants have to switch between a non-episodic problem-solving task and the episodic recognition task. As a consequence, participants partly lose the episodic context of the study phase in the retrieval cue for test items

following the problem-solving task. In global memory models such as Minerva 2 (Hintzman, 1988) this “context loss” predicts the revelation effect without any further assumptions, such as a criterion shift. We will show how this explanation fits some basic effects in the literature on the revelation effect. Moreover, we test our explanation in a new experiment by comparing an episodic and a non-episodic problem-solving task. As predicted by our new approach, the revelation effect only shows up for the non-episodic problem-solving task. This result is challenging for other theoretical accounts such as criterion shifts (Niewiadomski & Hockley, 2001) or the discrepancy-misattribution hypothesis (Whittlesea & Williams, 2001).

Synaptic plasticity and motor learning in Tourette patients

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Tourette’s syndrome is a neuropsychiatric disorder characterized by motor and phonic tics that can be considered motor responses to preceding inner urges. It has been shown that Tourette patients have inferior performance in some motor learning tasks and reduced synaptic plasticity induced by transcranial magnetic stimulation. However, it has not been investigated whether altered synaptic plasticity is directly linked to impaired motor skill acquisition in Tourette patients. In this study, cortical plasticity was assessed by measuring motor-evoked potentials before and after paired associative stimulation in 14 Tourette patients and 15 healthy controls. Tic and urge severity were assessed using the Yale Global Tic Severity Scale and the Premonitory Urges for Tics Scale. Motor learning was assessed 45 minutes after inducing synaptic plasticity and 9 months later, using the rotary pursuit task. On average, long-term potentiation-like effects in response to the paired associative stimulation were present in healthy controls but not in patients. In Tourette patients, long-term potentiation-like effects were associated with more and long-term depression-like effects with less severe urges and tics. While motor learning did not differ between patients and healthy controls 45 minutes after inducing synaptic plasticity, the learning curve of the healthy controls started at a significantly higher level than the Tourette patients’ 9 months later. Induced synaptic plasticity correlated positively with motor skills in healthy controls 9 months later. The present study confirms previously found long-term improvement in motor performance after paired associative stimulation in healthy controls but not in Tourette patients. Tourette patients did not show long-term potentiation in response to PAS and also showed reduced levels of motor skill consolidation after 9 months compared to healthy controls. Moreover, synaptic plasticity appears to be related to symptom severity.

Introspective limitations in task switching

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In multitasking situations, two types of performance costs can be typically observed: dual-task costs and switch costs. Dual-task costs arise when people try to perform more than one task at the same time, whereas switch costs arise when people try to rapidly switch between different tasks. Previous research has shown that participants are largely unaware of the dual-task costs. In the present study we asked whether a similar misperception of performance costs would also be observed when participants switched between different tasks. We employed an alternating runs paradigms with predictable task sequences and manipulated the time that participants could use to prepare for the next task (i.e., response-stimulus interval, RSI). After each run of two tasks, participants had to provide an estimate of their reaction time (RT) for the second task on a visual analogue scale. RTs showed the standard pattern within the alternating runs paradigm: responses were slower in switch than in repetition trials and these switch costs were reduced with increasing RSI. In contrast to the previously observed unawareness of dual-task costs, participants' estimates of their RTs truly reflected the switch-costs and also the reduction of these costs with longer preparation time. However, participants incorrectly estimated longer RTs at long than at short RSI. Overall, this suggests that in task switching people are aware of their performance costs, even though introspection is flawed with respect to the general benefit of preparation.

Which piano?: The different costs of ambiguous references in sentence processing

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When a speaker uses a definite noun-phrase (NP) like "the piano" the definite article "the" in the NP triggers a uniqueness presupposition (PSP). This PSP signals to the audience that the speaker is aiming to refer to exactly one piano in the current context. Using EEG, we investigated how uniqueness PSPs are processed when uniqueness is not given in the current context and reference becomes ambiguous. In the experiment, participants were either presented a context in which a unique referent for a relevant definite NP was introduced, a context in which exactly two competing referents were introduced, or a context in which multiple competing referents were introduced. This resulted in matching and mismatching conditions for a subsequent test sentence containing a definite NP. Depending on the context and matching condition, different event-related potentials (Nref, N400, P600) were evoked during reading of the test sentence. These are thought to index different cognitive processes. Our findings thus suggest that how a PSP is violated in a context influences what cognitive processes are involved in PSP processing.

Does semantic information facilitate grammar learning?

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In a globalizing world, the question of how we should teach foreign languages is more crucial than ever. In this context, the interplay between meaning and grammar is of particular interest as it has implications for language learning in all instructed settings, from the classroom to computer-based language learning environments. There are a few studies addressing this issue by investigating the impact of sematic information on the acquisition of morphology/syntax with artificial languages. The evidence for a semantic benefit is mixed. Thus, further research is needed, especially using natural languages. Existing research mainly focused on the connection between the meaning of vocabulary and grammar. For the present experiment, we used the semantics of whole sentences instead. We thereby aimed at imitating a more realistic language learning in a lab setting. We investigated the hypothesis that rules are acquired more easily when semantic information is available during the learning phase. Participants (n = 40) learned the morphosyntactic rules of Latin sentences in a rule search paradigm, either with or without semantic information. The semantic information was implemented by the simultaneous presentation of the sentence meanings in form of matching pictures. The learning performance was assessed by a grammaticality judgment task combined with a metalinguistic knowledge test. Participants in the with-semantics group showed better learning outcomes than those in the without-semantics group. This finding suggests that semantic information facilitated the learning of the morphosyntactic rules. However, further research is needed to assess the extent to which this finding could alternatively be explained by means of a multi-media benefit in the with-semantics group. In principle, it seems possible that the relatively high performance in the with-semantics group reflects the fact that these participants had available verbal and pictorial information at the same time.

On the tragedy of personnel evaluation dilemmas

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As has been noted there may be a “tragedy of the commons” if several people in a social-dilemma situation (public good games) pursue their local egoistic interests and thereby lower the overall payoff of their group and, paradoxically, even their own resulting payoff. One may also speak of inner-individual dilemmas, where people pursue local goals at the expense of their overall utility (von Sydow, 2015). Our current experiments transfer a similar (mathematical) payoff-structure to the context of personnel evaluation. We expected that participants in an experiment in the role of human resource managers of a shop may not always properly recognize that an employee who contributes individually less than most others may actually contribute most to the overall payoff of a shop (e.g., by helping other colleagues). In our experiments, participants were put in the position of a human resource manager, who should be most interested in rewarding people who optimize the overall payoff of the company

and not those who optimize their specific payoffs. The results of the experiments suggest that people may—at least in particular situations—tend to focus too much on directly comparing individuals without evaluating the overall contribution to a group. The tragedy of this phenomenon may be that a particularly positive evaluation of employees that mainly optimize their individual interests may disadvantage employees who contribute much better to the overall goals of a company. This phenomenon may be linked to maladaptive incentive structures (personnel evaluation), advancement of employees (personnel promotion) and job offers (personnel selection) and consequently could have a real impact on the effectiveness of a company. We discuss potential boundary conditions of this phenomenon and briefly relate it to similar debates on altruism models in evolutionary biology and debates on self-regulation and temporal discounting in psychology.

When does time really fly? – The influence of task importance on the perception of duration

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The perception of time is a basic feature of human behavior and cognition. One typical finding is that the subjective perception of time duration varies tremendously but the basis of this inter-individual variation remains unclear. Based on the Attentional Gate Model (Zakay & Block, 1997), we predicted that higher task importance leads to shortened perception of duration. We tested this hypothesis with an experiment in which forty-eight participants were instructed to solve mathematical equations for an unspecified duration. After 13 minutes and 13 seconds the participants were asked to judge the duration of this phase. Importantly, the participants were not aware of this test beforehand. We manipulated task importance by enabling the experimental group to win an amount of money for a humanitarian organization of their choice. The manipulation did not lead to a high positive task importance but the manipulation did lead to higher anxiety in the experimental group. The main result was that the estimation of the duration did not differ between the two groups. However, the results suggest that perceived anxiety influences time perception substantially: In our experiment, higher anxiety led to prolonged perception of duration ($r = 0.29$, $p < .05$).

False memories in FIFA referees, soccer players, and novices: An event completion experiment

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Wrong referee decisions in soccer (football) often raise discussions about the limitations of human visual perception. The purpose of our study was to investigate the impact of expertise on anticipatory properties of perception by manipulating the availability of causal information. To that end, we recruited three different expertise groups: FIFA referees (N = 16), soccer players (N = 16), and students with no interest in soccer (novices, N = 42). We investigated the size of

the event completion effect (Strickland & Keil, 2011), describing that humans falsely remember a causal moment they have never seen (e.g., kicking of a ball) when it was implied by the following depicted action (e.g., a flying ball), across our expertise groups. We used video clips depicting a player approaching a soccer ball as if he was about to kick it. The moment of ball contact was not shown. In “implied causality” trials, the video clip continued with the ball flying or bouncing down the field. In “non-implied causality” trials, the video clip proceeded with a sequence other than the natural result of a ball kick (e.g. cheering players from a different match). While these events fall within the area of the tested expertise, they were also simple enough to be grouped into logical units based on cause and effect by laypeople. Each group showed the expected event completion effect, that is implied-contact clips produced higher false alarms for the image of the ball-contact moment than non-implied contact trials. However, referees differed from players and novices in the strength of the effect: referees indicated more often than the other participants that they have actually seen the contact moment. We suggest that expertise leads to event models that are more abstract in nature, compared to a novice’s model that consists of multiple concrete subevents within the event. We present our findings with regard to research on expertise in sports and event perception.

Intuitive and deliberate decisions from memory

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In many everyday decisions, information about options has to be retrieved from memory. The retrieval of this information has been shown to be costly and to affect decision behavior as compared to situations with given information. In addition to deliberate strategies of heuristics, more "intuitive" mechanisms of decision making have been proposed, such as exemplar-based reasoning and parallel constraint satisfaction networks. The former mechanism assumes judgment processes based on the comparison of options with stored similar objects. The latter theory assumes spreading activation in a network, eventually leading to a maximally consistent representation of the decision situation. Both views apply to different information acquisition or learning situations, however. We summarize a series of experiments trying to delineate the boundary conditions for both kinds of "intuitive" processes in memory-based decisions. Broadly speaking, exemplar-based processes depend on the representation of information during the learning of information, such as the individuation of stimuli by pictorial cues or the ease of deriving rules from the learning feedback. Network models, on the other hand, successfully describe data only in situations with clear representations of cue validities and cue directions that do not require search or transformation of information pieces before integrating them.

Multi-task integration facilitates implicit motor learning

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In this study, we explore how multi-task integration, induced through structural similarity between the primary and secondary task, facilitates implicit motor learning. We were particularly interested in how manipulating motor load in a dual-task situation affects learning of a constant segment embedded in a pursuit tracking task. Furthermore, we examined if dual-task effects could be attributed to task integration by temporally correlating task characteristics and increasing difficulty of primary and secondary task. In Experiment 1, participants performed a pursuit tracking task while simultaneously counting only high-pitch tones. One experimental group performed the tracking task only. The two remaining were additionally presented with either randomly occurring high- and low-pitch tones or random low-pitch tones and high-pitch tones that were temporally coupled to the tracking task. In Experiment 2, the motor difficulty of the secondary task was increased. In Experiment 3, the difficulty of the primary task was also increased. The results indicate that implicit motor learning depends on the difficulty and similarity of both the primary and secondary tasks. Learning is hampered in the presence of a dual task but only when there is no structural similarity between primary and secondary task and no stringent sensory-motor load forcing participants to exploit optimization strategies. Our results support theories of task integration in terms of beneficial effects of temporal relationships between tasks. Other types of integration such as predictability or automaticity need further research.

The perks of being friends with oneself: Self-compassion reduces self-other differences when evaluating showing vulnerability

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Have you ever been afraid to confess your romantic feelings? Have you ever hesitated to ask for help for fear it would make you look weak? Many important situations require individuals to show their vulnerability. Is showing vulnerability evaluated differently for oneself than for others? Qualitative analyses of verbal reports have provided first evidence that individuals are reluctant to show their vulnerability and tend to associate it with weakness. In contrast, when it comes to others, individuals tend to see the act of showing vulnerability as showing strength and consider it to be desirable behavior (Brown, 2012). Based on these findings, we hypothesize that, in general, individuals evaluate the act of showing vulnerability more negatively in oneself than in others. Moreover, we claim that these self-other differences are especially pronounced in individuals who are low on the trait self-compassion. Self-compassion refers to treating oneself kindly and to recognizing one's own connection to others in times of struggle as well as to accepting the present moment. Confronted with a difficult situation, self-compassionate people treat themselves the way they would treat others: they remind themselves that it is

human to be imperfect; they recognize that all people go through tough times and they do not over exaggerate the difficulty of the situation (Neff, 2003). Therefore, we argue that people, who are low on self-compassion, display self-other differences in evaluation of showing vulnerability more strongly than self-compassionate people. Hypotheses were addressed in a set of experiments by asking participants to imagine either themselves or others in vulnerable situations and to evaluate the act of showing vulnerability. In line with our prediction, individuals evaluated showing vulnerability as more negative in oneself than in others. Furthermore, these differences disappeared for highly self-compassionate individuals. Implications are discussed.

Effects of stimulus preview on task-switching – An approach to investigate preferences of cognitive control under multiple task demands

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For the last two decades, research on the psychological refractory period (PRP) and task-switching has dominated the field of multitasking research. Merging insights from both lines of research, we investigated whether possibilities of partly overlapping (parallel) processing that have been shown by PRP studies for processes before or after a presumed bottleneck of central processing would also be applied in a task-switching paradigm to optimize performance. Therefore, we introduced a modified task-switching paradigm, allowing a sample of 16 participants to preview the specific task stimulus they had to switch to next, while they worked on the current task. This stimulus preview offered an option of overlapping processing of the successive tasks already before the actual task switch had to be performed. A second sample of 16 participants performed a classical task switching paradigm for comparison. We expected that providing a preview option would result in higher performance efficiency, mainly reflected in less switch costs and unchanged mixing costs, compared to the classical task-switching paradigm where no overlapping processing of task stimuli is possible. In line with this expectation, the comparison of switch costs and mixing costs between both samples revealed a significant difference in mean switch costs (preview option < classical task-switching), but not in mixing costs. The results provide evidence that the preview option in fact can be used to reduce switch costs and achieve improvement of overall performance. However, fine-grained analyses of individual response patterns revealed that the effect was only found for a subgroup of participants. That points to systematic individual differences with respect to preferences for serial and overlapping processing in coping with multiple task demands. This result will be discussed in the context of other converging findings from PRP and other dual-task research.

Baselinemessung bei Fragebögen: eine Annäherung an die Wahrnehmung von Ratingskalen?

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Fragenbögen können als ein experimentelles Setting angesehen werden, da zahlreiche Studien einen bedeutsamen Einfluss von Fragenbogengestaltung, Iteminhalten und Antwortskalen auf die Messung gefunden haben (z.B. Schwarz, Grayson & Knäuper 1998; Tourangeau, Couper & Conrad, 2007; Attali & Bar-Hillel, 2003; Tourangeau, Couper & Conrad, 2013; Rost, Carstensen & Von Davier 1999). In der experimentellen Forschung werden nach Möglichkeit Umgebungsreize konstant gehalten um den spezifischen Einfluss einer Variation zu betrachten. Hierfür wird eine Messung mit denen für die Untersuchung notwendigen bzw. nicht auszuschließenden Umgebungsreizen gemacht, die Baselinemessung Die hier vorgestellte Untersuchung verwendet diesen Ansatz und versucht, ihn auf die Bearbeitung von Fragebögen zu übertragen. Als basaler Stimulus wird die Antwortskala interpretiert. Hierfür wurden zu dem inhaltlichen Fragebogen zwei unterschiedliche Variationen von Skalen dargeboten. Die eine Skala beinhaltete nur die Antwortskala ohne inhaltliches Item, die andere allgemeine Items über Größenverhältnisse. Die beiden Antwortskalen waren vom Design genauso gestaltet, wie die der inhaltlichen Skalen. Ebenso wurden die Instruktionen konstant gehalten und forderten dazu auf, möglichst spontan zu antworten. Die Ergebnisse mehrerer Teilstudien mit unterschiedlichen inhaltlichen Fragebögen zeigen einen deutlichen Zusammenhang der beiden untersuchten Skalen mit den inhaltlichen Skalen. Wenn man den Zusammenhang zwischen den Baselineskalen und die inhaltlichen Skalen mittels eines kubischen Zusammenhangs beschreibt erhöht sich die vorhergesagt Varianz erneut beträchtlich. Dies kann als Hinweis für eine dislineare Wahrnehmung der Skalen gedeutet werden. Die Ergebnisse werden präsentiert und ihre Bedeutung und Einschränkungen diskutiert.

Consequences of feeling-dependent shifts of levels of mental abstraction

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Judgments and decisions are based on individual mental representations of the information given rather than the information actually given. Mental representations of decision situations are highly flexible with respect to how detailed or abstract they are. As highlighted by research on construal level theory (CLT, Trope & Lieberman, 2010) the level of mental abstraction has important implications for judgments and decisions because particular features of judgmental targets or decision alternatives receive more or less weight depending on how abstractly the information given is represented. While CLT focuses on psychological distance as a contextual feature that influences the level of abstraction of mental representations, other aspects of the context in which a judgment or decision is situated might just as well have an impact on the level of mental abstraction adopted by individuals. This talk presents the theoretical considerations and empirical findings of a research project that investigated the influence of feelings on levels of mental abstraction as well as the consequences of feeling-dependent shifts

of levels of mental abstraction for judgements and decisions. It is argued that feelings are a particularly useful signal that individuals can use to adapt the level of abstraction of their mental representations to the demands of the current situation. Findings of experimental research on the influence of affective (e.g., mood) and cognitive (i.e. fluency) feelings on phenomena such as the weighting of idealistic and pragmatic concerns in decision situations and the sunk cost effect will be presented.

Women are not evaluated on the assertiveness dimension: Conditioning as a measurement tool of attribute salience

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Men have more professional success than women although women are equally or better educated than men. One explanation for this difference is that women are rated as less assertive or competent than men. In addition to this effect, we will test the assumption that women are not only rated as less assertive than men but that their assertiveness is not attended at all. Thus the likelihood to spontaneously process assertiveness of a person is lower for women than for men. To test this we used an attributes conditioning paradigm with female and male US. The US were selected to be either highly assertive vs. unassertive and highly sympathetic vs. unsympathetic men or women. In line with Förderer and Unkelbach (2014), we expected that CS ratings will only change for attended attributes. The results show that changes in CS ratings were smaller for female US than for male US. Unexpectedly, this was true for both assertiveness and sympathy. Thus, attributes of women seem to be generally attended to a lesser extent than attributes of men. Further, participants high in benevolent sexism showed stronger conditioning effects of female assertiveness than participants low in benevolent sexism. Thus, sexists processed assertiveness of women more strongly than non-sexists. These findings imply that it will be more difficult to identify a capable woman than a capable man especially by people low in sexism. The findings highlight the chances of using conditioning as a measure within attitude research.

Simulating biases in frequency judgments with an artificial neural network

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When estimating frequencies of events, people make systematic mistakes. With the help of a simple artificial neural network, the Probability ASSociater (PASS, Sedlmeier, 2002), some of these biases can be explained and simulated as memory effects. We investigated one such bias in an online experiment. In the first phase of the experiment, participants (N = 42) viewed abstract stimuli with varying frequencies of occurrence (2, 4, 8, 16 times). In a second phase, 24 hours later, the participants viewed the same stimuli again, but this time with a constant

frequency of occurrence (4 times). When participants had to judge the frequencies of these stimuli solely regarding the second phase (ignoring the frequencies of the first phase), the estimates were still biased by the frequencies of the first phase. The PASS-model predicts such an effect because old information is still present in the memory traces of the artificial neural network. The median correlation of the individual prediction between the PASS-model and the empirical estimation was r = .34. The results imply that existing memories are systematically included in judgements of frequency even if they are irrelevant.

The memory state heuristic: A research program

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In typical binary comparative judgments (e.g., Which of two cities is more populous?), if one of the objects is recognized and the other is not, recognition can be used as a cue. According to the recognition heuristic (RH) theory, if recognition is a valid cue, all other information is ignored in these cases and the decision is based on recognition vs. non-recognition only. The memory-state heuristic (MSH) extends this theory by postulating that the underlying memory states (i.e., recognition certainty, uncertainty, and rejection certainty) are crucial, not the recognition judgments by themselves. Specifically, the MSH predicts that the larger the discrepancy between the memory states of two objects, the higher reliance on recognition should be. This means that the MSH has a larger spectrum of predictions, since, unlike the RH, it is not limited to pairs of one recognized and one unrecognized object. Building on prior work of Erdfelder, Küpper-Tetzel, and Mattern (2011), we report three studies which consistently support the MSH. While the first study focused on qualitative predictions going beyond those investigated by Erdfelder et al. (2011), the second study moved one step forward by assessing the MSH predictions against both the RH and an evidence accumulation account through formal modeling. Finally, the third study aimed at developing and testing a new paradigm and new measurement model of the MSH that does not necessarily require perfect empirical indicators of memory states. Overall, our studies yielded converging evidence supporting the idea that underlying memory states, and not recognition judgments per se, are crucial for determining reliance on recognition in binary decisions.

Movement speed moderates valence evaluation of pictures in the horizontal dimension.

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Movement speed moderates valence evaluation of pictures in the horizontal dimension. The Body Specificity Hypothesis proposes that the space surrounding the dominant hand is associated with positive valence whereas the space surrounding the non-dominant hand is associated with negative valence. Similarly, movements like arm flexion and extension have

been associated to positive and negative evaluations respectively. However movements may imply different meanings regarding their fluency (e.g., movement speed) and the stimuli with which we interact. The present study explored if valence evaluations of pictures may change differently after horizontal flexion and extension movements, performed with various movement speeds. To do so, 120 right-handed participants evaluated the valence of 60 pictures after moving the pictures horizontally. Specifically, participants performed either a horizontal flexion movement (i.e., from right to the left) or a horizontal extension movement (i.e., from left to the right) on a Multi-Touch Monitor (MTM). Movement speed (i.e., release pixel - press pixel of the picture divided by release time - press time of the picture in ms) was recorded. Half of participants performed the movement with their dominant right hand, the other half with their non-dominant left hand. Results showed that movement speed moderated valence evaluations. Specifically, in the horizontal extension condition the valence of negative pictures increased and the valence of positive pictures decreased with faster movements more than with slower movements. Moreover, in the horizontal extension condition, positive pictures obtained better evaluations than in the horizontal flexion condition with slower movements. These results were found only for the right (dominant) hand suggesting that the right hand may be more sensitive to this effect. The results also suggest that movement speed may be associated with valence evaluation, at least when moving a stimulus towards a goal.

Eye tracking of attention in patients with obsessive-compulsive disorder

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Whereas numerous studies using eye-tracking have demonstrated attentional biases in individuals with anxiety disorders, studies on obsessive-compulsive disorder (OCD) are lacking. Two studies have been conducted with individuals high in contamination fears with only one of these using contamination threat stimuli. Weierich et al. (2008) put forward that individuals with anxiety disorders detect threat stimuli more easily and at the same time disengage from such material with more difficulty. For the present study, we expected that individuals with OCD would orient their gaze faster to OCD relevant stimuli than to neutral stimuli and to fixate OCD relevant stimuli longer than neutral stimuli compared to healthy controls. The present study employed eye-tracking to assess eye movements in patients with OCD during five second free viewing tasks. Each task consisted of an OCD related picture (either relevant to checking or contamination) and a neutral picture. In our ongoing study, 16 patients have been included so far. We aim to recruit a total of 30 patients and 20 healthy controls by February 2016. Preliminary data analysis from a subgroup of patients tentatively suggests that patients fixate OCD relevant stimuli significantly longer than neutral stimuli.

Cognitive links between music and language in young children

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Music and language seem to have various overlaps regarding different aspects and levels of cognitive processing. Especially in preschool children it has been shown that musical training seems to promote specific aspects of language and literacy acquisition. Previous research points to equivalent important skills, e.g. the subtle perception and production of sound, as well as to shared mechanisms and resources in the real-time processing of music and language. This study extends previous studies by systematizing distinct corresponding language and music skills on diverse levels of cognitive processing in a sample of 5- to 7-year-old children. Results indicate interrelationships between diverse music and language skills according to different levels of cognitive processing as well as links between perceptual and productive tasks in both domains. Results will be discussed in terms of transfer effects and the long-term promotion in young children.

Enhancing working memory through tyrosine administration: A tailored approach

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In a previous study, we found evidence that the administration of L-Tyrosine (TYR), precursor of dopamine, refills resources required for cognitive-control operations, such as working memory updating (as indexed by the n-back task). Here, we tested the assumption that previous failures to demonstrate generalizable effect of TYR were due to the insufficient appreciation of interindividual differences, such as genetic variability related to dopamine supply.

Visual working memory for invisible parts of an object as revealed by amodal completion

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Amodal completion refers to the perceptual ‘filling-in’ of partly occluded fragments of an object. Past work has shown that object completion occurs rather efficiently at early perceptual stages of processing. However, irrespective of efficient early completion, at a later stage, the maintenance of object representations in visual working memory (VWM) may be severely restrained due to the limited availability of mnemonic resources. To address this potential limitation, we investigated whether the structure of to-be-remembered objects influences what is encoded in VWM using a change detection paradigm. Participants were presented with a memory display that either contained composite objects, which were notched shapes abutting an occluding square, or, comparable simple (that is, non-occluded) objects. Results showed

overall increased memory performance for simple relative to composite objects. Moreover, composite objects were preferentially represented in VWM for globally completed wholes as compared to corresponding local completions or mosaic interpretations. This global completion advantage was obtained only when the simple objects also supported a global object interpretation, but no such benefit was found without an appropriate simple object context. Finally, with an increase in set size, the global object advantage vanished. Together, our results indicate that processes of amodal completion influence VWM performance measures until an overall capacity limitation prevents completion. Such completion processes do not occur automatically but they are triggered by the available (simple) object context. These findings support the view of VWM as reflecting a continuous resource with capacity limitations depending on the structured representation of to-be-remembered objects.

Evaluative conditioning? I don't know what you mean… - Weaker EC effects found among high meanness scorers

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Three studies provided evidence that evaluative conditioning is moderated by psychopathy. Psychopathy was operationalized according to the Triarchic Model of psychopathy, which distinguishes three dimensions: meanness, boldness and disinhibition. Study 1 showed that meanness hinders evaluative conditioning and that this effect is not due to deficits in perceptions of valence of the stimuli nor in lower CS-US contingency awareness. Studies 2 and 3 replicate this effect and point to a critical moderator: stimulus type. Specifically, the hampering effect of meanness on evaluative conditioning was observed on attitude formation towards objects but not faces. Taken together, the present findings reveal that individual differences may play a critical role in EC and confirm that different dimensions of psychopathy should be examined separately.

Learning to tie the knot: The acquisition of functional object representations by physical, linguistic and observational experience

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What does it mean to "know" what an object is? Viewing objects from different categories (e.g., tools vs. animals) engages distinct brain regions, but it is unclear whether these differences reflect object categories themselves, or our tendency to interact different with objects from different categories (i.e., we grasp tools, but not animals). In this talk, two different training studies are presented that examine how object knowledge is built de novo for a class of objects that were previously unfamiliar to participants: knots. The first study explored how the human brain constructs representations of objects one learns to name or physically manipulate.

Neuroimaging evidence demonstrated that a portion of the anterior intraparietal sulcus, a brain region associated with object manipulation, was more strongly engaged when participants passively viewed images of knots they learned to tie compared to those they learned to name. The second study explored how knowledge associated with constructing novel objects is learned via physical versus observational practice. Each participant in this study was assigned a training partner, and for five consecutive days practiced tying one group of knots or watched their partner tie different knots, while a third set of knots remained untrained. fMRI was obtained prior to and immediately following the week of training while participants performed the same visual knot-matching task used in the first study. After training, a portion of right intraparietal sulcus responded when viewing images of knots from the tied and watched conditions compared to knots that were untrained. This activity suggests that physical and visual experience with previously novel objects impacts this region of sensorimotor cortex in a similar manner. Findings from both studies are consistent with a theory of embodiment in which there can be clear overlap in brain systems that support conceptual knowledge and control of object manipulation.

Attentional network functions in patients with asymptomatic carotid artery stenosis

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By narrowing a major artery in the neck, carotid stenosis (CS) decreases the cerebral blood supply. Therefore, CS might cause cognitive deterioration even if the patient is asymptomatic, that is free of symptomatic cerebrovascular diseases, such as stroke or transient ischemic attack. In line with this, recent evidences suggest that asymptomatic CS might be an independent risk factor of impairments in, for example, attentional functions. Attention, however, is a complex process involving multiple components, and no studies have been addressed to the question of how the different attentional components are affected by an asymptomatic CS condition. To explore this issue, in the current study, attentional functions of patients with asymptomatic CS (N = 25) were examined and compared with a matched group of healthy individuals. Participants in both groups completed a set of questionnaires (e.g. Beck Depression Inventory) and performed the Attentional Network Task (ANT). As a combination of a cued reaction time task and a flanker task, ANT provides measures for three different components of attention: alerting, orienting and executive control. The analyses showed that the effect of cueing is significantly different in the two groups: In contrast to healthy individuals, for CS patients, alerting cues before the targets did not improve performance. This finding generally suggests that alerting attentional function might be sensitive to a CS-induced decrement in blood supply. No similar effect of asymptomatic CS was found for orienting and executive functions of attention.

ERPs suggest children detect response conflict during a flanker task, but are unable to up-regulate cognitive control on consecutive trials

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According to the conflict monitoring account, cognitive control is up-regulated upon the detection of response conflict. Hence, interference costs are particularly high when incongruent stimuli are unexpected. Given well-established difficulties in interference control in children, little is known about the developmental trajectory of regulating cognitive control according to task context. Specifically, it is unclear if children are unaware of increased conflict and/or unable to recruit cognitive control. Here, event-related potentials (ERPs) were used to examine the error-related negativity (ERN) as a neural signature of the ability to detect conflict immediately following erroneous responses. Task context was manipulated by using frequent or rare incongruent trials and by reversing response rules. Young adults, older children (aged 10 years) and younger children (aged 7 years) completed a flanker task, which required participants to inhibit both irrelevant information (flanker stimuli) and responses (NoGo-Trials). The results confirmed children´s behavioral difficulties, in particular with inhibiting No-Go responses. RT-interference costs were age invariant. By contrast, accuracy-interference costs were smaller for non-reversed rules and frequent incongruent trials for adults only; this pattern was absent for older children and reversed for younger children. ERPs suggested that conflict detection is functionally mature even in young children; shorter ERN latencies for children compared to adults suggest the delayed execution of a motor response after decision-making. Together, these results indicate that all age groups were able to detect response conflict and to respond more slowly to incongruent flankers. However, increased conflict did not lead to increased cognitive control on consecutive trials for children, as younger children in particular were unable to translate conflict into correct response selection.

Systematic distortions in visual working memory

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Current models of working memory assume that mnemonic representations of individual items are stored independently of one another. Recent studies, however, have indicated that representations held in visual working memory interact, leading to systematic distortions of item representations along their feature dimension. In a series of experiments, we found that several aspects of the encoding situation influence whether this interaction leads to attraction vs. repulsion between two retained dot motion directions. Items consistently repulsed each other when presented simultaneously during encoding. When presented sequentially, however, the interaction profiles depended strongly on an item's serial position as well as on the spatial and temporal characteristics of the item presentation. We manipulated spatial position (same vs. different retinal positions) and inter-stimulus interval (ISI) duration and found opposing

distortion patterns for the first (S1) and the second (S2) presented item. If presented on the same retinal position, S2 was repulsed by S1 but not vice versa. If presented on different retinal positions, however, the pattern reversed: S1 was attracted by S2, but there was no systematic bias in the responses to S2. An exception to this interaction pattern was observed when both items were presented in immediate succession: here S1 was attracted by S2 while S2 was repulsed by S1. Our results provide new evidence for systematic interactions of item representations in visual working memory. Interestingly, the observed distortions varied considerably between different encoding conditions and serial positions, hinting at different origins of the distortion effects. In summary, encoding and storage mechanisms in visual working memory appear to be more complex than current models assume.

Altersabhängige Planungsstrategien für visuell-räumliche Probleme

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Wenn Kinder visuell-räumliche Probleme lösen, brauchen diese meist erheblich mehr Zeit und machen häufiger Fehler (unnötige Zwischenschritte) als vergleichsweise Erwachsene. Die Ursache für das suboptimale Lösungsverhalten wird unter anderem auf die geringe Arbeitsgedächtniskapazität und eine Inflexibilität der Planungsstrategien zurückgeführt. Da in der vorliegenden Arbeit vermutet wurde, dass eine geeignete Organisation der Komplexität des Problems die verwendeten Lösungsstrategien beeinflusst, wurden strukturelle Eigenschaften im Rush-Hour Spiel berücksichtigt. Um das Lösungsverhalten von Kindern unter diesem Aspekt besser einordnen und beschreiben zu können, wurden mögliche Lösungswege im Rush-Hour Spiel durch Gestalten und kontraintuitive Züge manipuliert und zwischen drei Altersgruppen (7,10 und 24 Jahre) verglichen. Die Ergebnisse legen nahe, dass sowohl Kinder als auch Erwachsene Gestalten und kontraintuitive Züge in ihrem Lösungsverhalten vermeiden. In einer Erweiterung der Studie wurden präferierte Planungsstrategien in zwei Modellen implementiert und entsprechende Vorhersagen mit den Daten des Experiments verglichen. Die Ergebnisse legen hier nahe, dass das Planungsverhalten der Kinder durch eine geringere Planungstiefe in Kombination der Strategie der Vorwärtsverkettung am besten simuliert werden kann, bei Erwachsenen führt wie erwartet das Modell der Rückwärtsverkettung zur besten Vorhersage der beobachteten Daten.

Accuracy in imagined dart throwing

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In motor imagery no feedback from the body and the environment about the ongoing movement is available. Such feedback needs to be predicted, and it is not clear whether this is adequately done. If predicted movement feedback is similar to actual feedback, the accuracy of

imagined and executed movements should be similar. In Experiment 1, novice and expert dart players executed and imagined throwing darts. In imagination they reported the predicted landing position. Irrespective of expertise the bias of the landing position was lower in imagination than in execution. Variability of the landing position was lower in imagination than in execution in novices, but not in experts. Distance to the target did not differ significantly between imagination and execution. In Experiment 2, three groups of novices performed execution with delayed feedback, execution without feedback, and imagination. All groups reported the predicted landing position. Prediction in imagination did not differ significantly from prediction in execution in any variable. The results indicate that inaccuracies in throwing darts are predicted in motor imagery similar to predicted inaccuracies after actual throws. However, predicted inaccuracies are sometimes lower than actual inaccuracies. In conclusion, motor imagery is more closely related to prediction in execution than to actual execution.

The joy of discovery: What makes an Aha! moment?

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Self-reports of “Aha! experiences” are used to differentiate insightful from analytical modes of problem solving. For this purpose, the Aha! experience is typically described to participants as a multi-dimensional construct encompassing suddenness, certainty and surprise. The present study explored the extent to which these purported dimensions predict an Aha! experience. In addition, we examined a possible role of positive affect. 34 participants watched 37 magic tricks with the task of finding out how each trick works. Upon discovering the solution to a trick, participants indicated if they had experienced an Aha! Then they rated their problem solving experience on the following six dimensions: Suddenness in the emergence of the solution, certainty about the solution, surprise, pleasantness, relief, and drive (i.e. how much they were looking forward to seeing the next trick).The strongest correlations with the overall Aha! rating on correct solutions were found for pleasantness, relief and certainty (all r around .55). Suddenness and drive were correlated to a lesser extent. No significant correlation was found for surprise. Although the two affective ratings related to each other with .70, the other relations among these dimensions were in the .3-.5 range, except for surprise which did not relate strongly to anything else. Consistent with prior findings, we found that the Aha! experience is linked to strong emotional involvement (pleasant feelings and feelings of relief). There was also evidence for quality of solution (certainty and suddenness) being linked to Aha! experiences. In contrast, the dimension surprise could not differentiate between Aha! and no Aha! solutions. These results bring into question the wisdom of the established approach of using a multi-component operational definition for Aha! that encompasses suddenness, certainty and surprise. The positive affect that comes with discovery seems better expressed as pleasantness or relief than surprise.

Text problems are (almost) individual: Delineating the linguistic, arithmetic and general cognitive components underlying their solution: An eye-tracking study

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Word problems are considered one of the most difficult tasks for students in the mathematical education. Their difficulty is influenced by the complexity of linguistic and arithmetic factors. However, rarely, they were manipulated orthogonally from one another, which allows understanding their interaction. Therefore, these variables were manipulated in a within-subject eye-tracking study, while the text remained largely identical. Two mathematical factors (simple operation (subtraction or addition), carry (carry or non-carry)) and two linguistics factors (lexical consistency and nominalization (a simple manipulated syntactic form of the text)) were chosen. 24 adults participated in the study. During the measurement 320 simple two digit arithmetic word problems had to be solved by the participants. Specific and general capabilities (arithmetic, reading, text comprehension, working memory) were assessed to explore the relation of above factors to other capabilities. The behavioral as well as the eye movement data shows that numerical and linguistics factors interact – at least in part they operate on a common processing stage. Furthermore numbers (especially calculations requiring carry or borrow) results general in higher fixation and total spent time. The sentence level eye-tracking analysis reveals that sequential step-wise solution models cannot account for participants' solution strategies. We suggest that there is no single easy and difficult word problem, but difficulty operates both on numerical and linguistic factors and their interaction, which are differentially related to other cognitive factors.

Exploring multisensory duration integration: An MMN study

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Typically, auditory duration information dominates perceived visual duration. This finding has been interpreted in terms of multisensory integration of the two modalities. However, it still remains unclear at which stage of processing multisensory integration of perceived duration takes place. Therefore, we measured the mismatch negativity (MMN) component of the event-related potential which reflects preattentive deviance detection, and thus an early stage of processing. Specifically, we examined whether an MMN was elicited by visual, auditory, and audiovisual deviant durations embedded within a train of visual, auditory, and audiovisual standard durations, respectively. Additionally, recent work suggests that despite the typical auditory dominance in duration perception, the visual contribution to the combined audiovisual duration percept increases with decreasing reliability of the auditory stimulation (Hartcher-O´Brien, Di Luca, & Ernst, 2014). Therefore, standard and deviant duration stimuli were embedded in white background noise of either low or high intensity. If multisensory integration arises at early perceptual processing stages, deviance detection, and thus, MMN amplitude, should be enhanced for multisensory deviants compared to unimodal ones. This

effect should be especially pronounced when the reliability of the auditory stimulation is compromised by background noise. Preliminary results indeed suggest an increased audiovisual MMN compared to the unimodal conditions, however, only in the low-intensity noise condition. Presumably, the high-intensity noise prevented automatic deviance detection and thus the occurrence of an MMN. Nevertheless, these preliminary results suggest that auditory and visual duration are combined at an early stage of processing.

The mental timeline in a crossed-hands paradigm: A matter of instruction

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There is well-established evidence for the existence of a mental timeline, in which – in cultures with a left-to-right writing direction – past is associated with the left, and future with the right. For example, in response time studies in which participants classified the temporal reference of words or sentences, they responded faster with the left to words referring to the past, and with the right to words referring to the future. Recent studies have shown that this association is related to extracorporal, not intracorporal, space, and follows side, not hand, when participants respond with their hands crossed (Bottini et al., 2015; Rolke et al., 2014): In those studies, participants responded faster with the left key (and their right hand) to past-related stimuli, and faster with the right key (and their left hand) to future-related stimuli. We investigated the role of instruction for the mental timeline in a crossed-hands paradigm. Participants classified the temporal reference of words or phrases referring to the past or future by pressing a response key on the left with their right hand, and a response key on the right with their left hand. Half of the participants were instructed to respond with their right or left hand; the other half were instructed to respond with the left or right key. An interaction between temporal reference and response key showed only for the participants instructed to respond with the right or left key. This finding provides further support for the role of extracorporal space for the development of the mental timeline.

Affective priming in judgments of social norm violations

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Recent theories of moral psychology have emphasized the importance of emotion in moral judgment, particularly the influence of disgust. Despite the fast and automatic nature of affective processes, previous empirical research has frequently employed explicit measures, which are susceptible to conscious control. The present study aimed at establishing affective priming as a new experimental paradigm for the implicit investigation of affect-based intuitions in moral judgment. In a series of experiments, a total of more than a hundred participants categorized negatively vs. positively valenced adjectives (evaluative judgment task) and short descriptions of socially unacceptable vs. acceptable actions (socio-normative judgment task) as quickly as possible. These target stimuli were preceded by the short presentation of emotionally

arousing negative vs. positive images or nouns using 250-ms stimulus onset asynchronies, ultra-short masked priming, or simultaneous prime-target presentation. The first hypothesis concerned the replication of cross-domain affective priming effects in simple evaluative judgments. Indeed, faster responses in affectively congruent vs. incongruent trials were demonstrated in all experiments. In some cases, priming affected only responses to positive targets. The second hypothesis, more importantly, targeted affective priming effects in socio-normative judgments in line with prior findings from morality research using affect induction. However, overall congruency effects could not be demonstrated here. In fact, contrary to our expectations, there was a trend for faster detection of norm transgressions after positive compared to negative primes in all experiments. These findings clearly contradict the existing literature on more severe moral judgments after disgust induction based on explicit measures. Implications for moral psychology and the potential of affective priming using complex target stimuli are discussed.

Does the feeling of error detection emerge already before the response?

Francesco Di Gregorio, Martin E. Maier & Marco Steinhauser

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Detecting errors is crucial for efficient goal-directed performance. Several theories propose that error detection occurs when accumulated evidence for an error reaches a threshold for error detection. Nevertheless, some people report the subjective feeling of having detected an error already when they are about to commit it. The present study aimed to test whether such a phenomenon can be measured empirically. To this end, participants performed an arrowhead flanker task. After their response in the flanker task, they had to indicate whether they thought having responded correctly, having committed an “early” error (i.e., the feeling of having detected it already before they committed it), or having committed an error without the feeling of early error detection. In Experiment 1, participants reported the feeling of “early error detection” on 72% of error trials. In Experiment 2, participants could additionally indicate that they didn’t know when they have detected the error, which should reduce the effect of guessing to our data. Here, participants reported the feeling of “early error detection” on 59% of error trials. This study shows that people indeed report having detected errors already before error commission.

Option weights should be determined empirically and not by experts when assessing knowledge with multiple-choice items

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Option weighting is an alternative multiple-choice scoring procedure that awards partial credit for incomplete knowledge reflected by certain distractor choices. Option weights may be

determined either empirically or by expert judgment. We identify a major weakness in the method used by previous studies to investigate empirical option weights. When splitting the sample into two halves for cross-validation, the assessment of the usefulness of empirical option weighting critically depends on how the sample is divided. To obtain more reliable and generalizable results, we therefore used repeated random sub-sampling validation and found that empirical option weighting, but not expert option weighting, increased the reliability of a knowledge test. Neither option weighting procedure improved test validity.

Modeling framing effects in risky choice tasks

Adele Diederich

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Framing effects occur when participants exhibit risk-averse behavior in choices framed as gains and risk-seeking behavior in choices framed as losses. One prominent approach states that framing effects in risky choice are the result of two different systems of reasoning – one that is fast and intuitive and another that is slow and deliberate (Kahneman & Frederick, 2002). To allow for precise predictions we propose a sequential sampling model in which the drift rates and boundaries vary in accordance with the thinking modes, frames, and time pressure. Drift rates are defined by subjective values of the gambles which in turn are determined by Prospect Theory. Furthermore, we assume that the intuitive system precedes the deliberate system and attention shifts from one system to the other during one trial. Because the systems are characterized as being fast and slow, we expect pronounced framing effects under time pressure.

Stimulus conflict triggers behavioral avoidance

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According to a recent extension of the conflict monitoring theory, conflict between two competing response tendencies is registered as an aversive event and triggers a motivation to avoid the source of conflict. Five experiments are presented that tested this assumption and examined whether conflict is associated with an avoidance motivation and whether stimulus conflict or response conflict triggers an avoidance tendency. Participants first performed a color Stroop task. In a subsequent motivation test, participants responded to Stroop stimuli with approach- and avoidance-related lever movements. Results showed that Stroop-conflict stimuli increased the frequency of avoidance responses in a free-choice motivation test and the speed of avoidance responses relative to approach responses in a forced-choice test. High and low proportions of response conflict in the Stroop task had no effect on avoidance in the motivation test. Avoidance of conflict was however obtained even with new conflict stimuli that were not presented before in a Stroop task and when the Stroop task was replaced with an unrelated

filler task. Taken together, these results suggest that stimulus conflict is sufficient to trigger avoidance.

Influences on fixation-related brain activity during scene viewing: An update

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Fixation-related potentials (FRPs), scalp voltage fluctuations time-locked to saccade offsets, are a promising tool to study neural correlates of visual cognition under naturalistic conditions. While several studies have shown that large signal components like LPC or N400 are replicable in FRPs, there is only an incomplete understanding of the basic low-level factors influencing the waveform. This poster presents updated results from a project aiming to identify and disentangle visual activity (peri- and post-saccadic), non-visual activity, and motor activity contributing to the FRP during scene perception. Eye tracking and EEG data were simultaneously recorded from forty participants while they searched for a randomly appearing target stimulus within photographs of natural scenes, phase-scrambled scenes or in total darkness. To allow for recordings in total darkness, the eye tracker was equipped with custom 950 nm LEDs. Modeling of the single-trial response following each fixation uncovered numerous independent influences on early exogenous FRP components (P1/N1). Among the visually-driven effects were strong non-linear influences of the fixated screen region, explained by relative movements of the contrast-rich monitor area across retinotopic cortex. Among the picture-specific visual predictors were the local image luminance at the currently foveated region, the absolute luminance difference between the currently and previously fixated spot, the duration of the last/next fixation, and incoming saccade amplitude. Recordings in darkness also revealed systematic non-visual contributions. These potentials peaked around 100 ms, increased with increasing saccade amplitude and are most likely generated in occipital cortex. Procedures to address these complex influences on EEG data during free viewing are discussed.

On the comparability of processes underlying the joint flanker effect and the joint Simon effect

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Albert-Ludwigs-Universität Freiburg

Previous studies observed compatibility effects in different interference paradigms such as the Simon and flanker task even when each task was distributed across two co-actors. These findings have been taken to indicate that actors automatically co-represent their co-actor's task. Recent research on the joint Simon and joint flanker effect suggests alternative non-social interpretations, but it is still unclear whether both joint effects are driven by the same non-social cognitive processes. We scrutinized this question by manipulating the visibility of the co-actor. The joint Simon effect was not affected by the visibility of the co-actor, providing

further evidence for a non-social, spatial interpretation of the joint Simon effect. The joint flanker effect, however, was reduced when participants did not see their co-actors but knew where the co-actors were seated. To explain these findings, we propose a new explanation of the joint flanker effect that attributes the effect to an expanded attentional focus contingent on the visibility of the co-actor. By additionally including a "pair factor" as random factor in the mixed linear model analyses, we were able to analyze whether participants adapt their responding behavior to their co-actor's behavior. We found an influence of this factor on the effects in the flanker task demonstrating systematic variation between pairs of participants; a random factor that should be considered in future research.

Overt and covert monitoring of non-contiguous locations

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Recent research has shown that covert spatial attention can be split over several non-contiguous locations. However, when asked to monitor several locations at once, people usually do not use covert, but overt attention. We directly compared the effects of covert and overt monitoring of non-contiguous locations during randomly mixed trials of the same task. Participants monitored several non-contiguous locations either overtly or covertly in order to detect a low contrast target. We found that participants´ target detection sensitivity, as well as their decision criterion exhibited very different patterns in the two different modes of attention. These results emphasize the fact that findings about the distribution of covert attention do not necessarily have to be valid for overt attention.

Differential effects of a game-based task-switching training on motivation and interference control in children with ADHD

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Children suffering from ADHD show specific impairments in cognitive control functioning, especially in the ability to shift flexibly between different task sets. These deficits are even more pronounced in contexts with high demands on interference resolution. Recent training studies have shown that practice in task switching with high cross-task interference between task-set representations (i.e., ambiguous stimuli and overlapping response sets) is a promising way to induce cognitive compensation. Children with ADHD also show motivational impairments due to an elevated reward threshold. They may thus be less amenable to low-motivational training settings, especially if demands on interference control are very high. In line with this, it has been documented that the motivational enrichment of the training setting (e.g., by adding video-game elements) can enhance the training outcomes. However, previous evaluations on game-based cognitive training regimens often failed to differentiate between the effects on

motivation and interference control. The present study aims at disentangling the effects of a video-game setting on training motivation and on training performance in task switching under low- versus high-interference task conditions. A preliminary sample of 19 children diagnosed with combined-type ADHD (mean age = 10.42, SD = 1.54 years) performed a task-switching training, which was either embedded into a video-game setting or presented in a low-motivational standard training setting. First results of an ongoing study suggest that the game-setting group showed a substantially higher training motivation, but at the same time decreased cognitive performance towards impulsive responding (shorter latencies with enhanced error-proneness), specifically in the high-interference switching condition. Implications for future clinical cognitive interventions for children with ADHD will be discussed.

Multitasking of young and older adults in ecologically valid scenarios

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Modern society relies on our ability to perform multiple motor and cognitive tasks concurrently, e.g., when driving a car or when using a smartphone while walking. Multitasking skills have been shown to decrease with advancing age, however. It therefore is of essential interest to better understand the age-related decay of multitasking and cognitive skills, and to design effective approaches to maintain or increase these skills. This work should focus on multitasking in realistic scenarios, since cognitive and motor performance in everyday life is oftentimes different from that in laboratory tests (e.g., Bock & Züll, 2013).Executive functions (EF: updating, inhibition, task shifting, dual-tasking) of young (20-30 years) and older (65-75 years) persons will be assessed with standardized laboratory tests. In addition, participants' multitasking skills in natural scenarios will be assessed by use of two virtual-reality (VR) tasks (simulated street crossing and car driving) combined with a battery of realistic loading tasks that draw on participants' working memory, perceptual search, reasoning and movement planning. Specific EF will subsequently be trained in older persons in a ten-week computer-based intervention, and will be re-tested immediately after the intervention and ten weeks later. We expect a moderate correlation between multitasking scores in the two VR scenarios, as well as between those scores and laboratory test values. We expect these correlations to be stronger for older than for young participants, due to the age-related increase of cross-domain associations (e.g. Baltes & Lindenberger, 1997). Finally, we expect that computer-based training will improve older persons' multitasking skills.

Metacognitive judgements of performance in patients with major depression

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RWTH Aachen University

Research: Cognitive deficits in patients suffering from major depression can be found in many

domains like attention and memory, for example. Furthermore, depressive patients often underestimate their own abilities. Evaluating one's own abilities is a metacognitive skill, which has been widely studied in the domain of memory, but here is only little research in other cognitive domains. This study aims to answer the question whether there are also metacognitive deficits in patients suffering from depression regarding the domain of attention. Methods: N = 30 healthy participants as well as n= 30 patients suffering from major depression were asked to make judgments of performance (JOP) before and after participating in a paper-pencil version of the Stroop task. The JOPs referred the accuracy and the speed of responding by using error percentages and msec, respectively. Results: First results regarding differences between patients and healthy controls are presented on the conference.

Central or peripheral attention as source of the attentional blink effect?

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When two targets are presented in a rapid stream of visual stimuli (RSVP, rapid serial visual presentation), the second of these targets (T2) is often missed if it appears within about 500 ms after the first target (T1). This so-called attentional blink (AB) effect, has gathered huge interest in attention and working memory (WM) research in the last two decades. Several explanations have been put forward to account for this effect, some focusing on more „central" mechanisms in working memory (e.g. consolidation hypothesis), and some on rather „peripheral" visual-attention processes (e.g. attentional gating). In an attempt to distinguish between different accounts from these two fields, the frequencies of the individual lags (i.e. temporal intervals) between T1 and T2 were varied within (Exp. 1) and between (Exp. 2) participants. The results clearly show that in conditions with many short and few long lags the AB effect was attenuated relative to an equal lag-frequency condition, whereas in a condition with few short and many long lags the effect was even increased. The attenuation, however, was not strong enough to eliminate the AB effect (Exp. 1) and rather resulted from an extension of the effect across all lags (Exp. 2). These results are interpreted in terms of central attentional limitations in WM rather than limitations in peripheral visual attention as the cause of the AB effect.

Who is stripy and who isn't? Using negation to investigate the lexical and sentential influences on the N400 complex

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Successful language comprehension usually requires the comprehender to take into account information from various sources, in particular linguistic information given by the sentence, contextual information, as well as information that is available from linguistic and non-linguistic background knowledge. The N400 complex typically indicates integration difficulties that arise

during the comprehension process. Up to date it is, however, still unclear to what degree the N400 reflects lexical associations as opposed to higher-level sentence integration processes. In the current study, we used affirmative and negated sentences allowing for a manipulation of the sentence's truth value without changing the critical content words in the sentence (i.e. keeping the lexical associations identical). Specifically, we focused on true sentences (e.g., "Zebras are surely stripy"), sentences with a world-knowledge violation (e.g., "Ladybirds are surely stripy") and sentences with a semantic violation ("Songs are surely stripy"), as well as on their negated counterparts. Whereas a true sentence becomes false when negated ("Zebras are not stripy"), a sentence with a world knowledge violation becomes true ("Ladybirds are not stripy"). Interestingly, a sentence with a semantic violation seems to stay violated when negated ("Songs are not stripy"). This material thus allows distinguishing between integration difficulties arising from lexical content and integration difficulties arising from different processes at the sentential level. First results suggest that the influence of lexical associations overweighs sentence integration processes in the N400 complex. Implications for the N400 measure – and the use of this measure in sentence comprehension studies - will be discussed.

Multi-attribute decision making: A diffusion model approach

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In multi-attribute decision making, decision makers need to choose between two options the one with the higher criterion value. Options are described by several cues and cues are predictive of the criterion to different degrees. Decision makers have been found to differ in the amount of cues on which they base their choices: Some base their choices on only one cue (Take-The-Best; TTB), others base their choice on a combination of cues (weighted-additive rule; WADD). An evidence accumulation model has been proposed to account for the choice behavior of TTB and WADD, where TTB-decision-makers are assumed to have lower decision thresholds than WADD-decision-makers. Participants performed a multi-attribute decision task and we classified them as either TTB or WADD on the basis of their choices. We further manipulated the consistency of cues and measured decision times. Choices and decision times were analyzed with a diffusion model. We found lower threshold parameters and higher drift rates for TTB than for WADD.

Action selection by temporally distal goal-states

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In line with ideomotor theory, numerous response-effect compatibility (REC) studies found evidence that action -effects are anticipated prior to action initiation, as indicated by an REC effect: a response is given faster when its effect occurs on the same compared to the opposite

side. So far, REC studies only applied contingent effects, i.e., effects occurring immediately after the response was given. However, it may be argued that in everyday life, many actions cause effects which do not occur immediately. Additionally, as actions can have more than one effect, desired effects occurring in the future may only be arrived at by achieving fundamental effects first. The present study investigated whether temporally more distal effects are anticipated in order to initiate actions, and how multiple, serially occurring effects are represented. To this end, a spatial REC paradigm was extended in a way that a first contingent effect (that immediately followed the response; E1) was 500 ms later followed by another visual effect (E2). An REC effect was only observed for the temporally more distal effect E2. Taken together, these results indicate that temporally more distal effects are anticipated, and that multiple, serially occurring effects are represented separately rather than as a composite.

How to interact with a Cybercar? Attitudes and expectations on the interaction and communication with fully automated vehicles

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German Aerospace Center (DLR)

In this paper, we are addressing the question how driverless vehicles (Cybercars) driving fully automated could interact with surrounding traffic participants. Cybercars present a new mobility approach and are dedicated to provide a new way of transportation for short to medium distances, especially in city centres or on campus areas. As Cybercars are operated in non-dedicated environments the interaction with other either motorized or non-motorized, vulnerable road users become a crucial factor. We conducted a face-to-face interview study (N=14, structured interview, 25-53 minutes) at the German Aerospace Center (DLR) to investigate the expectations people have towards the concept of Cybercar and the interaction with Cybercars. On the one hand, results show that people prefer quite conservative interaction elements as known from conventional vehicles such as braking lights or indicators to predict the future behaviour of Cybercars. On the other hand, 53% of the participants wish additional information like a stopping announcement of the Cybercar or whether pedestrians were detected or not. Based on the results, we discuss how Cybercars could be designed to optimize the interaction and communication with other traffic participants.

New findings on object permanence among 2.5-year-olds concerning the rotation of hidden objects

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Object permanence relates to the ability to mentally represent an object that is temporarily out of sight. While 3.5-month-olds show object permanence for hidden objects that remain static (Baillargeon, 1987), more advanced skills are required to mentally track the movement of

hidden objects. Sophian (1984) claimed that children not before 42 months of age successfully search for an object hidden under a cup whose location has been transposed with that of an empty cup. However, more recent research has suggested that children's ability to track moving hidden objects might depend on the type of movement and the discriminability of the hiding locations. Using a paradigm in which the hiding cup and the empty cup were rotated, 40-month-olds performed on chance level after a 180° rotation but searched successfully when cups were rotated by 360° (Okamoto-Barth & Call, 2008). Moreover, in another paradigm 22-month-olds found the hidden object more often when hiding locations differed in their appearance (i.e., different colors and additional marks) rather than when looking the same (Garrad-Cole, Lew, Bremner, & Whitaker, 2001). The present study examined the effects of discriminability of the hiding locations and rotation angle on the search performance of 30-month-olds. Children were prompted to find a hidden object under one of two identical or differently colored cups whose locations were rotated by either 90° or 180°. Children performed as a group and on individual level above chance when the cups were rotated by 90° but on chance level when they were rotated by 180°. Contrary to our expectations, their performance was not affected by the different colors of the cups. Results are discussed with regard to children's development of object permanence and their ability to use landmarks in search tasks.

When and why social exclusion affects the discrimination between lie and truth

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Previous research has shown that people are not better than chance in discerning lies from truths. One reason is the often more difficult processing of verbal than nonverbal cues to deception. Verbal cues to deception are often the more valid cues so that the accurate processing of these cues can improve the discrimination between lie and truth. In several experiments, we investigated whether social exclusion affects the processing of verbal information and thereby the ability to discriminate lie from truth. Building on the finding that social exclusion increases the processing of highly affiliation-relevant information, we hypothesized that social exclusion improves the discrimination between lie and truth when the verbal content of the messages is of high (vs. low) relevance to affiliation. The results of our studies support our hypothesis on condition that the senders of the truthful and deceptive messages are appropriate affiliation candidates.

Compatibility effects of motion direction and/or stimulus position with target direction in response priming

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How do dynamic and spatial information of a prime stimulus influence the response to a

subsequent target stimulus in a modified response priming paradigm? Response priming refers to the finding that a prime stimulus influences the responses to a target stimulus that follows the prime after a short temporal delay. When both stimuli evoke the same response tendency, reactions are typically faster. In the current experiment, we modified the classic response priming paradigm using dynamic prime stimuli (moving dot rows) and including elements of spatial cuing, that is, varying the position of the prime stimuli. Hence, compatibility effects of both motion and position were possible. With a stimulus onset asynchrony (SOA) of 150 ms, we found a positive compatibility effect of motion direction. However, with a longer SOA, of 300 ms, negative compatibility effects for both factors were found: faster responses to targets that moved in the opposite direction, or were presented in the opposite location, as the primes. Results are discussed in relation to previous findings from experiments utilizing response priming and cuing paradigms, as well as different theories on positive and negative compatibility effects.

Intranasal oxytocin modulates eye gaze towards stimuli related to attachment and pair bonding

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Research on the neuropeptide oxytocin has revealed a plethora of effects on social cognition and pair bonding. Using intranasal application, it has become an interesting neuromodulator for both, basic and clinical research. On the one hand, oxytocin influences complex processes, such as empathy or generosity. On the other hand, it modulates basal neural and endocrine responses. We aimed to investigate whether oxytocin modulates social cognition and bonding at a basic perceptual level: the eye gaze towards stimuli related to attachment and own relationship. In the current eye-tracking study, standard pictures of dyads, of unfamiliar faces and of the own partner were used. We investigated whether oxytocin might affect focus on bonding-related areas of interest (AOIs; e.g. the face, the eyes). In a double blind placebo controlled design, 24IU of oxytocin vs. placebo were intranasal administered. N= 70 participants (37 women, 33 men), of whom 29 were in a romantic relationship, were repeatedly assessed two weeks apart. Analyses suggest that oxytocin increased eye-focus towards the informative eye and face regions, as well as pupil dilation towards attachment stimuli. Furthermore, oxytocin led to significant shorter gaze duration towards unfamiliar faces in pair-bonded women compared to placebo control. Surprisingly strong carryover effects were found, indicating that the hormonal treatment at the initial contact to social stimuli determinates how the same stimuli are processed in later sessions. Our results demonstrate an important influence of oxytocin to basal social cognition and stimuli associated with attachment and bonding. Effects of repeated oxytocin administration on social cognition processes have rarely been investigated in the past. Particularly the neuropeptide´s long-term effects might have relevance for clinical applications.

Emotional backward compatibility effects in dual-task performance

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Responses in the second of two subsequently performed tasks can speed up compatible responses in the temporally preceding first task. Two experiments show that responses to affective stimuli were selected faster in Task 1 when an affectively congruent response effect was anticipated for Task 2. This emotional backward compatibility effect demonstrates that affective features of the response in Task 2 were activated before the selection of a response in Task 1 was completed—a finding that is problematic for the assumption of a serial stimulus-response translation stage. Our research shows that the affective consequence of a response is anticipated during action selection, which means that response selection considers codes that represent and, thus, predict emotional action consequences.

Potentials and limitations of voluntary pupil control: Real-time feedback in pupil-based biofeedback applications

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During the past years, increasing attention is being paid to operationalize pupil dynamics for user characterization in human-machine interaction (HCI) (Jacobs, 1996). Thereby, pupil dynamics are regarded as a passive information channel that provides direct impressions of the user's cognitive state but defies any voluntary control (Loewenfeld, 1993). However, given that standards for biofeedback-based training are provided, pupil size can be deliberately influenced. In a recent study (Ehlers et al., submitted), we applied visual real-time feedback on pupil diameter changes to enable intentional influence on the related dynamics. Results indicate that every participant was capable of inducing pupil dilations beyond baseline values by modulating sympathetic arousal; albeit with varying degrees of success and over differing durations. Thereby it is reasonable to assume positive loop effects due to successful feedback that cause additional increase of activation and strengthen the effect (Ekman et al., 2008). Hence, our current study focuses the impact of various forms of (real-time) feedback to better differentiate between endogenous generated and external triggered dynamics. Data analysis is currently in progress. Results will shed light on the operating principles in pupil-based biofeedback applications and provide further indications of how accurate and reliable voluntary pupil control in HCI may become.

Representation of sequential time on the back-front mental timeline in adults and pre-school children

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University of Tübingen

It has been suggested that abstract concepts like time need to be grounded in concrete domains such as space that are accessible to direct experience. Accordingly, the concept of time is thought to be represented in terms of space, i.e. as mental timeline running from back/left (past) to front/right (future). Evidence for this notion comes from a number of empirical studies employing spatial arrangement tasks. In these studies, participants typically arrange pictures depicting temporal sequences on a plain surface according to their mental timeline. Moreover, when asked to make earlier/later judgements, participants respond faster when a left keypress corresponds to an earlier response and a right keypress corresponds to a later response compared to the reversed mapping. In the present study, we examined this space-time congruency effect for sequence judgements on the back-front mental timeline. Since it is still unclear when and how the mental timeline develops in children and whether it is necessary for an understanding of temporal succession, we tested adults as well as pre-school children in a picture sequence judgement task. Two pictures depicting a temporal sequence were presented successively and participants judged whether the second picture depicted an earlier or a later state than the first picture. Participants responded by making whole body forward or backward movements. Results show a clear difference between the space-time congruency effect on response times of adults and children. This suggests that the mental timeline is not yet fully developed in pre-school children, although these children were able to make correct sequence judgements.

Application of pupillometry in medical contexts

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TU Chemnitz

Pupil size is a readily accessible correlate of neurophysiological and cognitive processes. Although the pupil light reflex is widely used as a simple and reliable diagnostic tool for fundamental brain function, the usefulness of pupillometry in more high-level cognitive contexts has only been started to be exploited. In my talk, I will review our recent work on pupillometry in the context of psychiatric and neurological disorders. First, I will show how pupillometry in conjunction with functional imaging helps revealing the circuitry underlying pain empathy in neurological patients and healthy controls. Second, I will report ongoing work on pupillometry as measure of embarrassment and vicarious embarrassment with applications to autism research. Finally, I will demonstrate our recent progress on using purposefully elicited pupil responses as a means of communication for patients with severe motor impairments.

Pupillary response to conceptual fluency in aesthetic appreciation

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Universität Konstanz

Early empirical theories tried to explain aesthetic preferences by relatively basic object features such as symmetry or color. Only recently, more integrative models have been proposed that also consider cognitive and emotional processes. Relevant mechanisms in this respect seem to be perceptual and conceptual fluency, i.e. the idea that fluent mental processing is rewarding by eliciting positive feelings. However, studies examining the effect of fluency on aesthetic judgment, especially the relation with emotion, are rare. Recently, Kuchinke, Trapp, Jacobs, and Leder (2009) used pupillometry to examine this issue. Their participants saw reproductions of cubistic paintings which differed in abstractness. As expected, less abstract pictures were not only processed more fluently and liked more, they also produced larger pupil dilations than more abstract paintings. Thus, their results support the idea that fluency produces emotions that affect aesthetic appreciation. The aim of the present study was to replicate and extend these findings by presenting expressionistic paintings in addition to cubistic art works. As a result, more fluent processing was again associated with aesthetic preference, shorter response times and a greater pupil size. These relations held for both the processing of cubistic and of expressionistic artwork. Therefore, our results support the idea that the effect of fluency on aesthetic preference is mediated by emotional responses.

Cycling anger of regular cyclists and professional bicycle messengers in Germany: Further validation of the Cycling Anger Scale

Birte Emmermann & Michael Oehl

Leuphana University Lüneburg

Cycling anger defined as the propensity of cyclists to become angry in traffic is a concept so far rather neglected in research. However, as the popularity and use of bicycles as means of daily transportation is growing, an increase of cyclists involved in accidents becomes evident. This development is not limited to Germany and both described trends are pronounced especially in urban areas. So far, research on emotions in traffic has been focusing rather on car drivers than on cyclists. To bridge this gap and to suggest a measure assessing cyclists' anger experience in traffic, we developed a Cycling Anger Scale (CAS). On the basis of previous qualitative research a questionnaire was developed assessing cyclists' anger experience in interaction with their cycling environment. This current study aimed at a further validation of the CAS and at assessing the structure of cycling anger. Two samples of cyclists were examined (N = 421 regular cyclists and N = 123 professional bicycle messengers). Exploratory and confirmatory factor analyses proposed again four subscales of the CAS: police interaction, car interaction, cyclist interaction, and pedestrian interaction resulting in a short CAS total scale with 12 items. Cross-validation supported these results. Alpha reliabilities were acceptable to good. The CAS correlated significantly with the Driving Anger Scale for car drivers and with the general State-Trait Anger Expression Inventory suggesting convergent validity and providing a complementary instrument

for measuring cycling anger in traffic. Additionally, results of the CAS revealed gender differences between regular cyclists: male cyclists showed overall higher anger scores. Moreover, bicycle messengers experienced generally and on the subscales cyclist interaction and car interaction less anger than regular cyclists. For both cyclists groups significant correlations between cycling anger and self-reported risky cycling behaviour was observed.

Salient nutrition labels increase the integration of health attributes in food choice - (Attentional) drift diffusion modeling

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Food decisions occur very frequently and often require a trade-off between health and taste attributes. Nutrition labels are commonly used to convey the health attributes of food products. Previous research suggests that labels differ in their effectiveness in conveying health information and increasing healthy choices. However, the psychological mechanism of how different nutrition labels influence food choices is rather unknown. Here, we used a preference-based binary decision task in which participants choose between a healthy and an unhealthy product, labeled either with a salient traffic light (TL) label, or a numeric, information-based label. We use traditional logistic regression analyses as well as computational modeling to analyze if and how different labels affect the decision-making process. We found that TL labels induced a significant choice bias, in that the TL labels increased the probability to choose the healthy product, and the effect was highest when the unhealthy product was preferred, or roughly equally liked. Using drift diffusion modeling, we first analyzed drift rate differences due to the label. We then let the drift rate vary as a function of taste ratings to determine the weight on health and taste attributes for each label. We found that TL labels increased the drift rate towards healthier options, compared to numeric labels. The TL labels increased the sensitivity for health and decreased the weight on taste attributes. Results suggest that health and taste information are integrated as a single source of evidence in the decision-making process. Results are consistent with models stating that information as well as values and internal goals converge in a single valuation signal in goal-directed decision-making. Salient labels proved to be more effective in altering this valuation process towards healthier, goal-directed decisions. We now also obtained eye-tracking data and will analyze them using the attentional drift diffusion model.

Does unitization reduce the associative memory deficit in old age?

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Episodic memory declines in old age and age-related memory changes are characterized by a decline in associative memory and preserved memory for items. We investigated whether this

associative memory deficit can be reduced by unitization, a process by which two items are bound together and encoded as a single representation. Young and older adults studied semantically unrelated word pairs in one of two conditions. In the inter-item condition, each word of the pair had to be inserted into a sentence with blanks. In the unitization condition, a definition that described the pair as a novel compound word allowed the two words to be fused into a single concept. In Experiment 1, memory for the word pairs was tested with an old / new recognition task. Unexpectedly, older adults showed better memory performance in the inter-item associative than the unitization condition while memory performance of young adults did not differ between the conditions. To test whether the lower performance of older adults in the unitization condition was due to difficulties with the old/new test format of the recognition task, which imposed high demands on recollection-based retrieval, in a first follow-up experiment the test format was changed to a 2-alternative-forced-choice task that supports familiarity-based remembering. A second follow-up experiment additionally included a response deadline in the test phase to prevent the use of alternative retrieval strategies. Notably, in both follow-up experiments associative memory performance of older adults did not differ between the two conditions. Taken together, unitization does not always alleviate the associative memory deficit of old adults. Among factors that affect whether older adults are able to successfully apply unitization encoding, the manner in which associative memory is tested plays a key role, in particular the extent to which the test format supports familiarity-based remembering.

Neural correlates of temporal overestimation

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Our experience of time is often subject to distortions. The apparent slowing down of time during unexpected events is a striking example of this. Previous research has identified increased generation and registration of time pulses by an internal pacemaker as a possible cause of this effect. However, its neural underpinnings are not yet well understood. We propose that surprising, motivationally salient events cause a neural response that alters the subjective perception of time by increasing the amount of information encoded. Centrally, we assume that the P3 component of the event-related potential (ERP) is a correlate of this neural response. Therefore, we hypothesized that the P3 amplitude can be used to predict whether the duration of a stimulus will be overestimated or not. To this end, we recorded ERPs during an oddball task with pseudo-words of varying duration. Infrequent red target oddballs were embedded within a series of frequent white distractor stimuli. Participants were asked to memorize the target oddballs and to estimate whether their duration had been longer or shorter than the duration of the preceding distractor. In addition, participants were also asked to estimate the duration of distractors on infrequent catch trials. As expected, the duration of target oddballs, but not of distractors, was overestimated and overestimations were associated with larger P3 amplitudes than correct estimates. Because the P3 peaked before stimulus offset, we conclude that this

effect is independent from actual oddball duration. Moreover, using single-trial analysis we found that the greater the temporal overestimation, the larger the P3 amplitude. Together, our results suggest that the neural processes underlying the generation of the P3 contribute to the subjective expansion of time. This implies that factors affecting the amplitude of the P3 should also alter time perception and vice versa.

A novel singleton color captures attention on its first presentation

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While it is common wisdom that a salient visual event draws attention, experimental research provided only mixed support for this hypothesis. The present experiment seeks evidence that a singleton draws attention to the degree that its feature is novel or unexpected. To test this proposition, an irrelevant singleton paradigm is used where a salient singleton that is uncorrelated with the target position is presented on each trial to familiarize participants with the presence of the singleton. On the critical trial, the singleton was presented in a novel color for the first time and without prior announcement. The singleton was gazed at significantly earlier and longer in the critical trial, as compared to the pre-critical trials. This result is consistent with predictions from the expectancy discrepancy hypothesis that color-novelty is sufficient to capture attention.

The influence of blue-light protection glasses on sleep quality in morning and evening types

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The circadian photoreceptor responds predominantly to blue light which delays release of the sleep hormone melatonin, and may disrupt circadian rhythms. Digital devices including smartphones, tablets, and computers emit high concentrations of blue light. Therefore, the wearing of blue-light protection glasses in the evenings may help to normalize sleep patterns. In this study, 25 participants used blue-light protection glasses when using digital media in the evenings for two weeks. Another 25 participants used similar glasses without the property of filtering out blue light as a control condition. Results show that sleep length, latency, efficiency as well as subjective sleep quality improved in these two weeks. Especially the evening types benefit from this intervention. Since these effects also appeared in the control condition, the treatment seems to have triggered aspects of sleep hygiene which improves sleep independent from the blue light exposure.

Variation of ingroup preference in the Affect Misattribution Paradigm

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System Justification Theory (SJT) postulates that members of low-status groups show implicit outgroup favoritism toward higher-status groups. However, SJT does not consider the role of ingroup identification in shaping inter-group attitudes. In Experiment 1, using a novel groups design, we manipulated status and ingroup identification and measured implicit ingroup and outgroup evaluations using the Affect Misattribution Paradigm (AMP). Additionally, participants provided explicit ingroup and outgroup judgments of warmth and competence. Our main hypothesis was that implicit ingroup evaluation would primarily be a function of ingroup identification, regardless of group status. As expected, members of low-status and high-status groups displayed implicit ingroup favoritism regardless of group status, but effects varied with identification. Most importantly, implicit ingroup evaluation was primarily a function of identification. Results are discussed in light of Experiment 2, using a real group, as well as inter-individual differences in implicit evaluations and their relation to warmth and competence.

The dopamine transporter: From molecular imaging and pharmacology to cognition and clinical symptoms

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In this talk, I will present evidence on the role of the dopamine transporter (DAT) in brain function, cognition and the clinical symptoms of attention deficit hyperactivity disorder (ADHD). Experimental studies using methylphenidate, a DAT blocker, indicate that temporal aspects of eye movement control are improved by this compound. Using functional magnetic resonance imaging (fMRI), we observed that methylphenidate has anatomically specific effects in the putamen, in agreement with the known pattern of DAT expression. We also observed that the 40-bp VNTR in the 3' UTR of the DAT gene (SLC6A3), predicts methylphenidate effects in a thalamo-cortical network during response inhibition, with 9R-carriers showing an increase in BOLD signal but 10R homozygotes showing a decrease. These findings are consistent with previous evidence of enhanced sensitivity to pro-dopaminergic interventions in 9R carriers and can be reconciled with our meta-analysis of pharmacogenetic studies of ADHD patients, where 10R homozygotes show less clinical response to methylphenidate treatment in naturalistic trials than other genotypes. The molecular mechanisms of the observed pharmacogenetic effects remain unclear, however, as striatal DAT availability, measured using SPECT, was not related to the magnitude of methylphenidate effects. This suggests that the SLC6A3 VNTR may act via mechanisms other than transporter availability. Finally, a recent meta-analysis failed to show any association between the SLC6A3 VNTR and various domains of cognitive function in healthy adults. We conclude (1) that DAT blockade through methylphenidate improves timing processes underlying oculomotor control, (2) that methylphenidate effects on brain function and ADHD symptoms depend in part on SLC6A3 genotype and (3) that in the absence of pharmacological

challenges the SLC6A3 VNTR has effects that are penetrant at the level of striatal DAT availability and brain function but not observable cognition.

Theory of Mind and executive functions in preschoolers

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Whereas 3-year-olds often perform poorly on tasks assessing Theory of Mind (ToM), most 5-year-olds master with ease (e.g. Anderson, 2002; Wellman, 2002). Several studies indicated that gains in executive functions (EF) might account for advances in the development of ToM (e.g. Carlson et al., 2002). The aim of the current study was to investigate how the individual components of EF, working memory, inhibitory control, and cognitive flexibility, separately relate to ToM performance of preschoolers. 304 German preschoolers between 35 and 80 months (52% male, M_{age} = 55.44 months, SD_{age} = 12.34) participated in the study. Digit Span (Petermann & Petermann, 2008) and Block Recall (Gathercole et al., 2004) were used to assess working memory, Tower (Kochanska et al., 1996) and Sticker Choice (Thompson et al., 1997) to assess inhibitory control, and Dimensional Change Card Sort (Zelazo, 2006) to assess cognitive flexibility. ToM was assessed using the Stuffed Toy Story (Bischof-Köhler, 2000). Performance on ToM and EF tasks varied as a function of age, with significant improvement occurring from 3 to 6 years. Correlational analysis continuously showed highest correlations between ToM and working memory measures for all age groups except the 3-year-olds. A stepwise multiple linear regression analysis was carried out. All EF measures as predictors of ToM were entered. All variables except for Tower added significantly to the prediction (all $p < .02$,), however, working memory measures explained the majority of the variance. The present study indicates that out of all three components of EF, working memory plays the biggest role in the development of ToM. Results suggest that advances in the capacity to hold information in mind influences the development of ToM substantially. As with all studies on this age group, results depend heavily on the measures used. Therefore, replications as well as new studies using different kinds of assessments of ToM and EF are needed.

Emotionserkennung bei Schizophrenie und Borderline Persönlichkeitsstörung

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Sowohl Patienten mit Borderline Persönlichkeitsstörung (BPS) als auch Patienten mit Schizophrenie weisen deutliche sozial-kognitive Defizite auf. Hinsichtlich der Emotionserkennung existieren zahlreiche Befunde, die auf einen negativen Bias in der Emotionserkennung, insbesondere für neutrale Gesichtsausdrücke, hinweisen. Die emotionalen Kontextbedingungen, unter denen ein solcher negativer Bias auftritt, sind bislang jedoch wenig untersucht.44 Patienten mit BPS, 29 Patienten mit Schizophrenie und 44 hinsichtlich Alter und

Bildung parallelisierte gesunde Probanden nahmen an einer Emotionserkennungsstudie teil. Es wurde ein Emotionserkennungsparadigma verwendet, in dem jedem zu klassifizierenden Gesichtsbild entweder ein positiv, neutral oder negativ valentes Szenenbild aus dem International Affective Picture System voraus ging. Patienten zeigten im Vergleich zu Gesunden eine signifikant geringere Emotionserkennungsleistung für positive und neutrale Gesichtsausdrücke. Zudem zeigten beide Patientengruppen signifikant mehr negative Klassifikationen neutraler Gesichtsausdrücke als gesunde Kontrollprobanden. Patienten mit Schizophrenie zeigten zudem mehr positive Fehlklassifikationen als gesunde Probanden und als Patienten mit BPS. In keiner der Gruppen zeigte sich ein signifikanter Effekt der IAPS-Bilder. Die Ergebnisse stützen bisherige Befunde zu Defiziten in der Emotionserkennung bei Schizophrenie und BPS. Zudem weisen die Befunde für die Fehlklassifikationen neutraler Gesichtsausdrücke auf einen negativen Bias bei BPS und einen generellen Emotionsbias bei Schizophrenie hin. Die Ergebnisse liefern jedoch keine Hinweise darauf, dass ein signifikanter Einfluss vorangehender emotionaler Information auf die Emotionserkennungsleistung besteht und legen daher die Vermutung nahe, dass der negative Bias bei Patienten mit BPS und der emotionale Bias bei Patienten mit Schizophrenie kontextunabhängig auftreten.

Blind spots & arousal patterns in unethical behavior: An eye-tracking analysis

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In previous work, people reported to experience ethical dissonance when behaving dishonest. One proposed explanation is that their self-interest maximizing behavior stands often in conflict with their moral self-image (Self-Maintenance theory), whereas another account suggests that people are cognitively limited and systematically biased in their moral judgments (Bounded Ethicality). In an eye-tracking study, we aim to test the validity of these two main theoretical accounts in the context of strong and weak honesty norms. If cheating behavior is predominantly unconscious and motivated reasoning leads people to biased perceptions that the payoff-maximizing alternative is the correct and honest response, we should expect a confirmation attentional bias where the locus of attentional processing in dishonest responses is biased towards the high-paying alternative independent. On the other hand, if people first become aware of the correct answer and only then deliberately decide to act dishonestly, we should expect a more balanced locus of attentional processing that facilitates a more accurate representation of the available information and potentially a bias towards the higher incentivized option at a later stage of the decision process. The results show that the decision to cheat within a flexible dot task is mainly made before the concrete decision situation is even presented, indicated by a pre-decisional increase in arousal in cheating decisions. However, we also found that attentional biases occur in the information search phase, suggesting that people aim to avoid increased tension by preemptive biased processing. This pattern of results provides support for the relevance of both accounts with regard to the underlying mechanism of dishonest responses.

Reinterpreting allocentric effects using egocentric spatial reference frames

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Max Planck Institute for Human Development in Berlin

Does the brain encode object locations using spatial reference frames that are independent of the egocentric position? In other words, are object locations represented relative to other objects or landmarks, using an allocentric spatial reference frame? Whereas a wealth of behavioral and neuroscientific evidence exists for egocentric (eye-, head-, hand-, or other body-centered) spatial reference frames, the existence of allocentric (object- or world-centered) spatial reference frames has been debated. Here, I review several behavioral and neuroscientific findings, from visually-guided goal-directed movements to spatial navigation and scene processing, which suggest that the brain may rely on entirely egocentric spatial reference frames. The (behavioral or neural) effects observed when objects and landmarks are used to guide movement or spatial judgments could equally well be explained via non-spatial mechanisms, such as holistic object or scene recognition from the egocentric perspective; rule-based decision making; or imagined spatial transformations. The latter include mental rotation or translation of the self or of objects such that spatial judgments can be made from an egocentric perspective. These findings suggest the need to distinguish spatial versus non-spatial allocentric mechanisms when using the term allocentric. I outline several testable predictions that could differentiate spatial vs. non-spatial mechanisms in egocentric and allocentric processing.

Complexity of elements in pictorial compositions as predictor for aesthetic appreciation

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Theodor Fechner (1876), the founder of experimental aesthetics, suggested that a fundamental aspect of aesthetic preference is diversity ('Mannigfaltigkeit'). He assumed that an object can be contemplated with pleasure if it possesses a so-called unified variety. Pleasure increases with the degree of perceived unity, and extends through a greater variety. This idea is consistent with empirical results showing that stimuli with a more complicated structure are liked more than those with a less complex structure. A feature of visual objects which reflects diversity is rotational symmetry. Geometrical objects can have a higher or lower degree of rotational symmetry. For example, a hexagon has more mirror-axes than a triangle and, therefore, has a higher unity and is more complex. In the current study, we investigated the effect of the rotational symmetry of elements in pictorial compositions on aesthetic preferences. Our stimuli consisted of seven elements with same shape but different size. These shapes (triangles, squares, pentagons or hexagons) differed in their degrees of rotational symmetry. On each trial, participants had to indicate which one of two stimuli with the same pattern but different element shapes they liked more. It was hypothesized that stimuli with elements of a higher degree of rotational symmetry are preferred. Furthermore, it was of interest to what extent the preference depends on the specific pattern of elements. Our results show that preference for

the different elements was clearly ordered, irrespective of the pattern. However, the order did not depend on the degree of rotational symmetry. Rather, for liking it was crucial how many of the element axes were main axes.

Attentional bias triggers disgust-specific habituation problems in subclinical contamination-based obsessive-compulsive disorder

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Disgust-specific emotion regulation seems to be strongly impaired for people with increasing tendency to contaminated-based obsessive-compulsion disorder (C-OCD). In the present study, 58 subclinical participants performed a modified emotional go/no-go task to measure early attentional disengagement problems elicit through validated neutral, disgust- and fear-specific pictorial material. The task was slightly modified to measure emotion elicited changes in heart rate and facial muscular activity. The results show that in comparison to fear induction, disgust induction is followed by greater problems of behavioral execution and attentional disengagement, but not by greater problems of inhibitory control. This supports the hypothesis of a general freezing of all ongoing activities after short stimulus presentation. There is also a strong reaction time reduction between the experimental blocks, a greater disgust-specific facial muscle activity and a strong heart rate deceleration compared to the baseline. These results are in line with the biological cost and benefit hypothesis. Furthermore, when the tendency to C-OCD increases, habituation effects of heart rate and reaction time is increasingly impaired, likely due to stronger obsessions and repeated exploration. Furthermore, the results support an experimental paradigm combining the emotional go-/no-go task and psychophysiological measures.

Attentional changes in Mild Cognitive Impairment

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Ludwig-Maximilians-Universität München

Attention functions are considered critical determinants of cognitive abilities in older age. They are known to decline with normal aging and they seem to be particularly affected by pathological aging processes induced by Alzheimer's disease. In a series of studies, we assessed critical parameters that characterize an individual's visual attention capabilities with high cognitive specificity. Here, we focus on changes in the speed of visual perception in patients with Mild Cognitive Impairment (MCI) at risk for developing Alzheimer's diseases. Using a TVA-based whole report we found significant changes in the response to an alerting cue in a group of patients with MCI compared to a demographically matched healthy control group. In a second study, we demonstrated how changes in perception of complex visual information are related to basal changes in visual processing speed. These results indicate the existence and the

relevance of attentional deficits during early stages of Alzheimer's disease.

Modality specific crosstalk in multitasking: Modality compatibility in "mixed" mappings

Edina Fintor, Denise N. Stephan & Iring Koch

RWTH Aachen University

The term modality compatibility refers to the similarity between the stimulus modality and the modality of response-related sensory consequences. Earlier studies found higher switch costs in task switching in modality compatible tasks (auditory-vocal and visual-manual) than in modality incompatible tasks (auditory-manual and visual-vocal). These previous studies examined switching either between two modality compatible or two incompatible tasks. The aim of the present study is to examine modality compatibility when switching between modality compatible and incompatible tasks. To this end, a novel experimental design was developed by implementing mixed mappings. With these mixed mappings, performance can be assessed when switching between a modality compatible and an incompatible task by switching either the stimulus modality (e.g., auditory-vocal and visual-vocal) or the response modality (e.g., visual-manual and visual-vocal).We will discuss the results in the context of response-based priming. Task interference should be much larger when switching between two incompatible tasks than when switching between a compatible and an incompatible task because response based priming of the competing task will also prime the competing response modality, whereas this should not be the case when the response modality is constant. Moreover, priming of the competing stimulus modality should be rather uncritical when the relevant stimulus modality remains constant.

Serotonergic effects on action monitoring in a pharmacogenetic EEG study

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The serotonergic system influences diverse aspects of action monitoring and cognitive control, yet results of studies remain ambiguous today. Inter-individual genetic differences may be a confounding factor contributing to this problem. Here, we investigate the effect of an acute intravenous application of the SSRI citalopram on action monitoring functions and their EEG correlates while controlling for the influence of 5-HTTLPR and two additionally modulating SNPs in a placebo controlled cross-over design in a caucasian sample of 31 healthy subjects. In a flanker task, we found increased post-error slowing in subjects with presumably lower serotonin transporter gene expression. Additionally, pharmacological blockade of the serotonin transporter increased post-error slowing across all subjects. Electrophysiological correlates of error monitoring functions (ERN and Pe) were unaffected by genotype and medication. The data speak towards an association of increased extracellular serotonin levels with increased behavioral adaptation following errors. As no effect was seen on cortical correlates of these

functions, this effect may be mediated subcortically.

Transfer between different minimally-complex DDM tasks

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In this study, two kinds of Dynamic Decision Making (DDM) will be contrasted and compared to each other (event-driven dynamic decision making vs. real-time dynamic decision making).More specifically, in an experimental design, participants were presented to a series of DDM-tests (e.g., the event-driven MicroDYN-test & the real-time Dynamis-test). The order of tests was varied systematically to test for transfer effects between the MicroDYN-test and the Dynamis-test: One fourth of all participants worked on MicroDYN before they worked on Dynamis, one fourth worked on Dynamis before they worked on MicroDYN, one fourth worked on two different MicroDYN-tests, and one fourth worked on two different Dynamis-tests. Results indicate a transfer effect from MicroDYN to Dynamis, but not the other way round. We argue that participants learn something important about real-time dynamic problems while working on MicroDYN-tasks (but may be unable to do so in case of real-time problems). Implications for psychometric applications of the MicroDYN-test will be discussed.

Competing biases in mental arithmetic

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Three experiments investigated cognitive biases in mental arithmetic. Healthy adults produced lines whose lengths corresponded to the correct outcomes of multiplication and division problems. We found a reliable tendency to overestimate division outcomes (Experiment 1) and discovered an over-reliance on the first operand for multiplication (Experiments 2 and 3). These previously unknown biases are interpreted as non-spatial contributions of anchoring to the operational momentum effect in mental arithmetic.

The regulation of cognitive control in multiple task performance – An introduction

Rico Fischer

University of Greifswald

The present talk aims at providing a) an introduction to classical research paradigms for the study of processing two tasks at the same time (dual-task paradigms), b) an overview about performance costs that arise in such conditions, and c) an introduction to theoretical assumptions of cognitive control involvement in the coordination of processing multiple task

components. I will argue that understanding how to increase the adaptability and efficiency of dual-task performance requires knowledge about the flexible regulation and adjustment of cognitive control in multitasking situations. As marker for control regulation, I use the adoption of complementary processing modes in dual tasking: sequential processing of task components (serially, one at a time) versus more parallel processing of task components (simultaneously, at the same time). I will discuss how shifts between these complementary processing modes are realized and suggest that one aspect of optimized and efficient dual-task performance might be reflected in the ability to flexibly adopt either a more parallel or more serial task-processing mode, depending on situational demands.

The TVA model applied methodologically in the 5-choice serial reaction task, a mouse model of visual attention.

Ciaran Martin Fitzpatrick, Maitane Caballero-Puntiverio, Thomas Habekost, Claus Bundesen, Jesper Tobias Andreasen, Signe Vangkilde, David Poul Woldbye & Anders Petersen

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Attentional dysfunction is coupled to functional disability in ADHD patients, thus presenting a need for improved understanding and treatments. Although attentional function is studied frequently using continuous performance tests in humans, there are few adequate tests assessing attention in rodents. The 5-choice serial reaction time task (5-CSRTT) is one such test, where rodents' attentional and impulsive control is determined when light stimuli are presented in an operant chamber touchscreen. In order to improve construct validity for this rodent task in ADHD, Bundesen's theory of visual attention (TVA) model was applied to the 5-CSRTT. Sixteen C57BL/6 male mice (7-14 months of age; single/grouped housed; 21-29g) were trained for the 5-CSRTT and tested in 60-minute sessions during two consecutive days. Unmasked stimuli of 200, 400, 700, 1100 and 1800 milliseconds were pseudo-randomly presented with a fixed inter-trial interval of 5 seconds. TVA modeling: The mean score was calculated and represented as a function of stimulus-duration time. Specifically, the TVA parameters of visual processing speed (C) and perception thresholds (t0) were calculated. The non-linear performance pattern shown by mice completing the 5-CSRTT was successfully modeled by TVA on an individual level. The model assumes that with a certain probability in each animal an attentional lapse occurs, explaining why scores do not approach 100% as in humans. In the remaining trials, the animal's encoding of the visual stimulus is assumed to follow the equation described by TVA. The probability of a correct report follows an exponential function of the exposure duration t: $1 - \exp(-C*(t - t0))$.The TVA model has shown cross-species validity to study attention in both humans and mice, adding a translational value to the 5-CSRTT. This finding will improve the ability to model attentional processes in rodents and increase the understanding of the neurobiology and pharmacology of attention.

Let's talk about a common fear: Threat towards a superordinate inclusive category reduces racial categorization in the "Who said what"-Paradigm

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Evidence suggests that race categorization can be attenuated by establishing cross-cutting categories, as well as introducing situational factors that selectively make offered categories salient. These cross-cutting categories represent a vertical shift in categorization, while dissolving racial categorization by recategorizing ethnic groups into a superordinate inclusive category would constitute a horizontal shift. We aimed to demonstrate the latter mechanism using the example of categorization of black and white Americans. A frequent rhetoric to gather support of larger entities is the reference to a common enemy. In the present research, we sought to test whether such a unifying effect of external threat exists even for such strong schisms as the one between black and white Americans and also at the very basic level of automatic categorization. We measured racial categorization by means of the "Who said what"-Paradigm (Taylor & Fiske, 1978, analysis according to Klauer & Wegener, 1998). Accessibility of the inclusive category was manipulated within the discussion phase of the task. In Study 1, participants saw Blacks and Whites, represented by names rated typical of the respective group, discuss Islamist Threat to the US (experimental condition) or race relations (control condition). While categorization by ethnicity occurred for black speakers in the control condition, it receded in the inclusive threat condition. In Study 2, names were replaced by black and white faces, and the speakers in the control condition engaged in small talk. Categorization could be reduced substantially for both ethnic groups in the inclusive threat condition relative to the control condition. Results are discussed with regard to their applicability to the recategorization concept.

Pseudocontingency effects on choice behavior: Moderators in the learning environment and the learner

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Research on pseudocontingencies demonstrates that learners may infer a (pseudo)contingency between two variables X and Y if both X and Y are correlated with a context variable C. In a series of experiments, we show that learners adapt their decision behavior to pseudocontingencies even if cell frequencies indicate a true contingency of the opposite sign and biased contingency judgments have immediate and personally relevant negative consequences. Furthermore, the present research program identifies moderators of pseudocontingency effects on choice behavior in the learning sample (e.g., the strength and signs of CX and CY contingencies), the learning environment (e.g., the salience of base rates), and the learner (e.g., cognitive and affective variables which influence how deeply and efficiently information on cell frequencies and base rates is processed). Our results indicate that pseudocontingencies may be regarded as a smart and adaptive response to cognitive limitations

and constraints in the learning environment.

Strategic choices of moral comparisons give people the possibility to be less moral

Alexandra Fleischmann & Joris Lammers

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If people feel bad about themselves, they compare downwards to feel better (Wills, 1981). But is there a general tendency to strategically choose comparison standards in the moral domain? Does this motivated choice have consequences on further behavior? We investigated these questions in three studies. Study 1 (N = 134) established the basic mechanism of motivated comparison choice in the moral domain. Participants recalled a moral or immoral memory, then they were asked for their interest in and choice of moral and immoral stories. Compared to participants recalling a moral memory, participants recalling an immoral memory were both more interested in reading an immoral story (vs. a moral story), $t(132) = 1.86$, $p = .065$, $d = .34$, and actually chose to read an immoral story more often, $\chi^2(1) = 6.68$, $p = .01$. Study 2 (N = 201) looked at similarity to comparison standards, which is an important moderator of comparison outcomes (Mussweiler, 2003). Participants felt more interpersonally similar to an immoral protagonist when they themselves recalled an immoral memory (vs. a moral memory); the reverse was true for a moral protagonist, $F(1, 197) = 8.74$, $p = .003$, $\eta^2 = .04$. Study 3 (N = 205) examined consequences on moral behavior. Again, participants recalled either a moral or an immoral memory and were randomly assigned to read a moral or immoral story. When morality of recalled memory and story matched, participants had marginally lower intentions to behave morally than when it did not, $F(1, 200) = 3.47$, $p = .064$, $\eta^2 = .02$. We interpret these results as being driven by two different processes: People who are reminded of their immoral actions strategically choose other immoral comparisons to be able to continue with their actions without feeling bad. In contrast, people who are reminded of their moral actions choose moral comparisons to avoid having to demonstrate their morality compared to an immoral person and therefore be able to decrease their moral efforts.

Alibi effects in a cued lying paradigm

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To understand dishonest behavior, researchers often rely on a convenient paradigm in which participants follow cues to respond honestly or dishonestly to simple yes/no-questions. The advantage of such a procedure is clear-cut: the targeted underlying cognitive processes of dishonest responding can be isolated from other cognitive and social influences. Despite the simplicity of the paradigm, dishonest responding remains tricky and comes with behavioral costs (e.g., prolonged response times; RTs) as the agent needs to inhibit an automatic activation of the honest response to give way to its dishonest counterpart. In the current experiments, we

adopted this prominent procedure with an important modification: Participants performed a mock crime and were given an explicit alibi, which should be used to obscure the activities of that mock crime in the subsequent questioning. The explicit alibi indeed affected responding as it reversed the usually obtained effects of dishonesty: Participants were considerably faster when giving dishonest than when giving honest responses. The evidence attests a limited utility of such a paradigm for lie detection.

Declarative versus procedural attentional selection in sequential sensorimotor actions

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When performing goal-directed actions on objects of the environment, visual information is prioritized according to explicit task sets specifying where to attend, look, and act. In well-practiced sensorimotor tasks, long-term memory (LTM) can directly control for the sequence of attention, gaze, and manual actions (Foerster et al., 2011, 2012). Explicit declarative selection is needed early during learning, while implicit procedural motor coding is assumed to take over with increasing expertise. Here, we could demonstrate that individuals differ in the usage of declarative versus procedural LTM-based attentional selection independent of their level of expertise. We asked participants to practice a computerized version of the number-connection test. Participants clicked in ascending order on the numbers 0-8 that where spatially distributed on the screen. In 65 trials with constant spatial arrangement, participants could acquire LTM-based procedural attention, gaze control, and motor codes. In 20 consecutive change-trials, the numbers 3-8 switched to the numbers 4-9. In this way, the task-relevant visual features were changed, while the required spatial motor sequence was still the same. In 15 reversion-trials, the original numbers 0-8 appeared again. During the first nine change trials, about half of the participants clicked slower, performed more fixations, and exhibited longer and less synchronic cursor- and scan-paths. The remaining participants were hardly affected by the trajectory-irrelevant number changes. They might have used procedural motor codes without a declarative representation of action targets. These different performance patterns for gaze and hand did neither correlate with overall task performance nor with performance gains prior to the change phase. Thus, the applied attentional selection mode – declarative vs. procedural – seems to be independent of the level of expertise.

Exploring modality-specificity of response-effect compatibility

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Greenwald (1972) proposed the concept of ideomotor compatibility, according to which certain stimulus-response (S-R) modality mappings are stronger than others because they naturally

occur together. Based on this view, we can assume that this modality-specificity is not only present between S-R modality, but also between response-effect (R-E) modality mappings, since the stimulus resembles the anticipated sensory response effects (e.g., auditory stimuli should fit well with vocal responses because the latter usually produce auditory effects). In the present research, we aim to investigate different modality mappings in a R-E compatibility (REC) paradigm. In Experiment 1, we replicated an experiment of Badets, Koch & Toussaint (2013), where vocal number word responses produced visual digit effects on the screen. The effect stimulus was either compatible or incompatible with the preceding response (i.e., TWO followed by 2 vs. 8; manipulated block-wise). While the original experiment used only Arabic digits as effects, we added a number word effect condition. We found a larger REC effect using number words than digits as effects which already points towards modality compatibility since number words also have a verbal component. (Thus, while digits are purely visual, number words can be related to the auditory E modality.) In Experiment 2, we use vocal number word responses and auditory number word effects in order to examine whether REC effects are stronger with modality mappings that are more compatible. In the context of further experiments using manual/vocal responses and visual/auditory effects, this research will allow us to assess the influence of modality mappings on REC effects and thus contribute to further development of ideomotor approaches in action control, numerical cognition, and language processing.

Private and shared taste in aesthetic appreciation of abstract art and faces

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Research on facial attractiveness revealed that evaluations of beauty comprise interindividually shared, but also individual private components (Hönekopp, 2006). Private and shared taste each accounted for roughly half of the variance in the evaluations. In facial attractiveness, the shared taste component reflects universally shared beauty standards. Analogously in the arts, theories claim that especially abstract art reflects a universal visual language, shared and similarly understood by everyone. Thus, the responses to abstract art should be comparable among participants and consequently the shared taste component should be high. Recent evidence on a strong variability of gaze patterns when viewing abstract art casts doubt on these theories (Brinkmann et al., 2014). Thus, we assessed private and shared components of taste from 95 participants rating abstract art for liking and faces for attractiveness. Additionally, to test whether shared and private aspects are fixed or vary due to context, we instructed half of the participants to evaluate the images according to their taste (private taste group) and half of the participants according to what people in general would like (shared taste group). The overall findings for faces confirm previous findings. Private taste accounted for 40% of the variance. In abstract art, however, private taste accounted for around 75% of the variance. This clearly shows that individuals vary considerably in the evaluations of the artworks. The instruction to consider what generally might be liked lowered the proportion of private taste in both abstract art and faces. More general, our findings show that, contrary to theories of abstract art,

evaluations of abstract artworks differ considerably among individuals. The malleability of the proportions of private and shared taste furthermore supports the notion of a flexible sense of beauty.

Investigating racial biases in the decision to shoot using response dynamics

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In tasks representing mock police encounters, research has established a racial bias in decisions to shoot when a suspect holds an ambiguous firearm or neutral object (Correll, et al., 2002; Correll, et al., 2007). Bias is strongest toward Black targets, and exists across participant demographics. Researchers propose that implicit racial associations may affect the decision process, but have not disentangled precise selective influences (Correll, et al., 2002). The current studies extend this research by surreptitiously recording the path of a gun shaped controller in a shooter task, while varying stimulus race (White, Black) and object (Gun, Neutral). We use a response dynamics paradigm to provide new process evidence for the racial bias, clarify the time course of the decision, and adjudicate between competing explanations for the bias. Recording and analyzing trajectories preceding choices allows for inferences about underlying cognitive processes (see Freeman, et al., 2011) and has been validated as a way to monitor evolution of preference among competing options over the course of decision trials (Koop & Johnson, 2013).Study 1 involved a complete pairwise combination and participants were to shoot armed stimuli on each of 16 trial types or shoot a blank box if no target was armed. Study 2 involved a similar choice of shooting a single target or a box saying “don’t shoot”. Participants were incentivized and time pressured. Our trajectory analyses focus on critical trials to detail the time course of bias and compare a model incorporating continuous “pull” towards the biased target with a more discrete, two-stage process. We found that there was more competitive pull toward Black Unarmed targets when participants shot White Armed targets, and a more direct path when shooting armed Black targets, indicating less pull towards a White distractor. When both targets were armed, trajectories indicated a more decisive path toward Black targets versus White targets.

Unconscious lie detection as an example of a widespread fallacy in the neurosciences

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Neuroscientists frequently use a certain statistical reasoning to establish the existence of distinct neuronal processes in the brain. We show that this reasoning is flawed and that the large corresponding literature needs reconsideration. We illustrate the fallacy with a recent study that received an enormous press coverage because it concluded that humans detect deceit better if they use unconscious processes instead of conscious deliberations. The study

was published under a new open-data policy that allows to reanalyze the data with more appropriate methods. We found that unconscious performance was close to chance - just as the conscious performance. This illustrates the flaws of this widely used statistical reasoning, the benefits of open-data practices, and the need for careful reconsideration of studies using the same rationale.

Using serious games as a research instrument in aviation and railway traffic

Maria Freese & Jan Grippenkoven

German Aerospace Center

Serious games are games that do not follow the primary goal of entertainment, but are used for educative reasons in various fields. But is it possible to use a serious game approach in research? To answer this question, a serious game in the field of Air Traffic Management (ATM) called D-CITE (Decisions based on Collaborative Interaction in TEams) was developed. It is a multiplayer game with focus on collaborative decision-making. One team consisting of four players (2 Airlines, 1 Ground-Handler, 1 Airport) is playing at a time, aiming to maximize money of the team and gaining passenger-satisfaction points. Both factors are influenced by the outcome of the team's individual and collaborative planning performance. The game principle is based on a fixed number of rounds. The difficulty of each game play session can be adjusted by restrictions for the planning process. Within the team, part of the collective success depends on the quality of information sharing, since each member of the team to a certain amount has exclusive knowledge about certain states of the game. Therefore, a team wins or loses together. In summary, D-CITE is a research instrument that can be used to analyze the quality of collaborative decision-making in ATM. Furthermore, with the help of a serious game it is possible to raise the awareness of the relevance of sharing information within a team. Generally, serious games can be adapted to various areas in which the training and analysis of collaborative decision-making in teams is important for operations. Based on the positive experiences that were made with serious games in ATM, a next goal is to adopt D-CITE to the field of railway traffic management. As in ATM, in the railway domain safe, efficient and punctual operations depend on different "players". Roles that are comparable to the ones in ATM and could be incorporated in a railway version of the game might be for example the rail traffic controller, the dispatcher and the train driver.

Targeting the brain through the nose: Effects of an intranasal insulin application on human olfactory perception and memory processes

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The hormone insulin is considered an important metabolic key signal between the endocrine system and the brain, especially during the regulation of food consumption. Cerebral insulin

receptors in the hippocampus and hypothalamus, but also in the olfactory bulb are responsible for the effects of an increased cerebrospinal insulin level. We hypothesize that the anorexigenic effects of the neuropeptide insulin are mediated by a modulation of the processing of olfactory signals on a peripheral or central level. With this set of studies, we aim to examine the effects of an increased cerebrospinal insulin level on olfactory perception and memory processes. In order to deliver insulin and placebo to the brain, the non-invasive method of intranasal insulin application will be utilized. Within a behavioral study, we were able to show that intranasally applied insulin in comparison to placebo leads to a decrease in olfactory sensitivity for the odorant n-butanol. Further, we demonstrated that olfactory memory processes are enhanced by an increased insulin level in the cerebrospinal fluid. Our results provide innovative insights into the interaction of cerebrospinal insulin with the olfactory system. Conclusions on the fundamental mechanisms of insulin effects on food consumption and the mediation of satiety in healthy subjects can be drawn. Our results provide background information for the development of novel therapy strategies for diseases of which it is well established that cerebrospinal insulin levels are reduced (Morbus Alzheimer) or an insulin resistance exists (overweight, adiposity).

The influence of color similarity on distractor-response binding and response retrieval

Ruth Freitag, Frank Mast, Christian Frings & Birte Moeller

Universität Trier

If a target stimulus is presented together with a distractor, both stimuli and their features can be encoded together with the reaction in an event file. The repetition of one of the stored features can lead to a retrieval of the whole file and hence to the retrieval of the encoded response. Retrieval processes triggered by a distractor (distractor-response binding effects), are stronger for grouped targets and distractors (Frings & Rothermund, 2011). Retrieval theories assume two separate processes: stimulus-response integration and stimulus-response retrieval. Several studies investigated the influence of both processes on distractor-response binding. Here we investigated which of these processes can be modulated by color-similarity (grouping). In Experiment 1 (N = 30) a flanker design was chosen to investigate the influence of the distractor's and target's color similarity during the integration and during the retrieval process (which were orthogonally varied). The results support previous findings, that a manipulation during the retrieval process can influence the distractor-response binding effect. In Experiment 2 (N = 30) a similar design was realized to investigate the same modulating effects under conditions that make target-distractor grouping (and therefore also integration) less likely. Under these less than perfect conditions for binding, integration but not the retrieval of distractor-response bindings was modulated by the color-similarity of distractor and target.

Spatial abilities are related to an understanding of proportions and formal fractions

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University of Fribourg

In the present study, we investigated whether children's spatial abilities are connected to their proportional reasoning and formal fraction knowledge. We measured 1st to 8th graders' (N = 226) spatial abilities (with mental rotation and geometric tests), and their ability to reason about spatial proportions. Verbal IQ was assessed as a control variable. A subgroup of 6th to 8th graders (n = 107) additionally solved a formal fractions test. Linear regression analyses indicated that mental rotation and geometry skills explained a significant part of the variance in proportional reasoning abilities, after controlling for effects of age and verbal IQ. An analysis of the subgroup who solved an additional fractions test showed that even after accounting for age and verbal IQ, as well as proportional reasoning skills, mental rotation and geometry skills still explained a significant part of the variance in fraction understanding. These findings suggest a close relation between spatial and formal fraction knowledge above and beyond the understanding of spatial proportional relations.

Similarities in the perception of color and velocity: An empirical investigation of the cognitive representation of velocity

Max Friedrich & David Käthner

Deutsches Zentrum für Luft- und Raumfahrt

Object properties that can be perceived simultaneously and without focused attention are called features (Treisman, 1980). Examples include color and the movement of objects. To date, the question whether velocity is a feature or not has received little attention. In order to build exact cognitive models of visual object recognition, this research gap has to be filled. Therefore, the current study compared the visual perceptibility of color and velocity changes. A varying number of moving and non-moving squares was presented to 22 participants. In conditions with moving objects, squares moved on linear trajectories with different velocities. Further, the color of the squares was varied between conditions, with the squares being either unicolored or multicolored. Based on paradigms from working memory research, the first presentation of the stimuli was followed by a brief pause and a second presentation (Luck & Vogel, 1997). In the second presentation, color, velocity or both attributes of one square were changed. The participants had to decide whether both presentations were identical or differed. From the number of correct and incorrect answers a sensitivity index was computed. The computed sensitivity did not differ significantly ($p = .212$) between conditions with unicolored squares and an increase in velocity and conditions where only the color of a square changed. However, when conditions with a reduction of velocity were compared to conditions with only a color change, significant differences in sensitivity were observed ($p < .001$). In conditions with multicolored squares, sensitivity differences between color and velocity changes decreased with an increasing number of squares. The results indicate that velocity might in fact be a feature.

Shifting internal context modulates episodic retrieval: Implications for action control

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The general idea is that context shifts reduce involuntary retrieval. In various fields of psychology (memory, priming, action control), it has been suggested that external shifts in the context diminish episodic retrieval. Here, we argue that even internal context shifts (i.e. shifting the target selection criterion while maintaining the same task set) will reduce involuntary retrieval triggered by irrelevant (even interfering) stimuli. In four experiments (N = 122 in total), we show evidence for such a modulation and, furthermore, that this pattern is independent of stimulus modality. Thus, we argue that internal context shifts modulate action control due to regulating involuntary retrieval of previous Stimulus-Response episodes.

Unraveling the sub-processes of selective attention: Insights from dynamic modeling and continuous behavior

Simon Frisch, Maja Dshemuchadse, Max Görner, Thomas Goschke & Stefan Scherbaum

Technische Universität Dresden

Selective attention is a core feature of adaptive behavior as it biases information processing towards stimuli that are relevant for achieving our goals. The mechanisms underlying this bias are under debate, however: While one class of models postulates that selective attention solely relies on the amplification of goal-relevant information, a second class of models deems additional inhibitory processes necessary that selectively suppress distracting information. Here, we explore the explanatory value of both accounts from a dynamic, modeling-based perspective that focuses on the continuous unfolding of goal-directed behavior over time. We present two dynamic neural field models incorporating the diverging assumptions on the nature of selective attention. Simulations of an attentional set-switching paradigm with both models showed that they make similar predictions with regard to discrete markers of performance like response times, but that their predictions differ markedly with regard to how response tendencies evolve continuously over the course of single trials. To test these dynamic predictions empirically, human participants completed the same set-switching paradigm using mouse-tracking as a continuous measure of performance. Comparing modeled and observed behavior revealed clear evidence for the model solely based on amplification but no indication of persisting distracter inhibition. These findings illustrate that dovetailing dynamic computational modeling with continuous measures of behavior can open promising avenues for understanding the mechanisms underlying fundamental cognitive abilities.

The latent state-trait structure of diffusion model parameters

Gidon T. Frischkorn, Anna-Lena Schubert, Dirk Hagemann & Andreas Voss

Heidelberg University

Modeling decision processes with the diffusion model has become more and more popular within experimental psychology over the past years. A wealth of research has investigated how specific parameters of the diffusion model, representing different cognitive processes, can be manipulated experimentally. Beyond that, the relationship of diffusion model parameters to other cognitive processes, such as reasoning ability, working memory capacity, or fluid intelligence, has been analyzed. Specifically, drift rate (v) and boundary separation (a) were discussed as predictors for performance in cognitive processing tasks. Drift rate represents the speed of information accumulation towards one of two possible response alternatives and boundary separation represents the amount of information accumulated until a decision is made. The properties of these diffusion model parameters as a personality trait have not yet been explored in depth. This talk will present a latent-state trait analysis of diffusion model parameters and discuss in how far diffusion model parameters display qualities of a personality trait. For this, parameters of the diffusion model were estimated across three different tasks and two measurement points and then entered in a latent-state trait model estimated via structural equation modeling. The overall reliability was small, indicating that diffusion model parameters measured task specific processes to a large amount. However, the variance consistent across different tasks was almost fully captured in a latent trait. Altogether, results suggested that diffusion model parameters estimated for a single task capture processes specific to that particular task to a large amount. Nevertheless, the variance of diffusion model parameters consistent across different tasks is almost perfectly represented within a trait that is stable across time.

Theoretical basis and utilization of health apps: A review

Lara Fritsche

Universität Siegen

In recent years, the use of smartphones has opened new ways to gain information about healthy living and improving health care. New health apps offer to measure a large amount of physical and psychological data. Providing individually tailored health information to users for a variety of personal, medical, and therapeutical purposes – anywhere, anytime – a high effectivity is imposed. Evidence-based health apps are rare. Usually, health behavior change (internet-based) interventions are supposed to be more effective when based on health behavior change theories (cf. Abraham & Michie, 2008; Webb et al., 2010). So far, little research has been published on the content and the efficacy of behavior change programs based on health apps. Wherever behavior change strategies are systematically implemented in these applications, the findings often are limited, e.g. due to a small sample size, pilot testing only, short-termed follow-up etc. (cf. Payne et al., 2015). In first reviews, critics deplore the lack of implementation of basic behavior change theories in health app-based trainings and

applications (e.g. Crane et al., 2015; Middelweerd et al., 2014). While pursuing this line of reasoning, todays health apps' researchers should also call the adequacy of our current health behavior models into question (cf. Riley et al., 2011). In addition to behavior change theories and associated techniques, findings from the information science-based usability research have to be taken into account (cf. Kenny et al., 2014; Mendiola et al., 2015). A systematic reassessment of these factors that proved to be effective in reaching health apps' users is vital for the whole field. In this talk, the present behavior change foundations/intuitive strategies of health apps and the results of research on the efficacy of health apps' applications are reviewed and evaluated systematically, and a proposal how to integrate findings from health psychology and usability research is put forward.

How sequential changes in reward magnitude modulate cognitive flexibility: More direct evidence for increased flexibility under increased reward prospect

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Recent research has shown that sequential changes in reward expectation influence the balance between cognitive flexibility and stability: In a voluntary task switching paradigm, participants chose to switch the task more often when more reward than before was at stake whereas unchanged high reward reduced the voluntary switch rate (VSR; Fröber & Dreisbach, 2015). In the present experiment, we aimed to show that this sequential reward effect does not depend on the preview of the two available tasks. To this end, a double registration procedure was used. Participants first chose the preferred task by way of moving a mouse and only afterwards responded to the then presented target stimulus via button press. Again, we found a higher VSR when reward prospect increased and a lower VSR when reward prospect remained high. This strongly suggests that the sequential reward effect on VSR does not depend on the preview of the concrete target stimuli of the available tasks. Moreover, the measurement of mouse trajectory data provided further insights into the (voluntary) switching process. Results will be discussed within the framework of the adaptive gain theory.

Kognitive Methoden prospektiver Zeitschätzung - Eine Frage der Gedächtnisaktivierung?

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Universtitaet Koblenz-Landau, Campus Landau

Prospektive Zeitschätzung ordnet einer bevorstehenden Aufgabe eine Zeitspanne zu. Bei der Schätzung bestehen individuelle Unterschiede sowohl in der Genauigkeit als auch in der kognitiven Schätzmethode. In einer explorativen Studie fanden wir erhebliche Schätzfehler von -50% bis +550%. Selbstberichte ergaben folgende Schätzmethoden: (a) Aktivierung eines temporalen Bezugsrahmens, (b) prospektive Zergliederung der Aufgabe, (c) spontane Intuition ohne Aufgabenimagination, (d) Aufgabenimagination mit intuitiver Schätzung. In einer

web-basierten Studie untersuchten wir den Einfluss der time estimation method (TEM) und der time related awareness (TRA) auf die Zeitschätzung (N=200, 2x4-Design: TRAxTEM).Die Probanden waren aufgefordert, eine unvertraute Aufgabe zu erledigen (Sortieren der Wörter eines Gedichts). Vor der Bearbeitung gaben sie eine Zeitschätzung ab, wobei die TEM per Instruktion induziert wurde. Die TRA wurde abschließend per Fragebogen erhoben. Die Faktorenanalyse der TRA-Skala ergab als eigenwertstärksten Faktor „Pünktlichkeit“, anhand dessen die Stichprobe geteilt wurde. Die überwiegende Mehrheit der Probanden unterschätzte die benötigte Zeit. Probanden mit hoher TRA schätzten jedoch die benötigte Zeit signifikant präziser ein als solche mit niedriger TRA. Probanden mit hoher TRA schätzten mittels allen TEM die benötigte Zeit in etwa gleich gut. Probanden mit niedriger TRA schätzten die Zeit mittels der Schätzmethode (a) – Aktivierung eines temporalen Bezugsrahmens – am präzisesten ein (kein Unterschied zur Gruppe mit hoher TRA). In den anderen Bedingungen unterschätzten sie die benötigte Zeit stärker als die Vergleichsgruppe. Überraschend, aber eindeutig, ist der Befund, dass die Aktivierung einer temporalen Referenzdauer im episodischen Gedächtnis mittels der TEM (a) die präzisesten Schätzungen ergibt, während die Aktivierung des Arbeitsgedächtnisses mittels der anderen TEM die Zeitschätzungen verschlechtert, vor allem bei Probanden mit niedriger TRA.

Rubber hands drift, too: Spatial convergence of real and artificial embodied limbs

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In the rubber hand illusion (RHI), transient embodiment of an artificial hand is induced. An often- used indicator for this effect is the “proprioceptive drift”, a localization bias of the real hand towards the artificial hand. This measure suggests that the real hand is attracted by the artificial hand. Principles of multisensory integration, however, rather suggest that conflicting sensory information is combined in a “compromise” fashion and that hands should rather be attracted towards each other. Here, we used a new variant of the RHI paradigm in which participants pointed at the artificial hand. Our results indicate that the perceived positions of the real and artificial hand converge towards each other: in addition to the well-known drift of the real hand towards the artificial hand, we also found an opposite drift of the artificial hand towards the real hand. Our results contradict the notion of perceptual substitution of the real hand by the artificial hand. Rather, they are in line with the view that vision and proprioception are fused into an intermediate percept. This is further evidence that the perception of our body is a flexible multisensory construction that is based on integration principles.

Dynamic decision making: A field of growing importance

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The symposium gives an overview over the field of dynamic decision making and presents examples from research that addresses theoretical issues, issues of measuring the construct, and applications (i.e., trainings). This first talk introduces into the main topic of the symposium, dynamic decision making (DDM). DDM is a growing field of research with the potential for improving many aspects of daily life. The defining features of dynamic decision making are: (1) decisions are made at multiple points in time, and (2) between decisions the environment may change as a result of previous decisions, or (3) the environment may change spontaneously as a result of autonomous processes. In terms of a definition: DDM refers to decision processes in a series of interdependent decisions at multiple points in time in an environment that may change substantially in between decisions. DDM combines features from different research traditions like ”interactive problem solving”, “complex problem solving”, “naturalistic decision making”, or “dynamic decision making”. These are labels for established fields that obviously overlap. They differ at least in parts with respect to their used methodology: experiments, simulations, naturalistic observations. We will look at DDM from a competency based perspective that is informative for basic decision making research, because it evokes a shift of perspective from simple single shot decisions to the more common case of decisions that are based on prior experiences and that influence future decisions. At the same time, this issue is relevant from an applied perspective, as in an ever more complex world DDM competence and its training and assessment are of increasing importance. After this introduction into the concept, the stage is set for the individual contributions that go deeper into different aspects of DDM.

The proximity of pain: Subjective pain intensity is higher when the stimulated limb is nearer to the body

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Background: A spatially nearer stimulus to the body might attract higher attention and perceived to be more threatening than those perceived far from the body. The higher threat value might be accompanied with higher pain intensity. Therefore, in the current study, we predicted that subjective pain intensity is higher when the stimulated limb is positioned relatively near to the body or when it is positioned in front of the body. Methods: In two experiments (N = 20 in each), thermal pain was applied to individuals’ forearm. The effect of two factors on pain ratings were tested: The distance of stimulation relative to the body (near or far), and the rotation of the forearm. The forearm was either rotated medially (positioned in front of the body), or rotated laterally (away from the body). In experiment 1, free-viewing condition was applied; in experiment 2, participants were deprived from the view of the stimulation. Results: In experiment 1, participants reported more intense pain with forearm in the near space than in the far space. In experiment 2, the distance effect was replicated, and

the rotation factor showed also a significant effect with higher pain ratings for medially rotated forearms. Conclusions: The findings from both experiments suggest that nociceptive stimuli elicit more intense pain at a near peripersonal distance to the body than at a farer distance. In addition, a deprived view from pain stimulation seems to induce another position-related effect: A more intense pain sensation when pain is perceived in front of the body.

Secondary tasks in task switching – The impact of dynamic and constant tasks in switch costs

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The flexible exchange of ongoing task representations for fulfilling goal-directed actions is a hallmark of human cognition. Yet, this exchange comes at a performance cost. This cost has been extensively studied in research using the task switching paradigm. In this paradigm, participants are asked to flexibly alternate between two simple classification tasks based on a task cue. To account for task-switch cost, that is differences in reaction time and accuracy between task switch trials (i.e., AB with A and B denoting different tasks) and task repetition trials (i.e., AA), reconfiguration accounts as well as episodic memory accounts have been proposed. Whereas reconfiguration accounts assume a time-consuming control process enabling participants to switch to the now required task, episodic memory accounts suggest that the difference between task-switch and task-repetition trials is brought about by the benefit of re-using a recently created memory trace. To distinguish between those two accounts, secondary tasks in addition to a standard task switching paradigm can be used. In the present study, we employed four secondary tasks, fully crossing secondary task dynamics (dynamic vs. constant) as well as effectors (mouth vs. hands). Overall, we observed not an increase but rather a significant reduction in switch cost for secondary tasks conditions compared to a control condition. Most importantly, this reduction was neither bound to the dynamics nor the effector of the secondary task. Therefore, we conclude that secondary tasks interfere with the creation of episodic memory traces that are re-evoked in task repetitions, so that secondary tasks effectively reduce the task- repetition benefit in task switching.

Good job html developers! Perfect foveal and para-foveal perception of hyperlinks

Benjamin Gagl

Goethe-Universität Frankfurt

In applied research, the appropriateness of the dominant appearance of hyperlinks, as blue underlined text, was questioned. The ability to identify blue text in foval and para-foveal vision was identified as potentially constrained by the low number of foveally centered blue light sensitive retinal cells. The present study investigates if foveal and para-foveal perceptibility of hyperlinks is reduced during reading. This was realized by eye movement recordings and the

invisible boundary paradigm, which allows to investigate foveal and parafoveal perceptibility, separately, during reading. Target words in sentences were presented in either black or blue and either underlined or normal. No effect of color and underlining, but a preview benefit could be detected for first pass reading measures (comparing degraded vs. un-degraded para-foveal previews). For total reading times (i.e. including re-fixation durations), in addition to a preview effect, a reduced fixation time for not highlighted (black not underlined) in contrast to highlighted target words (either blue or underlined or both) was found. Thus, the present pattern indicates a not detectable perceptual disadvantage of hyperlink stimuli but increased additional attention, after first pass reading, through highlighting indicated by longer total reading times. In conclusion, I can only congratulate html developers as their design decision allows readers to easily recognize hyperlinked text and at the same readers re-visited hyperlinks longer as a consequence of highlighting.

The sparse familiarity model: Building a computational basis for the left ventral occipito-temporal cortex (lvOT) in visual word recognition

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Letter string familiarity predicts word recognition behavior and the activation pattern of the left ventral occipito-temporal cortex (lvOT). The present investigation evaluates the sparse familiarity model (SFM), a computational model of lvOT functioning during visual word recognition. The SFM implements the idea that letter string category recognition (informative word vs. un-informative letter string) can be achieved on the basis of letter string familiarity for very familiar and very unfamiliar letter strings (e.g. high frequent words and consonant strings, respectively). In contrast, for letter strings with intermediate familiarity, category recognition must be aided by additional string analysis. This is the case for a large number of words and most pseudowords (pronounceable letter strings without meaning). As a result, the SFM predicts low lvOT activation for extreme letter string familiarities and high activation for intermediate letter string familiarities. SFM applicability is established by successfully simulating benchmark effects from the literature (e.g. Words vs. Pseudowords), predicting behavioral data from lexical decisions and brain activation (fMRI) in the lvOT. In addition, the SFM is evaluated by two studies, which experimentally manipulate the familiarity of letter strings by pseudoword familiarization. The fMRI experiment allowed once more to relate the SFM to lvOT activation and the electrophysiological measures allowed to relate the SFM to the amplitude of event related potentials around 400 ms. Thus, in conclusion, the SFM has been found to be representative for lvOT activation indicating that lvOT function is to recognize informative letter strings (i.e. words) determining information extraction.

The amplification of risk in experimental diffusion chains

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Understanding how people form and revise their perception of risk is central to designing efficient risk communication methods, eliciting risk awareness, and avoiding unnecessary anxiety among the public. However, public responses to hazardous events such as climate change, contagious outbreaks, and terrorist threats are complex and difficult-to-anticipate phenomena. Although many psychological factors influencing risk perception have been identified in the past, it remains unclear how perceptions of risk change when propagated from one person to another and what impact the repeated social transmission of perceived risk has at the population scale. Here, we study the social dynamics of risk perception by analyzing how messages detailing the benefits and harms of a controversial antibacterial agent undergo change when passed from one person to the next in 10-subject experimental diffusion chains. Our analyses show that when messages are propagated through the diffusion chains, they tend to become shorter, gradually inaccurate, and increasingly dissimilar between chains. In contrast, the perception of risk is propagated with higher fidelity due to participants manipulating messages to fit their preconceptions, thereby influencing the judgments of subsequent participants. Computer simulations implementing this simple influence mechanism show that small judgment biases tend to become more extreme, even when the injected message contradicts preconceived risk judgments. Our results provide quantitative insights into the social amplification of risk perception, and can help policy makers better anticipate and manage the public response to emerging threats.

Success and failure in querying world knowledge affects subsequent throwing in game of darts

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Beside practice and informational feedback, self-efficacy proved to be an important factor of motor performance and motor learning. Usually, self-efficacy was enhanced by autonomy-support or positive normative feedback with regard to the motor task. In the present study, we induced success and failure in answering a world-knowledge questionnaire - thus in a task which was completely unrelated to a subsequent motor task. Two groups of participants had to solve either an easy or a difficult questionnaire and were afterwards asked to perform a novel task, i.e. throwing a dart with the non-dominant hand. We hypothesized that success in answering the world-knowledge questionnaire would improve throwing performance. The results confirm our hypothesis. Those participants who went through the easy questionnaire showed higher self-efficacy and a better throwing accuracy than participants who completed the difficult questionnaire. Hence, our results showed a cross-domain effect of improved self-efficacy, acquired in a world-knowledge questionnaire, on performance in an unrelated motor task.

Functional connectivity among visual and parietal cortex predicts the precision and variability of visual working memory

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Working memory encoding involves the top-down modulation of perceptual processing by fronto-parietal 'control' networks, and differences in the efficiency of such top-down modulation are a plausible source of individual differences in working memory capacity. Accordingly, we hypothesized that the coupling within and between perceptual and attentional systems may mediate working memory limitations. In the present study, we combined fMRI with behavioral modeling using a 'variable precision + fixed capacity' model (Van den Berg et al., 2012, 2014), in a sample of 22 participants. Participants performed a visual delayed continuous response task (fMRI: 72 trials; behavior: 405 trials) and a perceptual attention task, with color-location conjunctions as stimuli in both tasks. We quantified inter- and intra-areal functional connectivity during working memory encoding, for brain regions that were activated during both perception and encoding (i.e., for an occipito-parietal network including bilateral primary and ventral visual cortex as well as superior and inferior parietal cortex). These connectivity estimates served as features for a multivariate regression model that was used to evaluate the contribution of individual differences in functional connectivity to individual differences in the parameters of the behavioral model of working memory performance. Voxel-wise inter-areal connectivity of this network significantly predicted the mean precision and the variability of precision of working memory. Moreover, while intra-areal connectivity in occipital regions was predictive for the variability of precision, no such association was observed for connectivity within parietal lobe. These results are consistent with a network perspective of working memory capacity, suggesting that the efficiency of information flow between perceptual and attentional neural systems is critical for the trial-to-trial variation of working memory precision, thereby affecting capacity limitations.

Thinking of the average only second helps students to draw learning curves

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Psychology teaching (as well as theorizing) has long been torn between targeting general underlying principles by observing dynamics in the individual vs. focusing on average behavior (e.g. Lewin, 1930). Here, we employ a free report technique in order to assess and improve knowledge of psychology undergraduates about characteristics of individual vs. average time course of learning. As dealing with group averages is common practice in psychology (while being interested in processes on the level of individuals), it is important to understand what types of individual learning curves lead to what types of group average curves. For instance,

smooth learning curves on acquisition of operant behavior displayed in textbooks are based on averaging across animals – each showing a sudden onset of operant behavior (Gallistel, Fairhurst, & Balsam, 2004). In two samples (N=82; N=40) students were provided with vignettes asking them to draw hypothetical learning curves of individuals vs. averages of individuals into an empty coordinate system (time on the x-axis, performance on the y-axis). Start- and endpoints were fixed, the rest of the curve had to be drawn, allowing to combine free report with quantitative analysis. Despite that the scenario described a strategy shift, most students preferred continuous performance changes. Students drew better group average curves, if they before had to draw a learning curve for an individual. For instance, group average curves drawn without this prior task reached the ceiling too early (lacking to account for individuals with late onset). Drawing a hypothetical individual learning curve first helped to avoid such pitfalls.

Individual differences in suppression durations shed light on the role of perceptual uncertainty in resolving interocular competition

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Breaking continuous flash suppression (b-CFS) allows for assessing the difference between experimental conditions in the propensity of a stimulus to enter awareness (e.g., inverted versus upright faces). Here, we provide two pieces of evidence, and their implications, demonstrating that individual differences in perceptual uncertainty can explain differential breakthrough times between experimental conditions. First, we show that response time differences between experimental conditions are related to the within-subject SD of participants' response times. That is, participants' response times in b-CFS tasks are more easily manipulated experimentally when they experience more uncertainty as to when a stimulus will appear. Many b-CFS experiments include a so-called monocular condition, in which the stimuli are blended into the suppressors (i.e., no interocular suppression). Even when participants' response times between the suppression and monocular conditions are matched, within-subject SDs are larger in the suppression condition. Second, across a diverse set of experimental manipulations, individual participants' absolute response times in a b-CFS task correlate with the difference in response times between experimental conditions. This is important, since longer response times coincide with longer transitory periods of perceptual uncertainty. In monocular control conditions, however, where perceptual uncertainty is preserved despite the lack of suppression, this relation between absolute response time and modulation of response time is not observed. As such, differences in suppression durations between experimental conditions do not reflect perceptual uncertainty per se. Rather, suppression durations are more susceptible to experimental manipulations during phases of perceptual uncertainty. Thus, b-CFS studies cannot conclusively elucidate whether an experimental manipulation affected processing of the stimulus when it was still fully suppressed from awareness.

The predictive chameleon: Evidence for anticipated social action

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Observing an action automatically triggers a corresponding motor representation in the observer. However, research on ideomotor action and more recent theoretical accounts, such as predictive coding accounts, have put forward the idea that such motor simulation serves an anticipatory function. Based on such predictive models, but in contrast to classical perception-action theories, we assumed a motor simulation system in observers that simulates a predicted movement before an actor has executed it. In 3 studies we presented two videos (each 10 minutes long) of an actor whose nose was wrinkling or whose hair was falling into the face. Crucially, the actor did not engage in any hand or arm movements. While watching the videos, participants were videotaped. Afterwards, we coded how often participants engaged in two classes of behavior. Study 1 found that when watching the nose wrinkling video, participants engaged in more anticipated nose wrinkling actions (e.g., nose scratching) than in anticipated hair falling actions (e.g., hair stroking) and vice versa for watching the hair falling video. Study 2 demonstrated that this effect is stronger when the observed model has a strong desire to act, compared to when the actor has a weak desire to act. Study 3 replicates the findings by applying motor TMS to measure participants´ muscle activity in the biceps. In general, our findings suggest that motor co-representations are based on anticipatory mechanisms. Moreover, it demonstrates the existence of a link between inferring another person's desire to move and the release of an action that matches this desire.

Genetic modulation of large-scale brain network connectivity in an episodic memory task

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We report results from an exploratory study that investigated the modulation of large-scale brain networks associated to episodic memory by genes related to schizophrenia, a disorder which has been characterized by brain network dysconnectivity. 140 healthy subjects (age 18-50 years) had blood samples taken and conducted an episodic memory functional magnetic resonance imaging (fMRI) experiment in two 3T Scanners. The memory task consisted of an encoding phase in which subjects had to learn face-profession pairs and a subsequent recall phase in which the pairs had to be recalled. The fMRI data were preprocessed in a standard SPM pipeline and additionally corrected for movement artifacts by ART-based scrubbing. 4 Subjects were excluded from the analysis due to excessive head motion. The preprocessed functional data was clustered by spatially constrained normalized cut spectral clustering into 350 regions of interest (ROIs), eigenvariates were extracted from the ROIs, and a whole-brain psychophysiological interaction analysis was conducted to assess task-dependent connectivity changes between all ROIs. Genetic information was extracted from blood samples by the Illumina Infinium PsychArray-24 Kit and a polygenic risk score comprising 26 single nucleotide polymorphisms (SNPs) associated with an increased risk of schizophrenia was constructed as the

weighted sum of the number of risk alleles multiplied by the natural logarithm of the associated odds ratios. The risk score was not associated with task performance but was found to be negatively associated with task-dependent connectivity changes in a frontal brain network and positively associated with changes in a mainly parietal-occipital network in the encoding phase of the task. These results demonstrate a dissociation between two functional networks during memory encoding in accordance with the hypofrontality hypothesis of schizophrenia.

Menstrual cycle-dependent shifts in male attractiveness?

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There is evidence for menstrual cycle-dependent shifts when women rate male attractiveness. During fertile days, more masculine, dominant looking males are preferred. During non-fertile days, more feminine, trustworthy looking males are preferred. These differences might reflect adaptive mating strategies by encouraging preference for males that indicate good genetic qualities during fertile days and more socially amenable qualities during non-fertile days. However, these effects are controversially debated (Gildersleeve et al., 2014; Wood et al., 2014). Two points of critique concern the type of stimuli used and method for determining fertile days. Compared to previous studies where women actively changed or selected male stimulus faces altered on pre-defined traits, we used a method that reveals implicit internal representations with little explicit interference by using reverse correlation (Dotsch & Todorov, 2012) to produce male stimulus faces. Additionally, fertile days were determined by luteinizing hormone-tests. The experiment consisted of two phases: in the production phase, 33 normally cycling women performed a reverse correlation task by judging male faces on attractiveness in a short term mating context during both fertile and non-fertile days. In the evaluation phase, all produced faces were rated by a separate sample of 33 women (during fertile and non-fertile days) and 43 males for attractiveness, symmetry, trustworthiness, dominance, masculinity, and emotional expression. Results showed that faces produced during fertile days were considered more attractive, symmetrical, trustworthy, and more dominant - thus exhibiting a mixture of a masculine and positive social traits stereotype. However, the evaluation of these faces was only little influenced by fertility status or sex of rater. This dissociation in cycle dependent shifts in production but not in evaluation is discussed in relation to recent literature.

Distinct visual habituation to real objects and pictures of those objects in infancy

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Recent research on human object perception and recognition has increasingly questioned the ecological validity of using pictures of objects as a proxy for real objects. For example, Snow et al. (2011) replicated well-established findings that brain activation in visual areas selective for

objects decreases with repeated visual exposure to pictures of objects, a form of neural habituation (Grill-Spector et al., 1999; Grill-Spector, Henson, & Martin, 2006); however, they found no such repetition effects for the same real objects as depicted in the pictures. Given proposed theoretical parallels between repetition effects in functional neuroimaging and habituation in infant perception and cognition (Turk-Browne, Scholl, & Chun, 2008), we wondered whether already infants would show different habituation responses to real objects compared to pictures. Therefore, it was the goal of the present study to examine 7- and 9-month-old infants' visual habituation to real objects and pictures of the same objects. Sixty-one 7-month-old infants and 59 9-month-old infants were habituated to either a real object or a picture of the same object and afterwards preference tested with the habituation object paired with either the novel real object or its picture counterpart. Looking time served as the dependent variable. Infants of both age groups showed stronger overall decrement of looking times and steeper slopes of the looking time trajectory when habituated to real objects as compared to pictures. Additionally, all infants preferred looking at real objects when presented with both stimuli at the same time. Thus, our findings show basic-information-processing advantages for real objects from 7-months on. These advantages are probably due to certain characteristics of real objects, such as their three-dimensional shape and their affordance for acting upon them.

High levels of basal testosterone are associated with less majority and minority influence on attitude formation

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Research on social influence is dominated by the idea that the effects of other people's opinions on individual attitudes and decisions can be best understood by investigating two basic motivational forces, i.e., the goal of accuracy (informational influence) and the goal of affiliation (normative influence; Cialdini & Goldstein, 2004). Consequently, power motivation has largely been neglected in this research area. This is surprising, since being influenced by others can be seen as a loss of personal autonomy as well as a loss of influence on those others. To fill this void, we investigated whether basal testosterone (bT) moderates the effect of majority and minority influence on attitude formation. Past research has shown that testosterone promotes status seeking behavior and social dominances motives (i.e., power motivation; Eisenegger, Haushofer, & Fehr, 2011, Stanton & Schultheiss, 2009). Furthermore, testosterone is associated with lower levels of trust and cooperation as well as with more egocentric choices (Bos, Terburg, & van Honk, 2010; Wright et al., 2012). Following these findings, we predicted that higher levels of bT are associated with less majority and minority influence on attitude formation. To test this hypothesis, we employed the experimental paradigm by Erb, Bohner, Schmälzle, and Rank (1998; Experiment 1). Participants (N = 82) received a persuasive message about a hypothetical construction project which stemmed either from a majority (high consensus) or a minority source (low consensus). Beforehand, participants' bT levels were measured. The results supported our hypothesis: For participants with low levels of bT,

attitudes were more (less) favorable towards the construction project when confronted with a majority (minority) message. In contrast, attitudes of participants with high levels of bT did not vary depending on the source of the persuasive message. Potential mediators for this effect and limitation of the study are discussed.

Movement goal encoding in the frontoparietal reach network

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In our previous fMRI work we used a delayed pro-/anti-reach task to study spatial encoding processes in the human frontoparietal reach network during reach planning. In this task a visual cue (left or right) has to be combined with a context rule (pro or anti) in order to infer a movement goal. Accordingly, the subsequent reach is performed to the location corresponding to the visual cue location (pro reach) or to the mirrored location (anti reach). The task thus allows for dissociating the position of a (physically present) visual cue from the position of an (inferred) movement goal. Moreover, we introduced a condition where only the visual cue without the context rule was given before the planning phase, thus leaving the movement goal unspecified. Using univariate analyses, we showed that the precuneus contralateral to the moving effector encodes the movement goal rather than the position of the visual cue if both the visual cue and the context rule are given and the movement goal was thus specified. For conditions with unspecified movement goals, we obtained a significantly weaker blood-oxygen level dependent signal that was limited to posterior parietal regions. To extend our previous findings, we trained and tested a linear discriminant analysis-based classifier on the position of the visual cue or the movement goal in a broader set of frontoparietal reach regions derived from the same dataset as in the previous study. We support and extend our previous findings of movement goal encoding to several subregions of the superior parietal lobule (SPL), even in the ipsilateral hemisphere, as well as to the dorsal premotor cortex (PMd). We further demonstrate that subregions of the SPL, the PMd, as well as the anterior intraparietal sulcus encode the difference between specified and unspecified movement goals. Within the frontoparietal reach network particularly the SPL regions seem therefore to be crucial for sensorimotor integration and maintenance of reach plans.

Knowing when and where to listen at the „cocktail party": The role of focused and divided spatial attention for speech perception of younger and older adults

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Speech perception in multi-speaker environments decreases in aging. These deficits can be due to basic hearing loss, but there is increasing evidence that declines in higher cognitive functions also play an important role. In particular, dividing attention upon two or more speakers appears

to be reduced in older adults. Using behavioral and event-related potential (ERP) measures, we studied the ability of younger and older adults to attend to speech information from a single target speaker (focused attention) or from two different target speakers (divided attention). The attention conditions were alone or in the presence of other concurrent speakers. We hereto employed a speech perception paradigm in which the listener first had to detect the relevant speaker, and then to discriminate the task-relevant speech information. Especially in the multi-speech condition, older adults performed worse with divided than focused attention, while only slight differences were found in the younger group. The ERP analysis indicated a delayed and reduced attentional and inhibitory control (indicated by a later P2 and reduced N2) of older adults, relative to the younger ones. Moreover, a delayed and reduced Contingent Negative Variation (CNV) indicated a decline in preparatory activity for the critical speech information. In line with previous observations, these results suggest that deficits in preparation and allocation of attentional resources contribute to age-related deficits in speech perception under adverse listening conditions.

The power of attention: Using eye gaze to bias social preferences

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Research on cognitive processes underlying moral decision-making used the dynamics of eye gaze to bias moral decisions. Yet, it is unclear whether this effect extends to social preference decisions. The present study investigates the influence of gaze behavior during the decision-making process on decisions involving other-regarding preferences. Previous studies have shown that people who are more prosocial direct more attention towards their partner's payoff when considering their options. In order to disentangle the causal influence of attention and inter-individual differences in information search, we recorded participants' eye movements during a modified dictator game. In each game either the partner's potential payoff for the particular option or the potential payoff for oneself randomly functioned as a trigger to terminate the information search and prompt the choice. Results indicate that choices can be manipulated by directing attention. Implications regarding prosocial behavior and its underlying processes are discussed.

Manipulating, observing or smelling unfamiliar tools: How sensory and motor experience contributes to the neural representation of novel object concepts

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Conceptual object knowledge encompasses general properties of objects, e.g. how a hammer looks like, how to manipulate it, what it is used for. Grounded Cognition accounts claim that conceptual representations partially rely on sensory-motor systems, depending on the

dominant modality of experience during concept acquisition. One line of research provided evidence that processing familiar objects, which are mostly associated with a history of manipulation experience, elicits activations in an action-related, fronto-parieto-temporal network. An alternative and more direct line of research is based on learning paradigms with unfamiliar objects, which allow us to experimentally manipulate the type of experience that individuals gain during concept acquisition. We carried out a series of fMRI studies aiming at elucidating the role of experience on shaping conceptual object knowledge by applying a training-based paradigm with novel tool-like objects. In the first experiment, participants were trained to actively manipulated one set of objects, while a second set was only visually explored. Specific post training activity for processing objects associated with a manipulation training was found in regions within the action-related network. A second study went a step further in showing that the involvement of this network relies not only on the active manipulation experience, but also the observation of object manipulation can induce similar neural representations. Furthermore, a third study extended previous work on action/manipulation as the dominant channel of experience with objects, by examining the impact of experience on conceptual knowledge in the non-dominant olfactory modality. Specific activations for processing objects associated with olfactory training were found in the right hippocampus, a region included in the olfactory network. Altogether, this research suggests a role of both dominant and non-dominant experience in conceptual object knowledge processing.

Hands on interactions: The use of motor control as tool to investigate social cognition

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Kinematics studies have been widely used to analyse perception/action coupling in single participant settings. More recently, researchers have started to extend these methodologies to more social settings, where two people (or more) are requested to interact in a laboratory, or more rarely in ecological environments. Such an extension involves several methodological challenges, particularly regarding the degree of social interactions (e.g. ranging from action observation to joint tasks) and how controlled the social setting is (e.g. free or more controlled interactions). Besides the challenges, this extension revealed to be very powerful, with important implications for motor control studies in general. The aim of my presentation is to give an overview of the topic, by presenting recent data collected in my lab and discussing potentialities and limitations of this innovative approach to action control.

Flexible goal imitation: Vicarious feedback moderates stimulus-response binding by observation

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The present study investigated whether vicarious feedback exerts a moderating influence on transient binding processes between stimuli and observed responses. Two participants worked together in a shared color categorization task and took the roles of actor and observer in turns. Across a prime-probe design, stimulus relation, response compatibility of observed prime and to-be-performed probe responses, and prime feedback valence were independently manipulated. Results showed that prime feedback modulated stimulus-response (SR) retrieval effects: After positive prime feedback, typical SR-retrieval effects emerged (i.e., better [worse] performance in stimulus repetition probes with compatible [incompatible] responses). Importantly however, SR-retrieval effects were reversed after negative prime feedback, reflecting worse (better) performance in stimulus repetition probes with compatible (incompatible) responses. Findings are consistent with a flexible goal imitation account, according to which imitation is due to an interpretative and therefore feedback-sensitive reconstruction of action goals from observed movements. In concert with earlier findings, the present data support the conclusion that transient SR binding/retrieval processes are involved in social learning phenomena.

Face cueing effects in a personalized anchoring paradigm?

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According to research on spatial representation of numbers, random number generation can not only be influenced by a person's own eye movements but also by passive observation of another person's gaze (e.g. Grade, Lefèvre, & Pesenti, 2013). The pattern of results in these experiments is always the following: larger numbers are associated with (observing someone) looking upwards or to the right, and smaller numbers with looking downwards or to the left. Our study examined whether spatial information provided by head postures (upwards or downwards tilted heads) influence 'purposed' number generation, using a personalized anchoring paradigm (cf. Erle, in prep.). In two experiments, participants saw a photograph (heads and shoulders) of a person in one of three postures (head tilted upwards, downwards or not tilted at all). The line of sight of the persons in the photographs was independent of this head posture manipulation and was always directed at the camera. Participants then answered a trivia question and received numerical anchors for their judgments. Specifically, participants were told that the anchor provided was the answer of the person seen in the respective photograph. In experiment 1, the anchor was the median of the answers given by participants in a pretest. In experiment 2, the anchors were either always the 15th percentile or the 85th percentile of the answers given in a pretest (between-design; e.g. Strack & Mussweiler, 1997). The results of both experiments showed the pattern known from research on spatial

representation of numbers. An interaction with the anchor effect was not found. Possible mechanisms are discussed.

Somewhere over the rainbow – The role of color information during search for onset targets

Florian Goller & Ulrich Ansorge

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Many studies suggest that stimuli with a sudden appearance (onset) capture our attention in a bottom-up way. However, according to the contingent-capture theory (Folk, Remington, & Johnston, 1992), irrelevant cues defined by an onset capture attention only if the searched-for target is also defined by its onset. If the target is defined by color, onset cues do not capture attention, because such cues do not match the top-down control settings for the target's feature (i.e. color). Yet, attention capture in these study was estimated with onset cues of a color similar to that of the targets. In other words, the cue did not only match the onset feature of the target, but also the color feature of the target. This color match could have contributed to attention capture by onset cues, or might even explain it. In a series of experiments, we found stronger attention capture by onset cues with a color similar than by onset cues with a color dissimilar to the onset targets. In addition, we found attention capture by color cues of a color similar to the onset targets, but no cueing effects of color cues of a color different than that of the onset targets. Based on these and related findings, we conclude that color-based contributions to attention capture by onsets is due to the participants' use of the most economical top-down setting in an experimental situation.

Affective reactions to ambiguous artworks

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The processing-fluency-account states that the easier a stimulus is processed the more it is liked. Contrary to this notion, in previous studies we found that ambiguous artworks were preferred over non-ambiguous artworks, although they were rated as harder to process (Jakesch, Leder, & Forster, 2013). To resolve these conflicting findings and gain insight into the role of ambiguity versus fluency in aesthetic perception, we conducted a facial EMG study. Sixty-two participants rated ambiguous and non-ambiguous stimuli (presented for five seconds) for fluency and liking while the facial muscle activation of the Zygomaticus major and the Corrugator supercilii muscle regions was recorded indicating positive and negative affect. As stimuli, we used ambiguous paintings by Rene Magritte and produced non-ambiguous versions by manipulating the images via Photoshop. Behavioral results showed that ambiguous images were rated as less fluent than non-ambiguous images, but—contrary to previous studies—did not differ in liking. Physiological results showed that short after stimulus onset Corrugator supercilii and Zygomaticus major activation diverged for ambiguous versus non-ambiguous

images. Ambiguous images evoked a weaker Corrugator supercilii activation, but a stronger Zygomaticus major activation, which can be interpreted as a positive affective reaction. These effects were modulated by personality traits, like tolerance for ambiguity and need for personal structure. Our results indicate that ambiguous artworks can lead to positive reactions not because they are harder to process but rather although they are harder to process. The safe context of art perception might just be the ideal playground for indulging in this aesthetic challenge.

Eliminating dual-task costs by minimizing crosstalk between tasks: The role of modality and feature pairings

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We tested the independent influences of two content-based factors on dual-task costs, and on the ability to process two tasks in parallel after practice: The pairing of S-R modalities and the pairing of relevant features between stimuli and responses of two tasks. The two pairing factors were realized across four dual-task groups. Within each group the two tasks comprised two different stimulus modalities (visual and auditory), two different relevant stimulus features (spatial and verbal) and two response modalities (manual and vocal). Pairings of S-R modalities (standard: visual-manual and auditory-vocal, non-standard: visual-vocal and auditory-manual) and feature pairings (standard: spatial-manual and verbal-vocal, non-standard: spatial-vocal and verbal-manual) varied across groups. All participants practiced their respective dual-task combination in a paradigm with simultaneous stimulus onset before being transferred to a psychological refractory period paradigm varying stimulus-onset asynchrony. A comparison at the end of practice revealed similar dual-task costs and similar pairing effects in both paradigms. Dual-task costs depended primarily on feature pairings. Groups training with non-standard feature pairings (i.e., verbal stimulus features mapped to spatially separated response keys, or spatial stimulus features mapped to verbal responses) had substantial dual-task costs after practice. In contrast, dual-task costs were much smaller, and virtually disappeared, with standard feature pairings in both paradigms. Modality pairings had comparatively little effect on dual-task costs. The results can be explained by crosstalk between feature-binding processes for the two tasks. Crosstalk was present for non-standard but absent for standard feature pairings. Therefore, standard feature pairings enabled parallel processing at the end of practice.

The development of context-sensitive control adjustment

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The ability to use contextual cues to adjust cognitive control according to situational demands is

a hallmark of flexible and adaptive human behavior. Here, we investigated three different types of contextual control adjustment with respect to their ontogenetic development for the age groups of 9 and 12 year old children and young adults. In a first part, we implemented a list-wide-proportion congruence manipulation, in which conflict trials were frequently/infrequently presented within a list of trials. In a second part, we implemented a location-specific-proportion congruence manipulation, in which certain trial types (e.g., conflict trials) were frequently/infrequently presented at one of two locations. Both types of contextual control adjustments are based on the formation of high-level associations between features of the context (e.g., lists, locations) and the respective attentional control set. Contextual adjustments of control are observed in reduced interference at contexts with high conflict frequencies. In a third part, we tested for a trial-to-trial conflict-triggered adjustment of cognitive control. Here, the experience of a conflict in the previous trial reduces conflict in the subsequent trial. In all three forms of control adjustments, contextual cues (e.g., lists, locations, previous conflict) reveal information about the required extent of attentional control. As expected, young adults showed reliable adjustments of control for all types of contextual cues. Children at the age of 9 and 12 years were able to demonstrate contextual control adjustments based on stable context-control associations. Yet, they did not demonstrate adjustments of cognitive control that were based on previous conflict experience. Thus, children can learn and utilize high-level associations between context and control sets, but seem less able to utilize trial-to-trial-based conflict signals for cognitive control adjustments.

Why technicians should be tidy and nurses should be honest: Agency and communion halo effects as a function of social contexts

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Halo effects are one of the oldest and most well-known types of judgment biases. However, one still unresolved issue is the question whether different personality dimensions, such as agency and communion, promote halo effects of different strengths depending on the context. According to the salient dimension model, certain features can provoke halo effects on the ratings of other attributes when they are very salient. Since communion attributes should be especially salient in social jobs, they should lead to stronger halo effects than agency attributes in this context. In contrast, this difference should be weakened or even reversed in the context of technical jobs. A pretest showed that communion traits were indeed more salient than agency traits in the context of social jobs, while the opposite was true for the context of technical jobs. To test our hypotheses, participants judged fictitious individuals working in social or technical jobs in three experiments. These individuals were described with different positive or negative behaviors which reflected either agency or communion traits. The data revealed that communion behaviors led to stronger halo effects than agency behaviors for the judgment of people in social jobs, whereas the pattern was reversed for the judgment of people in technical jobs. In line with previous findings, this interaction was stronger for negative than for positive behaviors. However, the described effects only arose when the social context was

manipulated within subjects. These results have important implications for understanding the basic processes of halo effects as well as their application in job-related contexts.

Modeling route recall using landmarks

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In many day-to-day situations landmarks guide our orientation and wayfinding. In order to be useful for these purposes, a landmark must stand in contrast to the surrounding (e.g., by being more brightly colored). A recent theory describes a functional dependency between landmark selection for wayfinding and three types of salience; namely visual salience, structural salience and semantic salience. This theory has been shown to predict choice proportions of landmarks in a way-finding context. In this work, we extend the theory to further describe how landmark selection influences performance in actual way-finding. Based on manipulations of visual and structural salience of landmarks in a virtual environment experienced from an egocentric perspective, we test the impact of these saliences on route recall. We expect to find better route recall when high visual and structural salience align. By counterbalancing the level of salience of visual and structural salience, respectively, we can also investigate their relative contributions to route recall. Furthermore, an ACT-R model will be used to describe the underlying memory processes. The model tries to explain route recall in terms of spreading activation, where intersections with highly salient elements enhance the recall of the correct way by improving the activation of the encoded direction. Intersections without salient elements have less information and the activations of possible directions converge. This will result in quicker and more reliable recalls in presence of highly salient elements.

In-group and out-group effects on visual perspective-taking

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Visual perspective-taking (VPT), the ability to appreciate different vantage points, is vital for understanding and predicting other person's behavior. Of similarly fundamental importance with respect to social behavior is the human tendency to structure the world by means of social categories. The present study investigated the influence of social category memberships on observers' ability to take another agent's visual perspective. For this purpose, German and Turkish participants completed a Level-1 VPT task, which required them to repeatedly judge what could be seen either by themselves or by a human avatar whose perspective could be consistent or inconsistent with their own. Importantly, avatars could be in-group or out-group members regarding the participants' own ethnicity. In addition to the VPT task, participants completed measures assessing their identification with either group as well as the amount of contact with members of both groups. Analysis of the VPT task revealed that participants

experienced difficulty in overcoming their own vantage point when judging the avatar's perspective, but also in ignoring the avatar's irrelevant point of view when judging their own. This was indexed by increased response latencies and error rates on inconsistent as compared to consistent trials. Importantly, for participants who reported greater in-group than out-group relatedness in their identification and contact measures, performance decrements due to inconsistency of perspectives were more pronounced when avatars were out-group as compared to in-group members. This effect seems to be driven by those participants experiencing greater difficulty in taking an out-group avatar's deviating perspective.

The usefulness of light stimuli to draw car drivers' visual attention to the periphery at railway level crossings

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International statistics about accidents at railway level crossings reveal that a vast majority of it is caused by human errors of road users. Several studies prove that especially in the case of passive level crossings, a deficient visual search of drivers in the peripheral regions is a main cause for collisions between motorists and trains. As a countermeasure, the system PeriLight was developed in order to draw car drivers' visual attention to the periphery at railway level crossings. PeriLight consists of two strobe-LED flash lights which are positioned around 50 meters in the periphery of the level crossing to the left and the right close to the tracks. The pulsating lights of the system are triggered by a road-side sensor when a road user approaches the level crossing. The system was evaluated in a driving study. In an experimental vehicle, participants passed a target level crossing two times in an approximately one hour ride. When participants crossed the level crossing for the first time, the system was inactive, when they crossed it for the second time, the system was active. Eye tracking results show that the pulsating lights in the periphery significantly increased the number of participants that at least showed one fixation in the peripheral areas at the level crossing. This has been confirmed for both a day and a night condition. Additionally, the total number of fixations in the periphery increased significantly when PeriLight was active. Besides the improved patterns of visual fixation, driving data show that when the system was active, drivers in the sample also significantly decelerated in front of the level crossing, at least in the dark driving condition. Under daylight conditions a significant deceleration could not be observed. It is assumed that the positive effect of the system in drawing the attention to the periphery at the level crossing also has a beneficial effect on the probability of detecting an oncoming train.

Bayesian mixture modeling of significant p values: A meta-analytic method to estimate the degree of contamination from H0

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Publication bias and questionable research practices have long been known to corrupt the published record. One method to assess the extent of this corruption is to examine the meta-analytic collection of significant p values, the so-called p-curve (Simonsohn, Nelson, & Simmons, 2014). Inspired by statistical research on false-discovery rates, we propose a Bayesian mixture model analysis of the p-curve. Our mixture model assumes that significant p values arise either from the null-hypothesis H0 (when their distribution is uniform) or from the alternative hypothesis H1 (when their distribution is accounted for by a flexible nonparametric technique known as the Dirichlet process mixture). The model estimates the proportion of significant results that originate from H0, but it also estimates the probability that each specific p value originates from H0. We will present results for two concrete examples from the published literature.

Masked priming of complex movements: Perceptual and motor processes in unconscious action perception

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Fast motor actions in sports often require the ability to discriminate between similar movement patterns (e.g. feint vs. non-feint) at an early stage. Moreover, an athlete might even initiate a motor response without a conscious processing of the relevant movement information. Therefore, the question was raised whether or not athletes and novices of a particular movement can unconsciously distinguish between similar movement patterns. Using a masked priming experiment (Experiment 1), it is demonstrated that both groups were similarly able to unconsciously distinguish a feint and a non-feint action. To further investigate whether this result is based on perceptual priming effects or on unconscious motor activations, a second masked priming experiment was conducted (Experiment 2). Experiment 2 revealed perceptual priming effects which are not mediated by motor expertise. Moreover, unconscious pictures of feint and non-feint actions from different movement stages are sufficient to activate a motor response in athletes. In novices, a negative congruency effect occurred. The results found here point out that perceptual priming effects are not mediated by motor expertise whereas response priming effects might be.

The neurophysiology of the interference of grasping movements in functionally separate working memory processes

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This study focuses on the interaction of cognition and manual action control, particularly on the neurophysiology of functional interaction between working memory (WM) and grasping movements. First, we examined movement costs of grasping in behavioral memory performance. Second, we investigated the neurophysiologic signature of grasping interference in separate WM processes, i.e., encoding, maintenance and retrieval. In a WM-grasping dual-task paradigm, a single block requiring performing a verbal or visuospatial WM task was compared to a dual block requiring simultaneous performance of WM task and grasp-to-place task. The ERPs were analyzed separately for each WM process in single and dual blocks. Thirty participants were tested in a 2 (single vs. dual block) x 2 (verbal vs. visuospatial domain) within-subject design. Behavioral data revealed memory performance decrease from single to dual block only for the visuospatial task, i.e., domain specific movement costs. Regarding the ERPs, we showed distinct ERP effects for encoding, maintenance and retrieval of verbal and visuospatial material. Regarding the grasping interference, we showed dissociable interference in each WM process. This study supports distinct neural sources for encoding, maintenance and retrieval processes of verbal and visuospatial domains. More importantly, this study for the first time shows the distinct spatio-temporal characteristics of neuro-cognitive resources shared by grasping and each WM process, which contributes to a better understanding of neuro-cognitive architecture of grasping movements.

When words collide: Priming effects of adjective-noun phrases beyond the word level

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An important, but under-represented topic in psycholinguistics is that of meaning composition, in particular the question how and at which point in processing the meanings of two words are combined. To address this issue, we conducted a priming experiment (Lexical Decision Task, SOA of 1000 ms) in which adjective-noun pairs were used as primes, and single nouns were used as targets. Additionally, we conducted a control experiment in which only the noun pairs without the adjectives were used. As the most important predictor variables for response latencies in our main experiment we used the semantic similarity between the prime adjective and the target, as well as the similarity between the whole prime phrase and the target. Those similarities were determined by employing a distributional semantics model, where the phrase representation was derived compositionally from its constituents. In a Linear Mixed Effects Model, including length and frequency effects as well as the baseline response latencies observed in our control experiment, we found significant effects of the semantic similarity between the prime adjective and the target, and additionally, of the similarity between the whole phrase and the target. This finding implies that composition did indeed take place, and

that the combined adjective-noun concept produces priming effects over and above those of the single concepts that constitute it.

Individual differences in interference tasks

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Interference in tasks, such as Stroop, Simon, or Eriksen interference, are well established and used to explore variation in attention, inhibition, cognitive control, and working memory. Yet, there is a problem where the questions researchers tend to ask are artificially constrained by the quality of statistical models they use. The standard HLM/SEM approach is to assume all individual true effects are unique, graded, and with full support, such as those arising from a normal distribution. Yet, these propositions strike us as difficult because they imply that some individuals will have true reverse effects. For example, a true reverse Stroop effect is not plausible, where incongruent words speed color naming. Consideration yields new questions outside the HLM framework: Does everyone really have a unique, different Stroop effect? If so, does anyone have a truly reverse Stroop effect? Although these questions are not standard in conventional approaches, they are tractable in Bayesian analysis with fully Bayesian model comparison. We developed four different models: 1. The null model that no person has a true Stroop effect; 2. The same effect model that every participant has the same sized true Stroop effect, say 60 ms; 3. The constrained model that although people may have differently sized effects, these are all constrained to be positive and 4. The unconstrained model, typical in HLM, that people's true effects not only differ but are unconstrained in support. We develop Bayes factors for assessing the strength of evidence from data for these four models and calculate values for various interference effects. By applying these models, we can compare reasonable, theoretically informed models of individual differences and construct a landscape of individual differences across a range of tasks.

The influence of disgust-related natural images on visual processing in subclinical obsessive-compulsive disorder

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In recent years, numerous studies demonstrated that information processing of fear-related visual stimuli (e.g. spiders, angry faces) is enhanced in individuals with anxiety-related disorders. However, results for contamination-related stimuli in individuals with contamination-fear (i.e., the washing subtype of obsessive-compulsive disorder [OCD]) are much less clear. Few studies reported some enhanced processing of semantic contamination-fear-stimuli, others did not. We used a response priming paradigm to study this question using visual stimuli; those have a high ecological validity and are effective in attracting attention. To induce contamination fear, we

used hygiene-related images (e.g. dirty bathrooms, cockroaches). We compared 23 non-anxious control participants and 20 participants with subclinical OCD (i.e., "washers"). In each trial of the priming experiment, one prime and one target were presented in rapid sequence. The participants should discriminate hygiene-related from neutral images and, as a control condition, fear-related images (e.g. attacking dog) from neutral stimuli. We obtained strong priming effects for both combinations and in both participant groups. However, in the experimental group responses to hygiene-related targets were not faster and priming effects for hygiene-related primes were not stronger. Thus, hygiene-related images do not modulate responses of "washers". This suggests that although the washing subtype of OCD is associated with contamination fear, disgust might be the major factor driving participants´ responses. Despite the alarming character of disgust, its effect on the processing of visual stimuli seems to be different compared to fear. Additionally, hygiene-related stimuli are highly complex and ambiguous compared to rather stereotypical fear-related stimuli (e.g. spiders). Thus, it is less likely that they are overlearned by the visual system and less likely that responses are promoted by perceptual learning mechanisms.

Forest and flowers, trees and plants: Do specific odorants bias the level of processing of a visual scene?

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Despite the widespread use of aromatherapy and popular claims about the beneficial effects of odors, the capacity for odors to specifically alter our psychological states has only recently begun to receive empirical investigation. One recent study (Colzato, Sellaro, Paccani, & Hommel, 2014) suggested that the level at which visual stimuli are processed may be biased by the presence of specific odors, namely that lavender enhances a global processing bias, while peppermint biases visual attention to more local levels. In order to test this hypothesis, we utilized a within-subjects design and had subjects perform a global/local processing task, using Navon stimuli, while in the presence of clean air, peppermint odorant, and lavender odorant, with the odorants being presented in different blocks. The results suggest that neither peppermint nor lavender specifically bias the dominant level of processing of a visual scene. The discussion will focus on of whether odorants and odors can influence our psychological states, what mechanisms could account for such potential changes, and how these potential changes can be best utilized to in research in the field of cognitive psychology.

Shallow perceptual and deeper semantic processing affect event-related potentials (ERPs) of successful memory retrieval in children and adults

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Adults and children have been shown to process items differently – adults tend to encode items conceptually, whereas children focus more closely on perceptual details. This different approach to encode items can also affect subsequent episodic memory retrieval. Accordingly, in an earlier study (Haese & Czernochowski, 2015) we found that adults switched from more conceptual to more perceptual processing when perceptual details were relevant for memory retrieval; children, by contrast, encoded items on a perceptual level from the beginning. Memory performance was similar across groups – however, ERPs revealed an early frontal old/new effect thought to reflect familiarity in older children only after intentional encoding. To further investigate how different encoding processes affect these frontal old/new effects, children – grades two and five – and adults memorized items with a semantic (object size decision) or a shallow orienting task (color task). At retrieval, participants categorized items as identical, changed (different color), or new. Generally, memory was higher after semantic (vs. perceptual) encoding, in particular for adults. Participants recognized more identical than changed items, and higher memory performance in older children and adults compared to younger children suggested more efficient memory retrieval. By contrast, age groups differed in terms of the observed ERP effects: Early old/new effects were only reliable in adults, indicating very early discrimination of old versus new items, resulting in familiarity; later parietal old/new effects reflected recollection in all groups. Importantly, in contrast to our previous study, we observed no frontal old/new effects in older children, suggesting that the higher task difficulty may have prevented children from assessing even perceptual familiarity efficiently. Taken together, task difficulty appears to play a critical role for evaluating ERPs reflecting familiarity in middle childhood.

A diffusion model analysis of monetary gambles

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In this study, we examined whether an analysis of diffusion model parameters can help to further understand choice preferences in risky monetary gambles. In separate gain and loss sessions, participants were either first presented with a lottery followed by a sure monetary outcome (Exp. 1), or with a sure outcome followed by a lottery (Exp. 2). Participants selected between the sure outcome (gain / loss) and the risky lottery, which offered a higher outcome with a certain probability together with an outcome of zero with the counter-probability. The lotteries varied in their expected value (EV; 75%, 100%, or 125% of the sure outcome). As a result, in the gain domain, participants' sure choices increased with decreasing EV of the lottery, whereas for the loss domain, the pattern was reversed, and more lotteries were chosen as their EV decreased. Yet, between the two experiments, risk preferences varied differently as a

function of response time. Therefore, the data was further analyzed with diffusion models (fast-dm, Voss & Voss, 2007). Model parameters indicate (I) changes in the drift rate in accordance to the lottery's EV. When the sure outcome and the lottery's EV were about the same, the drift rate was close to zero indicating indifference between response options. With decreasing EV, evidence accumulated towards the sure-outcome option in the gain domain or towards the lottery-option in the loss domain. (II) A higher decision boundary in loss gambles indicated a more conservative response strategy than in gain gambles. (III) In Exp. 2, a shift of the starting point of the diffusion process towards sure outcomes in the gain compared to the loss domain support the notion of a response bias in differently framed monetary gambles. (IV) Finally, choice behavior could be well fitted by a parsimonious model. Taken together, our study shows that diffusion processes are a valuable tool for analyzing risky-choice performance.

How the twig is bend: Young children form attitudes by evaluative conditioning

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Many attitudes are acquired in early childhood. However, due to a lack of experimental research, it is unknown which processes underlie attitude formation in young children. To address this issue, two experiments were conducted with 153 children aged 3 to 6 years that provide first evidence for childhood attitude formation by evaluative conditioning. Specifically, it was found that children preferred novel stimuli previously paired with liked stimuli over novel stimuli previously paired with disliked stimuli. The effect occurred independently of age, generalized towards similar novel stimuli, and did not depend on the recollection of how stimuli were paired. The findings are discussed in terms of the processes underlying childhood attitude formation, and implications for related research areas are highlighted.

Using cognitive modeling to predict the usability of adaptive ambient systems

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When a user interface (UI) is to be displayed on many different devices, it often needs to be adapted according to the specification of the respective device. From a usability perspective, this raises the question of how to evaluate all adaptions and variations of a single UI in a reasonable manner. Conducting user tests with all combinations of UI variation and device is practically impossible. A promising approach to this problem is model-based evaluation. Computational user models do neither get tired nor demotivated when they are run against the same UI again and again. This talk promotes the application of cognitive modeling to evade the logistical collapse of empirical user testing caused by the mobile device explosion. Our approach is grounded deeply in psychological research by using the cognitive architecture ACT-R. Through close collaboration with computer scientists, we have access to machine readable

meta-information about the application under evaluation that helps to determine which cognitive strategies are used by our model. As a result, we are able to create automatic predictions of task completion times and error rates for classes of user interfaces (as opposed to single UIs). At the same time, we eliminate the laborious creation of UI mock-ups prior to the actual evaluation.

Why do people´s intentions do not reflect their actual inclination to act against norm violations?

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Recent empirical results suggest that determinants of morally courageous interventions against norm violations differ systematically from those of behavioral intentions. To shed light on potential underlying mechanisms, we investigated if the availability of cognitive resources during the confrontation with a moral norm violation affected a) the role of personality determinants and b) cost-benefit analyses for morally courageous behavior intentions. We assessed personality measures approximately two weeks prior to a laboratory session. Participants (N = 177) were randomly assigned to high vs low cognitive load (induced by having to memorize a 10 vs 1 digit number). They indicated their intentions to intervene in response to descriptions of four situations. For each participant, two situations involved high cost of intervention, two low cost, with type of situation being counterbalanced across participants. The results provided no evidence for an impact of available cognitive resources on the relevance of personality determinants. By contrast, we found that the impact of costs on participants' morally courageous behavior intentions was exclusively present in the low load compared with the high load condition. Implications of these findings for future research on morally courageous behavior will be discussed.

Adult age differences in inferring task states in decision making during uncertainty

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Recent work suggests that, in changeable and uncertain reward environments, we engage in 'serial hypothesis testing'. In this manner, our attentional and cognitive control is guided by our favoured task state model at any given time. We have previously suggested that older adult's difficulties in employing attentional and cognitive control in uncertain reward environments are related to a reduced ability to form reliable task state models. We present here two probabilistic reversal learning studies that use a) Bayesian models to estimate age differences in the reliability of task state models as well as b) fMRI and pupillometric data to examine the application of attentional and cognitive control based on these models. We find that older

adults form less reliable models of the currently assumed task state. With respect to brain activations, this is evident as weaker BOLD signal in brain areas associated with the representation of action guiding values (vmPFC) in the group of older adults. Furthermore, we observe reduced BOLD signals in older adults in brain areas involved in reward-based updating (ACC, striatum). This supports the assumption that reduced certainty about the current task state is related to a reduced ability to adjust behavioral control flexibly in older adults. Our functional imaging results are independent of age differences in accuracy, thereby suggesting qualitative age differences in orienting attention and cognitive control during reversal learning. Complementary to our fMRI results, our pupillometric data show that older adults show a tendency to differentiate feedback rather based on valence than on its informativeness for the currently assumed task state, thereby adding to their difficulties of adjusting actions flexibly during changeable environments. In summary, we hope that our findings help elucidate why older adults have a harder time to orient their attention and actions, especially in changeable and uncertain reward environments.

The craftman knits a sweater – Activating gender stereotypes during the processing of verbs

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Research on gender stereotypes has been often conducted with role nouns (e.g., doctor is usually associated with the male gender) and suggests an immediate activation of gender stereotypes upon presentation of a noun. Little is known about whether verbs immediately activate stereotypical associations such that they affect linguistic processing. Repeated exposure to verbs in gender specific contexts, such as describing a female person doing a stereotypically female activity (e.g. knitting a sweater), might result in the formation of probabilistic stereotypical inferences. Stereotypical connotations of certain verbs might become entrenched and lead to processing costs in gender-mismatching contexts. This study examined a) which intransitive verbs show gender-specific connotations, and b) whether the activation of verb-specific gender stereotypes is visible during reading. In a rating study, 69 participants assessed 111 intransitive verbs on gender connotations using a seven-point Likert scale. Based on the rating results, eight verbs with clearly male connotations and eight verbs with clearly female connotations were selected for a self-paced reading study. In the self-paced reading study, a new group of participants read simple sentences in which the sentence subject's gender either matched or mismatched the stereotypical gender connotation of a verb. The result showed that stereotypical meaning of verbs is accessed upon reading the verb in native readers and is visible immediately at the word following the verb. This finding suggests that gender stereotypes associated with verbs are incorporated into the verbal semantic representations and are accessed upon the presentation of a verb.

The impact of automation on older and younger drivers' perception of driving comfort and joy

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Highly automated driving opens up new prospects for the mobility of all ages. Especially older drivers are expected to benefit from this opportunity to preserve their autonomous mobility up to old age. But to ensure the acceptance and thus usage of this upcoming technology, new aspects of human-technology-interaction associated with the transition of the human's role from driver to passenger have to be investigated. One main research need is drivers' experience, as it is assumed that drivers will not be willing to drive highly automated if they will perceive it as uncomfortable or joyless. But it is still unknown how younger and older drivers experience automated driving or how the automated driving style influences their perception of comfort and joy. Thus, drivers' experience during manual driving and differently parameterized forms of highly automated driving was investigated in an exploratory driving simulator study with 20 younger and 20 older drivers. Each participant performed a manual and four highly automated drives based on either his own or other driving styles. Comfort and joy were assessed after each drive via questionnaire. Discomfort was assessed online during each automated drive via handset control. Automation improved the driving comfort for both age groups, but reduced joy of driving for younger drivers, at least without any secondary activities available. Drivers of both age groups preferred a driving style that is more typical for younger than for older drivers. Those results indicate a mostly positive drivers' experience of highly automated driving and its adjustability via driving style.

Emotion recognition and confidence in Borderline Personality Disorder

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Background: Facial emotion recognition has numerously been studied in patients with Borderline Personality Disorder (BPD). While findings are inconsistent ranging from enhanced recognition of emotions in general to impaired recognition of specific negative emotions in multiple choice tasks, there is consensus that alterations contributing to BPD pathology are subtle. To allow for a sensitive measure of such alterations in the processing of emotional expressions, we used a quantitative approach to study the evaluation of emotions in facial expressions in BPD. Methods: In two independent studies, BPD patients and healthy controls rated the intensity of happiness and anger in low intense happy, angry and ambiguous (study 1) as well as high intense happy, angry and neutral facial expressions (study 2). Additionally, following each intensity rating, confidence regarding these evaluations was assessed. Results: In both studies, BPD patients assessed happy faces as less intense happy than healthy controls. Groups did not differ in their evaluations of angry, ambiguous or neutral facial expressions. Confidence in judging low intense facial expressions was reduced in BPD, particularly when judging happy faces. In high intense and neutral facial expressions, lower confidence in BPD patients depended on the emotion displayed as well as on the emotion to be assessed. When

judging low intense facial expressions, confidence was linked to stronger anxious expectations of social rejection and more severe feelings of loneliness in BPD. Discussion: Using a quantitative rather than a categorical approach, our results extend previous findings of subtle alterations in emotional processing in BPD by pointing to differences especially in the processing of positive emotional stimuli as well as a reduced confidence regarding these evaluations. The link to sensitivity for social rejection and loneliness underlines the relevance of these alterations for reduced social functioning in BPD.

Flour or flower? Resolution of lexical ambiguity by emotional prosody in a non-native language

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It is well known that speakers' emotional state affects the prosodic characteristics of an utterance that in turn may influence linguistic processing. When ambiguity arises at the lexical level of processing, listeners have to access the appropriate meaning of a word. Emotional prosody has been shown to function as one type of contextual cues that influences resolution of lexical ambiguities (Nygaard & Lunders, 2002). Here, we asked whether non-native speakers of English are equally efficient in integrating the emotional tone of voice during non-native lexical processing. We selected a subset (n = 24) of the original homophones stimuli recordings from Nygaard & Lunders (2002) based on responses from 32 native speakers of German that indicated participants' familiarity with both meanings of a homophone pair (e.g., flower and flour). In the main experiment, 71 native speakers of German (highly proficient in English) heard emotional homophones (with a happy, sad, and neutral meaning) that were spoken in three different affective tones (happy, sad, and neutral) and were congruent, incongruent, or neutral with respect to the affective meaning. Participants saw two possible meanings of the homophone on a display and their task was to indicate which of the two meanings the speaker referred to. We found a significant emotion congruency effect only for sad homophones but not for happy homophones. Listeners were more likely to select the sad meaning of a homophone when the word was produced with a sad emotional prosody. Despite this asymmetry, the result suggests that non-native listeners use emotional prosody in non-native lexical selection.

A model-based account of the effect of mind wandering on decision-making

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People frequently lose focus from current task goals during everyday tasks, typically known as mind wandering. In the laboratory, such task-unrelated thoughts are associated with impaired performance on behavioral variables, such as decreased accuracy and more variable response times, and alterations in neural activity. We aimed to link these changes in outcome variables to

mind wandering in a model-based neuroscience framework. Participants completed a perceptual decision-making task where mind wandering was monitored with thought sampling methods. Neural activity was measured with electroencephalography and a time-frequency analysis was performed to extract the power of pre-stimulus alpha oscillations. We used a Bayesian approach to analyze pre-stimulus alpha power, task performance, and mind wandering. Specifically, we assumed that mind wandering is a neural state that affects the parameters of a cognitive process model, which in turn affects behavioral performance. Increased power of alpha oscillations in the pre-stimulus period was related to increased frequency of mind wandering and reductions in the efficiency of information processing in ongoing task performance. We conclude that trial-by-trial variability in neural oscillations can be related to changes in the parameters of cognitive process models, and that alpha band activity may have a predictive role in mind wandering.

New findings on intransitive chains and distorted betting decisions

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Causal reasoning is crucial to people's decision making in probabilistic environments. When betting on the occurrence of an event, people should take the presence and absence of possible causes into account and make predictions based on them. Theories of causal reasoning and learning often implicitly assume that the structural implications of causal models and empirical evidence are consistent. However, for probabilistic causal relations, mismatches between structural implications and empirical evidence may lead to distortions of empirical evidence. Previous work has shown that people may use the generative local causal relations A → B and B → C to infer a positive indirect relation between events A and C, despite data showing that these events are actually independent (von Sydow et al., 2010). We briefly report new findings using overview format (von Sydow, Hagmayer, Meder, in press), where the violation of transitivity of a chain is caused by mixing different subclasses of events for which different correlations hold. The results show that people still tend to reason transitively, even though they might have used item information to detect mixing of different subclasses and the resulting violations of transitivity. Based on findings on an economic sequential learning scenario, we then report studies on transitive reasoning in intransitive situations with even negatively related distal events and their relation to betting behavior (Hebbelmann & von Sydow, 2014). We sketch the results of three experiments where participants bet as if they were influenced by a transitivity assumption, even when the data strongly contradicted transitivity.

Testing between information integration and heuristic accounts of recognition-based decisions

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It is well known that people often choose the recognized alternative if only one of two alternatives is recognized as previously known. To explain this finding, the recognition heuristic (RH) was proposed as a fast and frugal decision heuristic according to which participants immediately choose the recognized object in a noncompensatory fashion. In contrast, global information-integration theories treat recognition as merely one of many decision-relevant cues and assume that an information-integration process determines decisions in a compensatory manner. As predicted by the RH, responses in line with the heuristic should always be stochastically faster than responses due to consideration of further knowledge. In contrast, global information-integration accounts such as the parallel constraint satisfaction theory (Glöckner & Betsch, 2008) predict that consideration of recognition-congruent knowledge actually results in faster responses than solely relying on the recognition cue. To test these qualitatively opposite predictions, we extend the multinomial processing tree model for measuring RH use by Hilbig, Erdfelder, and Pohl (2010) to response times. Specifically, we assume that RH use and information integration are mutually exclusive cognitive processes associated with separate, latent RT distributions. Based on this RT-extended model, we estimated the relative speed of RH use and information integration in a distribution-free manner using data from eight experiments by Michalkiewicz and Erdfelder (2015). The results consistently show that RH use is actually slower and not faster than decisions based on integration of recognition-congruent information, thus corroborating information-integration accounts of recognition-based decisions.

How experience with the AX-continuous performance task modulates the influence of positive affect and performance-contingent reward on proactive control

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It becomes increasingly clear that reward and positive affect have distinct effects on cognitive control. Here, we present one behavioral study investigating how experience with a given task modulates these affect and reward effects. To this end, a well proven modified version of the AX-continuous performance task (AX-CPT) was used. Critically, reward and affect were not only manipulated between but also block-based within participants: Three groups of participants received three blocks of the AX-CPT. In the first and third block, a given group either received a positive affective picture (positive group), a neutral affective picture (neutral group), or a picture of a Euro-Bill (reward group). In the second block, all groups received just the neutral picture. Results replicated both effects: reward is associated with increased, positive affect with decreased proactive control as compared to the neutral condition. Moreover, all groups showed an increase of proactive control with increasing experience with the task. This gradual shift

towards proactive control was even observed in another positive affect group that received positive affect pictures across all blocks. Taken together, the results reveal the sensitivity of the positive affect effect to strategic influences and highlight the robustness of a once adapted proactive control strategy.

Decoding silence: Brain activity during the pauses before highly predictable words contains information about semantic predictions

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Speech perception requires rapid processing of auditory stimuli that cannot be sufficiently explained by simple bottom-up models of information propagation. According to the predictive coding framework, the brain utilizes generative models to predict upcoming events and information. In the context of semantically dense sentences, this allows for rapid recognition and integration of words. The aim of the current study was to investigate predictive coding in language by using multivariate pattern analysis of EEG data to decode a semantic property - animacy - of a target word during a preceding delay in speech. Our hypothesis was that if predictive coding is utilized in speech perception, then a multivariate pattern classifier should be able to decode the animacy of the predicted word before its actual onset – when the preceding sentence context provides sufficient constraint to derive a specific prediction. Native German speakers (n = 39) were asked to listen to sentences, with some of the sentences containing a delayed target noun (delay length = 1000 ms) that was either an animate or inanimate object. Applying classifiers trained to decode whether an animate or inanimate noun is expected in the pause preceding the delayed target word, we found that we were able to decode above chance the animacy of the target word 500-1000ms after the onset of the pause ($p<0.05$). This indicates that brain activity preceding the actual word contains information about highly expected upcoming words, which is compatible with essential implications of predictive coding theories. We interpret these results as support for predictive models of language processing.

The influence of a background object on motion correspondence

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A major task of the visual system is to organize its input in a way that elements that belong together are represented together by a correspondence process. Here, we investigated whether a rectangular background object influences this correspondence process. We used the Ternus display, an ambiguous apparent motion display, in which three elements are presented next to each other, shifted by one position from one frame to the next. This display can be perceived as one element jumping across the other two elements (element motion) or as all three elements

moving together as a group (group motion), depending on how the correspondence problem has been solved. Rectangles were positioned in a way that their border was either between the Ternus elements or not. The borders were either real physical borders or perceived borders of Kanizsa rectangles. Participants reported to see more element motion when the physical border was between the elements. This was also true when there was only a perceived object border. These results suggest that object borders influence the correspondence process. Furthermore, they show that correspondence is determined after modal completion is achieved.

Tilted heads, tilted minds: Influence of face cueing on estimation of prices

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Does a sideways tilted head on a photograph influence a person's estimation of prices? Various studies corroborated the bidirectional link between spatial information and mental number representation (e.g., Shaki & Fischer, 2013). A study by Grade and colleagues (Grade, Lefèvre, & Pesenti, 2013) used that link to influence participants' random number generation by socially cued spatial information: participants produced smaller numbers after passively observing a gaze direction change to the left (downwards) and larger numbers after gaze direction change to the right (upwards). Following this line of research, Goetz and colleagues (in prep.) used photographs of people tilting their head (upwards, downwards) and a more purposeful number generation task in order to transfer these findings into a more communicative setting. In two experiments, they demonstrated the influence of socially cued spatial information in a personalized anchoring paradigm. The following experiments were built on these findings. They investigated the influence of heads tilted leftward or rightward on number generation in a likewise purposeful, but more applied anchor-like paradigm: the estimation of prices of various goods. In detail, we expected participants to estimate lower prices for a given good after looking at leftward tilted faces than participants looking at rightward tilted faces (line of sight directed at the camera). With this study, we not only wanted to demonstrate the influence of low informative social cues on mental number magnitude, but also tried to further substantiate the influence of spatial cues on purposeful number generation processes aiming at true values. Results are provided on the poster. Possible mechanisms are discussed.

Effects of modality mappings within working memory on postural control, associated neural correlates, and training-induced modulation of dual-task performance in old age

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Aging is associated with marked decrements in both postural control and working memory capacity as well as dual-task performance. Dual-task decrements in balance and working

memory have ample significance for everyday activities and critical outcomes such as falls. Previous research and theoretical models indicate, that both interference related to the compatibility of stimulus and response modalities within working memory (in that e.g., visual stimuli facilitate motor responses) as well as limited central capacities within working memory may modulate dual-task performance in older adults. At the same time, there is increasing evidence that working memory and dual-task performance show significant training-induced plasticity in old adults. However, the underlying mechanisms and neural correlates of these effects are poorly understood, to date. The overall objective of this project is to better understand mechanisms of such age-related decrements in dual-task performance between postural control and working memory. Using a behavioral and a neurophysiological approach, we will specifically disentangle effects of compatible versus incompatible stimulus-response mappings within working memory on dual-task performance from effects of the degree of central interference of these working memory tasks with postural control. Furthermore, within old adults, we will explore effects of dual-task training as a function of stimulus-response mappings and the degree of central processing constraints for upright posture and will be able to relate individual differences in cross-sectional behavior and associated neural changes. Our results will elucidate underlying mechanisms of decline in both working memory capacity and in dual-task performance involving postural control, and will inform both theoretical accounts of modality compatibility as well as future training and falls prevention studies in older adults.

Cognitive processes in goal engagement and goal disengagement

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The Dual Process Model by Brandtstädter and colleagues (Brandtstädter & Rothermund, 2002) distinguishes between a goal engagement and a goal disengagement mode, both are means to reduce discrepancies between the desired and the actual state, which become activated when personal goals are blocked. The Dual Process Model makes serval assumptions about how cognitive processes differ between the goal engagement and disengagement mode. The aim of the present study was to determine if these assumptions can be experimentally supported. Participants worked through tasks from the German version of the Compound Remote Associate (CRA) Test while simultaneously performing a cognitive paradigm to measure attention and cognitive flexibility. In order to experimentally create a blocked goal, similar tasks to those of the CRA Test were added, which were unsolvable. The results suggest that goal engagement and disengagement are accompanied by performance differences on the cognitive measures utilized. Results will be discussed against the background of goal attainment theories.

The effect of empathy on pro-environmentalism

Laura Henn

Otto-von-Guericke Universität Magdeburg

The evocation of empathy through images of suffering environment (Berenguer, 2007) and suffering humans (Pfattheicher, Sassenrath, & Schindler, 2015) has been shown to be associated with higher pro-environmental tendencies. It is assumed that compassion with other living beings increases positive attitudes towards the suffering objects and activates moral judgments and actions (Pfattheicher et al., 2015). Pro-environmental behavior can be seen as pro-social behavior (Kaiser & Byrka, 2011), thus pro-environmental tendencies should increase after manipulating empathic concern, irrespective of the empathy target. We tried to replicate and combine the findings of the effect of inducing empathy with humans, animals and nature on pro-environmental intentions and added a behavioral measure of pro-environmentalism as a dependent variable, i.e. signing a pro-environmental petition. A 2 (empathy high vs. low) x 3 (image of suffering human vs. animal vs. nature) design allowed us to investigate whether empathic perspective-taking with a suffering living being increased pro-environmental intentions and the engagement in a pro-environmental petition, and whether the target species of empathic perspective-taking moderated the effects. Pro-environmental attitudes and trait empathy were controlled and the degree of emotional arousal was assessed via self-report to check for effective manipulation. In an online experiment, 179 participants were randomly assigned to one of six conditions. Contrary to former experiments, manipulation of empathic concern did neither lead to stronger negative emotions, nor increase pro-environmental intentions, nor increase the probability that people signed a petition by a known environmental organization. In the three different image conditions, baseline differences were found in pro-environmental attitudes that explained pro-environmental intentions and signing of the petition, regardless of the experimental manipulation.

Beyond the lab: Collecting mouse-tracking data in online studies

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Cognitive scientists working in the laboratory are increasingly including mouse-tracking in their studies to assess the development of cognitive processes over time, particularly the emergence of choices and the degree of conflict between response options. At the same time, an increasing amount of experiments are conducted online, allowing for efficient data collection in larger and more diverse samples. The present contribution addresses both of these developments, and explores the possibility and unique challenges of collecting and analyzing mouse-tracking data in self-administered online studies, where the conditions of data collection are not as easily controlled. Based on these, we introduce a platform-independent, open-source javascript library (mousetrap-web, https://github.com/FelixHenninger/mousetrap-web) that can be integrated in existing web-based studies to collect and analyze mouse movement data.

Temporal dynamics in EEG theta and alpha activity in two dynamic Chinese Health Qigong techniques

Diana Henz & Wolfgang I. Schöllhorn

University of Mainz

Health Qigong is a common technique of Traditional Chinese Medicine applied to strengthen mental and physical health. Several studies report increases in EEG theta and alpha activity after meditational Qigong exercise indicating a relaxed state of mind. In the current study, we compared effects of two dynamic Health Qigong techniques on EEG theta and alpha activity. Subjects performed the techniques Ba Duan Jin, and Yi Jin Jing in a within-subjects design. Eyes-open and eyes-closed resting EEG was recorded before and immediately after each 15-minute exercise block. Results show a decrease in alpha activity after 15 minutes, followed by an increase after 30 minutes when performing the Qigong technique Ba Duan Jin. Theta and alpha activity was increased after 15 minutes, followed by a further increase after 30 minutes when training the Qigong technique Yi Jin Jing. Our results demonstrate different temporal dynamics in theta and alpha activity for the two dynamic Qigong techniques. We hypothesize that the found brain activation patterns result from different attentional focusing mediated by different breathing techniques performed during the investigated Health Qigong techniques.

The spatial (mis-)interpretation of pointing gestures

Oliver Herbort & Wilfried Kunde

Julius-Maximilians-Universität Würzburg

Pointing gesture are ubiquitous in human communication. Unfortunately, pointing gestures toward distal referents are frequently misunderstood. For example, it is tenaciously difficult to communicate the location of a specific star in the night sky solely with pointing gestures. We tested the hypothesis that such misunderstandings arise because production and interpretation of pointing gestures follow different geometric rules. In an experiment, participants were asked to point to referents at various distances or to judge where another person was pointing. When asked to point, participants aligned the index finger with their eyes and the referent. When asked to judge where someone else is pointing, they extrapolated the pointer´s arm-finger line. Moreover, the observers´ extrapolations of pointers´ arms followed a nonlinear trajectory. A second experiment asserted that the combination of the identified geometric rules for the production and interpretation of pointing gestures largely account for pointer-observer misunderstanding. In sum, the results suggest that the production and interpretation of pointing gestures are based on the most salient visual cues, which differ for pointers and observers.

Emergentism, language control and the bilingual brain

Arturo Hernandez

University of Houston

In recent years, there has been renewed interest in the relationship between bilingualism and a possible advantage on non-verbal cognitive control tasks. This presentation will discuss work in the laboratory for the Neural Bases of Bilingualism at the University of Houston that has looked at the nature of cognitive control in bilinguals. Results from these studies provide some evidence of a "bilingual advantage" in cognitive control. For example, there is evidence that bilinguals relative to monolinguals may show differences in the brain areas and behavior seen when engaged in cognitive control tasks. Furthermore, bilinguals show faster reaction times and reduced activity in brain areas devoted to cognitive control during word learning in a foreign language. Finally, more recent work suggests that there may be a genetic difference between monolinguals and bilinguals with regard to the certain genes that are involved in cognitive control. Future directions intended to extend this work in collaboration with the Neurocognitive research group headed by Prof. Dr. Christian Fiebach at Goethe University Frankfurt and in my laboratory at the University of Houston will be discussed.

Subliminal CS presentation in a cross-modal evaluative conditioning paradigm

Tobias Heycke & Christoph Stahl

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Preferences can be acquired when an initially neutral stimulus (the conditioned stimulus, or CS) is paired with a valent (positive or negative) stimulus (the unconditioned stimulus, or US) and later evaluated in accordance with the valence of the US. This phenomenon is called evaluative conditioning (EC). An important question for current theories in EC is whether an EC effect can only be produced consciously or whether it can also occur without awareness. One way to manipulate the awareness of stimuli is to present the CS subliminally (i.e., below the perceptual awareness threshold). This could be achieved by presenting the CS very briefly and in between masks. To be able to process the CS given this presentation method, it is important that participants attend the CS (i.e., effects of subliminal stimuli are more likely if they are attended; Dehaene et al., 2006). It is therefore possible that too little attention can be directed to a simultaneously presented US, an effect that in turn could diminish or eliminate EC effects. Given that recent studies investigating the difference between sequential and simultaneous pairing of stimuli in EC indicated that an automatic process requires simultaneous pairing of stimuli (while an EC effect produced by propositional processes can also be found with sequential pairings; Hütter et al., 2012; Sweldens et al., 2010), this procedural problem might tip the balance against unaware EC effects. To solve this problem, and to ensure that both stimuli can be presented simultaneously and adequately processes perceptually, we paired briefly presented and masked visual CSs with auditory USs that shared the same onset as the CS. An EC effect emerged for longer-duration CSs, but no evidence for an EC effect for briefly presented CSs was found. The implications of the data for current theories of evaluative conditioning are discussed.

Erfassung körperlicher Aktivität in der Selbstevaluation gesundheitsbezogenen Verhaltens: Validität und Usability von Wearables

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Ein vielversprechender Ansatz zur Unterstützung gesundheitsförderlichen Verhaltens sowie zur Prävention und Therapie einer Vielzahl psychischer Störungen ist die Erfassung körperlicher Aktivität zur Evaluation gesundheitsbezogener Verhaltensweisen über Wearables wie Smartwatches und Fitness Tracker. Notwendig hierfür sind jedoch valide Verfahren mit hoher Usability. Ziel dieser Studie ist daher der Vergleich von multiplen Sensordaten von Smartwatches und Fitness Trackern mit kalibrierten wissenschaftlichen Messinstrumenten unter Berücksichtigung von Usabilitykriterien im Rahmen unterschiedlicher Use Cases. 60 Probanden wurden dabei mit Wearables sowie einer Life-logging App ausgestattet. Die multiplen Sensordaten wurden bei der Bearbeitung von Stressaufgaben sowie Aktivitäten auf dem Laufband mit Daten eines EKG-Messgeräts sowie Videoanalysen verglichen, um so Rückschlüsse über Validität und Robustheit der Stress- und Aktivitätsmessungen zu erhalten. Darüber hinaus wurden verschiedene fragebogenbasierte Usability und User Experience Instrumente eingesetzt. Ergebnisse legen nahe, dass die eingesetzten Wearables als valider und nutzerzentrierter Self-Assessment-Ansatz langfristig dazu beitragen könnten, das Bewusstsein auf gesundheitsbezogenes Verhalten zu lenken.

Neural correlates of target and distractor processing in visual search for multiple targets

Hannah Hiebel, Joe Miller, Margit Höfler, Christoph Anzengruber, Anja Ischebeck & Christof Körner

University of Graz

The neural correlates of cognitive processes guiding overt visual search have hardly been explored so far. We present two experiments where electroencephalogram (EEG) and eye movements were co-registered during visual search for multiple targets. In this paradigm, participants search for two identical targets. Thus, search must continue after finding the first target and after memorizing its location. We investigated neural correlates of target and distractor processing in different stages of the search using fixation-related potentials (FRPs). Experiment 1 produced two main findings: Firstly, the detection of the first target was associated with a P3-like component. Secondly, compared to distractor processing before the first target fixation, a slow negative shift was observed for the three subsequent distractor fixations, likely reflecting neural changes related to the memorization of the first target. In a follow-up experiment, set size (number of items) was varied systematically (10, 22, 30 items). In this way, the time point of the first target fixation was manipulated experimentally, as an early detection of the target becomes increasingly unlikely in larger item sets. Furthermore, the

variation of set size allowed us to investigate the post-target negativity over longer retention intervals. Results of both experiments are reported and discussed.

Spatial memory in the vertical plane: The influence of gravity and room orientation during learning and retrieval

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Many studies examined memory of object layouts on a horizontal plane, pointing towards representations aligned with learning perspective or salient room/layout orientations. In contrast, findings regarding object layouts on the vertical plane are rare. While the horizontal plane is clearly defined by the direction of gravity, verticality can be interpreted along the observer's body, the visual or the gravitational up/ down axes. To investigate which of these axes is used for mentally representing vertically aligned objects, we experimentally varied two factors: room and body orientation. The former was manipulated by tilting a virtual environment (VE) – either being consistent with physical gravity (floor down) or not (floor to the right) –, and the latter by having people sit upright or lie down during exposure to the VE. After learning a configuration of nine differently colored objects aligned on a vertical plane in a single combination of both factors, participants were tested in both body orientations successively and with several different room orientations. Preliminary results show that if the VE orientation was consistent with physical gravity during learning, better performance was obtained if the individuals' body axis was aligned with physical gravity (upright) during retrieval (regardless of the VE orientation). If the VE was tilted and participants were lying down during learning, they seemed to represent object configurations mainly along their body axes. If participants were sitting while observing a tilted VE, results were mixed. We preliminary conclude that in natural conditions human memory in the vertical plane is aligned with physical gravity.

Higher-order control in dual-tasks: Evidence from task-pair switching

Patricia Hirsch, Sophie Nolden & Iring Koch

RWTH Aachen University

In the present study, we combined the psychological refractory period (PRP) paradigm with a newly developed task-pair switching logic to isolate performance costs occurring at a more global level of dual-task processing than that of subtasks itself. According to this logic, several tasks are combined to different task-pairs (i.e., PRP trials) and the sequence of the task-pairs is manipulated. In Experiment 1, we generated two task-pairs by combining one of two varying visual tasks (Task 1; T1) with an auditory task (Task 2; T2), which was constant across all task-pairs. To explore whether T1 and T2 in dual-task situations are represented as a higher-level task, we varied the task-pair sequence and the stimulus-onset asynchrony (SOA). In Experiment 2, we replicated Experiment 1 with the constant auditory task as T1 and the varying

visual task as T2. In addition to the PRP effect (i.e., T2 performance after a short SOA vs. T2 performance after a long SOA), the data showed task-pair switch costs (i.e., task-pair switches vs. task-pair repetitions). The existence of these costs suggests that information about task-pairs and, hence, about higher-order tasks is activated in the course of dual-task processing. Moreover, we observed a larger PRP effect in task-pair switches than in task-pair repetitions, indicating that the PRP effect increases when more cognitive control is required at the global level of dual-task processing. Thus, this finding shows that the PRP effect is influenced by the global processing level.

On the experimental control of social desirability: Validating the Crosswise Model

Adrian Hoffmann & Jochen Musch

Heinrich-Heine-University Düsseldorf

Responses to questions referring to sensitive personal attributes may be of questionable validity when respondents conceal their true status by answering in a socially desirable manner, rather than truthfully. Indirect questioning techniques such as the Crosswise Model (CWM; Yu, Tian, & Tang, 2008) grant full confidentiality to respondents by applying a randomization procedure. While this randomization procedure eliminates any link between an individual's response and his or her status with respect to the sensitive attribute, prevalence estimates can still be obtained on sample level. Arguably less biased by untruthful responses, prevalence estimates based on indirect questions are often higher than estimates obtained via direct questions (DQ). In the present validation study, the application of the CWM resulted in a prevalence estimate for Xenophobia that was about twice as high as in the DQ condition. Prevalence estimates for a non-sensitive control attribute corresponded well with the known prevalence in the population both in the DQ and in the CWM condition. Thus, the difference in CWM vs. DQ prevalence estimates for the sensitive attribute seemed to be attributable to the sensitivity of the question, rather than a method specific bias. We conclude that the CWM is an effective means to control for socially desirable responding. Our results also underline the importance of taking untruthful responses into account when investigating the prevalence of sensitive personal attributes.

Testing learning mechanisms of rule-based judgment

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Making accurate judgments such as choosing a job candidate presumes an adequate weighting of more and less important aspects, say the candidate's skills. In social judgment theory, these weighting processes have often been successfully modeled with linear models. How people learn to make judgments has received less attention. The delta-learning rule can perfectly learn to solve linear problems, but does not adequately describe and predict human learning. We amended the delta learning rule with three different psychological learning mechanisms – a

decay in learning speed, a capacity restriction, or attentional learning – and tested how well those learning mechanisms can describe and predict learning in a rule-based judgment task. In this judgment task, participants first learned to predict a continuous criterion based on four cues. After 200 trials, the cues that were important for predicting the criterion suddenly changed. On average, judgment accuracy improved from trial 1 to 200, suddenly dropped when the task structure changed, but improved again until the end of the task. A capacity-restricted learning model best described the learning curve of the majority of participants. Further, using the learning parameters from the first task, it also best predicted how most participants relearned the task. A model assuming a decreasing learning speed only described those participants best who did not adapt to the change in the environment. Taken together, these results suggest that rule-based learning models can better predict learning if they assume a capacity limit.

The relationship between inhibition of saccadic return and short-term memory

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Inhibition of Saccadic Return (ISR) has been shown to discourage the immediate reinspection to previously inspected locations and thus to guide search towards uninspected locations. Here, we investigated whether ISR in visual search is related to visuo-spatial short-term memory (STM). To this end, we used a dual-task paradigm in which participants performed a visual search task while storing none, two or four object locations in STM. In order to measure IOR, a visual probe was presented during search at a location that had either been previously visited (old probe) or not (new probe). The participants were instructed to saccade to this probe immediately and then to resume search. The results showed that, independent of the amount of stored locations in STM, saccade latencies to old probes were longer than to new probes. This indicates that ISR is not related to visuo-spatial STM.

Continuous Flash Suppression to investigate preconscious evaluative conditioning: workings and limits

Fabia Högden & Christian Unkelbach

University of Cologne

In Evaluative Conditioning (EC) experiments, neutral stimuli (CS) are paired with either positive or negative stimuli (US). Afterwards, CSs that were paired with positive USs are evaluated more positively than those that were paired with negative USs. A central question within EC research is whether such EC effects depend on participants' awareness of the CS-US pairings. Manipulating awareness, however, has proven an empirical challenge for EC researchers. Continuous Flash Suppression (CFS) might provide an answer for this challenge. During CFS, different stimuli are simultaneously presented to the right and the left eye. As the visual system

is unable to integrate these conflicting inputs, information from one eye is suppressed from consciousness; thus, stimuli are processed visually but suppressed from conscious awareness. We use CFS to study the possibility of unaware EC in two on-going lines of research: a) we suppress the CS and b) the US stimuli from conscious awareness. We observe recognition on chance level for suppressed CS, but above chance recognition for suppressed US. This indicates successful suppression for CSs but not for USs. Results from both lines of research concerning the evaluation of the CS have been mixed. We do observe the tendency, however, that EC effects emerge only when stimuli are not suppressed from awareness. We discuss the scope of CFS in suppressing USs and the merit and limitations of CFS in EC research more generally.

Effects of a problem solving training on performance in dynamic system control tasks with different degrees of complexity

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One of the practical goals of problem solving research is to develop methods to improve problem solving performance. We will present the results of a currently ongoing study investigating the transfer of a specifically developed problem solving training to system control tasks with different degrees of complexity. A total of 80 university students will participate in the study, split into a treatment and a control group. The treatment group receives an interactive problem solving training in small groups with a focus on effective exploration and control strategies for dynamic systems. The control group receives a generic lecture on problem solving and completes practice problems without further feedback. Transfer of training is tested using a selection of simple dynamic systems as well as a more complex microworld simulation. We expect the training to show strong transfer to the simple system control tasks, but only limited transfer to the complex microworld simulation. This result would support the view that dynamic system control is in principle trainable, but that task complexity and domain specificity limit the transfer distance that can be achieved.

The Theory of social Event Coding (TsEC): Explaining self- and other-representation, social conformity and trust

Bernhard Hommel

Leiden University

Originally, the Theory of Event Coding (TEC) (Hommel, Müsseler, Aschersleben & Prinz, 2001) was developed to explain how perception and action interact to create cognitive representations that are grounded in sensorimotor experience. However, recent theoretical, computational, and empirical work has successfully extended the theory to account for self-representation (the minimal self) and the representation of others, joint action, social conformity, and interpersonal trust. This presentation will provide a brief overview over these

developments and report experiments that successfully tested predictions from the social version of TEC (TsEC) by means of behavioral and virtual reality studies.

Influence of action control and stimulus-response repetition on sequential modulations in a vertical and horizontal Simon task

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In the Simon task participants usually respond faster and more accurate when stimulus and response location are corresponding compared to non-corresponding stimulus-response locations, although the location of the stimuli is irrelevant. Furthermore, this so-called Simon effect is more pronounced after spatially corresponding than after spatially non-corresponding trials. These sequence effects could be seen as a phenomenon of action control that regulates the flow of information through an automatic route driven by spatial location. On the other hand, sequential modulations could be explained by task feature repetition effects, i.e. responses are faster if features of a previous trial are repeated in the current one. To gain deeper insight into the nature of sequence effects in the Simon task, we combined vertical and horizontal stimulus positions and used vertical response keys. The instructions emphasized the vertical response level. Consequently, every stimulus was corresponding or non-corresponding either to the response hand (left/right) or to the response key (up/down). Our behavioural and electrophysiological results support the feature repetition view. After an alternation of the spatial axis (e.g. vert. -> horiz.) no sequential modulations of the Simon effect were found. However, within one spatial axis there were clear sequential modulations in the predicted direction – larger Simon effects after corresponding than after non-corresponding trials. Moreover, modulations in action control, as reflected by the fronto-central N2, were not revealed for the sequences of correspondence conditions. However, some aspects of attentional processing (N2pc) indicate correspondence-dependent sequence effects that were independent from changes in the spatial dimension. Thus, although there is substantial evidence for task feature repetition as the core mechanism for sequential effects in the Simon task, this cannot explain the data pattern as a whole.

Recognition as a cue for inference: A lifespan overview

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A bulk of research examined younger adults' strategic use of recognition for inference. For example, students in numerous studies were asked to make comparative judgments regarding a directly inaccessible criterion (e.g., "which of these two mountains is higher?"). A prominent model of a frugal strategy that capitalizes on old-new discrimination is the recognition heuristic.

The heuristic assumes that in those cases in which individuals recognize only one of the options, their inference will follow the recognized option. The success of the heuristic depends on the task environment (particularly the correlation between recognition and the criterion), in line with notions of ecological rationality. Little is known about developmental differences in such inference tasks. In this presentation, we provide a lifespan overview of our research on school-age children's, adolescents', younger and older adults' strategic and adaptive use of recognition. All age groups systematically relied on recognition to some extent, in line with the hypothesis that required abilities for strategy implementation are developed relatively early and may involve little effort. As an overarching theme, however, the use of recognition did not progress unidirectionally across age, but strongly hinged on the environment. Older age groups were largely adaptive and frequently relied on recognition when cue validity was high, but refrained from recognition use when validity was low. In contrast, younger age groups' strategy use was indistinguishable between environments. These findings suggest that the adaptive, cue-based use of recognition appears to develop relatively late and may require knowledge and experience.

Open Sampling: The effect of arrangement of gamble outcomes on risky choices

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Universität Koblenz-Landau

When it comes to risky choices, past research has shown that in the typical decisions from description or decisions from experience paradigms, decision makers tend to over- or underweight small probabilities, respectively. We argue that in both of these paradigms, decision makers receive distorted information, leading to biased representations of the options at hand, and biased decisions. It is assumed that the open sampling format, which presents all the outcomes of a gamble randomly arranged in a matrix with their respective relative frequencies corresponding to their probabilities, helps decision makers draw large and unbiased samples of the presented information, allowing for accurate and unbiased representations of the presented data. However, past research also indicated that, with respect to accuracy of probability judgments, icon arrays that are sorted by their underlying probability or value are clearly advantageous over randomly arranged ones. Thus, in this study we addressed the question whether consecutively arranged outcomes improve the percentage of normative choices and/or the time needed to decide compared to randomly arranged matrices. A within-subjects design was used to implement a total of three conditions: a) unsorted display of outcomes b) sorted display of outcomes (i.e. arranged by their values) c) blockwise display of outcomes. In condition c), outcomes were combined in blocks, but the blocks themselves were not arranged in a specific order. Data gathering is still in progress, but preliminary results suggest that consecutively sorted outcomes make it both easier to assess a gamble quickly and to make a normative choice.

Using event-related potentials for the investigation of attention shifts prior to and during saccades

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University of Vienna

Laterality effects (i.e., contra-to-ipsilateral differences) in event-related potentials (ERPs) can be used to study attention shifts before saccades. For example, about 200 ms after stimulus onset, ERPs are more negative at electrodes contra- than ipsilateral to attended stimuli. Here, we investigated pre-saccadic ERP laterality effects in single-target blocks requiring a single saccade, in two-target blocks requiring a single saccade, and in two-target blocks requiring two saccades. Also, in two-target blocks, targets were presented on the same or on the opposite sides of the vertical midline. If targets captured attention and pre-saccadic attention shifts to saccade target locations were necessary for saccade execution, we would expect enhanced attentional competition between (1) two targets compared to single targets; (2) two opposite-sides targets compared to two same-side targets; and (3) in cases, where two saccades rather than one had to be executed. More attentional competition was expected to delay saccade latency and to weaken and delay laterality effects in ERPs. For our ERP analyses, we temporally aligned ERPs simultaneously to stimulus onsets, saccade onsets, and to saccade offsets. Predictions (1) and (2) could, thereby, be partly and fully confirmed, respectively, but no evidence was found for (3). We explain the implications of our results for the role of attention during saccade preparation, and we point out how our approach of aligning ERPs compares to ICA-based cleaning of ERPs and to psychophysical dual-task approaches to further understand the role of attention during saccade preparation.

Combined effects of perceptual balance and pictorial homogeneity on visual aesthetic preference

Ronald Hübner & Martin G. Fillinger

Universität Konstanz

The aesthetic appreciation of a picture largely depends on the perceptual balance of its elements. The underlying mental mechanisms of this relation, however, are still poorly understood. For investigating these mechanisms, objective measures of balance have been constructed, such as the APB score of Wilson and Chatterjee (2005), which is largely based on symmetry. In the present study, we examined the APB measure and compared it to an alternative measure (DCM) that represents the center of perceptual 'mass' in a picture and its deviation from the geometric center. Additionally, we applied measures of mirror symmetry and of homogeneity. In a first experiment, participants had to judge the balance and symmetry of pictures, and in a second one, we collected preference ratings (liking) for these pictures. As a result, the DCM scores accounted better for the balance and symmetry ratings than the APB scores, whereas the opposite held with respect to liking. Detailed analyses revealed that these results were due to the fact that aesthetic preference did not only depend on balance but also on homogeneity, and that the APB score reflects these two features. Accordingly, the APB

measure had an advantage in predicting liking at the cost of being suboptimal for predicting pure perceptual balance.

Effects of brightness on pupil dilation and accommodation

Anke Huckauf & Lisa Eberhardt

Ulm University

In far senses, increasing the intensity of a stimulus signals decreasing distance. This should also hold for brightness: increasing brightness should statistically lead to a decreased distance perception. As we have already reported (Huckauf & Köpsel, submitted), respective indications can indeed be observed for vergence movements of the eyes when reading text from dark versus bright screens as well as from dark versus bright paper sheets. Now, we also measured accommodative responses to dark and bright stimuli using a Grand Seiko WAM 1100. Observers had to focus on a dark versus on a bright background on paper as well as on a screen. For two baseline luminance conditions of about 100 Lx and 500 Lx, changes in pupil size as well as changes in accommodation between bright and dark stimuli were investigated. Three observers with normal vision showed a systematic difference in both, pupil dilation and accommodation, when focusing at the bright versus dark stimuli. These preliminary results underpin the notion that brightness alters basic visual mechanisms like vergence and accommodation and suggest this is due to variations in distance perception.

Motivation for traffic-rule infringements in Germany

Anja Katharina Huemer, Heike Buttersack, Rebekka Führer & Susanne Laubersheimer

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Cyclists have a rather high risk of being involved in accidents. Contributing factors leading to these accidents are yet to be understood properly. Data from a case-control study showed higher risk for cycling on the left cycle path. Following observational studies on infringements revealed more than 50% of cyclists engaging in some kind of infringement. Therefore, online surveys were conducted about reasons, motives and likelihood for the three most common infringements; riding on the wrong path, cycling without light in the dark and cycling under the influence of alcohol. Data from these studies were used to assess whether an extended Theory of Planned Behavior is able to predict cyclists' infringements.

The eyes' many stories about action-related load: Saccadic amplitude, latency, pupil response, and blink rate

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Processing load is reflected in several eye-related parameters including saccadic amplitude, latency, pupil response, and blink rate, indicating that "stressed" eyes hesitate, widen, and eventually shut down. Here, these facets are analyzed under single- and dual-action demands across different effector systems. Participants in Experiment 1 switched between single-manual, single-vocal, and dual (manual-vocal) response demands while fixating a central fixation cross. Results suggest dual-response costs for manual and vocal latencies. However, while blink rate and pupil dilation were also increased in the dual vs. single-manual condition, the data from the single-vocal condition resembled those from the dual condition. Thus, vocal demands per se might increase blink rate and pupil dilation, potentially overriding any load-related effects. Experiment 2 compared saccade amplitude, latency, pupil dilation and blink rate in blocks of trials involving only basic saccade demands vs. blocks with additional manual key press demands. Results suggest increased saccadic latencies, shortened amplitudes, and changes in pupil dynamics under dual- (vs. single-) action demands, but no effect on blink rates. Taken together, the results suggest that while all parameters may individually be associated with variants of processing load, the underlying mechanisms appear to be distinct.

Not FLEXible enough: Exploring the temporal dynamics of attentional reallocations with the multiple object tracking paradigm

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The dynamic environment of human observers requires continuous reallocations of visual attention in order to compensate for location changes of the attended objects. Particularly, situations with reduced spatial distance between targets and other objects in the display are crucial for keeping track of the target objects. In the present experiments, we explored how the temporal dynamics of such moments of reduced spacing affects the reallocation of visual attention. We asked participants to track four targets among four indistinguishable distractors. Hereby, we manipulated whether target and distractor objects moved at a constant speed or whether their actual speed followed a sine wave profile. The variable speed oscillated around the constant speed thus maintaining average speed as well as travelled distance and average spatial proximity. We observed inferior tracking performance with variable speed profiles relative to constant speed profiles (Experiments 1a and 1b). When we increased the number of pairs of targets and distractors moving with a variable speed profile (Experiment 2), performance declined continuously. Remarkably, tracking performance also declined when only distractors moved at variable speeds, suggesting that the dynamic changes in inter-object spacing rather than the variable speed impairs tracking (Experiment 3). In sum, our results provide evidence for a flexible allocation of the attentional resource toward targets suffering

spatial interference by demonstrating the temporal constraints of the reallocation process.

Stimulus pairings as a symbolic cue for changes in liking: A novel perspective on evaluative conditioning

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Over the past fifty years, a seemingly simple question has attracted considerable attention: Why do people come to like certain stimuli and dislike others? Evaluative Conditioning (EC) - a change in liking due to the pairing of stimuli – represents one avenue via which preferences can be modified. In this talk, we put forward a novel account of EC that is based on two core ideas. The first is that EC effects may be solely due to stimulus pairings that take place here and now in space and time (i.e., pairings as a proximal cause of liking). A second possibility is that distal learning experiences transform stimulus pairings into a symbolic cue that signals how stimuli are related. This account leads to new insights into existing EC effects and what constitutes "genuine" EC, clarifies differences between human and non-human EC, and can contribute to the development of cognitive theories of EC.

Cognitive ability and system structure as predictors of performance in dynamic system control tasks

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Past research has shown that the cognitive mechanisms underlying performance in dynamic system control may vary depending on the nature of the task. While systems with a low degree of complexity and relatively salient relations are amenable to explicit reasoning strategies, complex systems with non-obvious relations tend to depend more on implicit learning. We therefore investigated to what extent cognitive abilities related to rational deliberation predict system control performance under different conditions of system complexity and structural salience. A sample of 128 university students completed two blocks of four different system control tasks that were manipulated in terms of complexity and salience of relations. One of the blocks included a cognitive load manipulation using a secondary task. Cognitive abilities assessed included reasoning ability, working memory capacity, and cognitive reflection. System complexity and salience of relations affected overall performance as expected. The cognitive abilities measured were generally good predictors of performance across different conditions, with cognitive reflection as the strongest single predictor. Further analyses revealed that the effect of cognitive abilities on performance can be partially explained by mediation through exploration behavior. Overall, our results support that high-level cognitive abilities are a good predictor of performance in dynamic system control tasks across a range of different conditions. We will discuss the relevance of this finding from a dual process perspective as well as its

implications for individual differences research in dynamic systems.

On the role of pseudocontingencies in evaluative conditioning: How skewed base-rates influence evaluative learning

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The investigation of evaluative conditioning (EC) has been mainly concerned with the conditioning of individual stimuli. Findings gathered from a recently developed EC paradigm demonstrate that the pairing with valent stimuli does not only have the potential to change attitudes towards individuals, but also towards cues. In the present research, we implement a similar paradigm to investigate EC's susceptibility to a contingency illusion commonly referred to as pseudocontingency. A pseudocontingency constitutes a logically unwarranted inference that relates a rare (frequent) cue value to the rare (frequent) criterion value (i.e., valence) . The present research program shows that the evaluative ratings are indeed influenced by this contingency illusion, but that it is confined to negative environments. Properties of the stimulus distribution thus constitute an important moderator of this seemingly universal phenomenon. The present findings have important implications for current theoretical accounts of EC.

Density Biases & Pseudocontingencies: How feature-dimension framing influences contingency learning processes

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Heidelberg University

When making inferences about the relationship of two cues, it is important to look at the entirety of observations and to not only focus on a specific type of observation. However, some information is more readily used than other information, which can lead to incorrect inferences. Building on a theoretical framework of Features and Dimensions by Garner (1978), we show that one factor influencing what information people focus on, is attribute presentation format. When attributes are presented as being present or absent (Features), contingency judgments are mainly driven by joint present occurrences (A-cell), leading to density biases. When attributes are presented as always being present on some level (Dimensions), base rates gain importance and promote pseudocontingency inferences. Frequent events get associated with other frequent events and rare events get associated with other rare events. Using the distinction of Features and Dimensions, we integrate two prominent, but hitherto unconnected findings: Density biases and pseudocontingencies.

Long-term procedural learning performance is unaffected by post-learning arousal treatment: Evidence from serial reaction time task

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University of Bamberg

Recent research provides evidence that post-learning arousal treatments modulate memory consolidation. In particular, it has been found that long-term memory of a word list is enhanced by a 20 min delayed post-learning presentation of arousing musical pieces (Judde & Rickard, 2010). Is this also true for memory consolidation processes after procedural learning? In the present study, we investigated the influence of post-learning presentation of a positively arousing musical piece on long-term procedural learning performance. In two conditions, participants (n=50) had to assess learning on a serial reaction time (SRT) task. The SRT task was a four-choice reaction time task that consisted of a) nine blocks in which the stimuli followed a sequence of twelve items that repeated itself ten times and b) two blocks in which items followed a pseudo random sequence. The random blocks were located at the first and the tenth position in the test procedure. A reduction in response latency over blocks two to nine and an increase in response latency in the tenth (random) block indicate a growth in procedural knowledge. In the emotional arousal condition, participants were exposed to the musical piece 20 min after accomplishing SRT learning task. Participants of the control group were not exposed to music. A similar SRT task with one random block surrounded by two regular blocks was used to measure long-term procedural memory one week later. We found an increase in response latency in the tenth block in both groups which means that procedural learning worked well. However, our results showed a decrease in performance one week later and no difference between both groups. Thus, post-learning presentation of the musical piece does not have an influence on procedural learning performance in the SRT task. It seems that post-learning arousal treatments does not modulate consolidation processes of implicit memory.

Emotional facial mimicry in adolescents

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Emotional mimicry, the imitation of the emotional facial expression of another person, encourages relationships and empathy. Even small deficits in emotional mimicry might lead to social interaction problems. Therefore, it could be highly important in the clinical context. Hess and Fischer (2013) indicated in their review that sufficient evidence exists only for the emotional mimicry effect of anger and happiness with their corresponding muscles m. corrugator supercilii and m. zygomaticus major, and not for disgust, anxiety, and sadness. Therefore, confirmation of emotional mimicry effects for a variety of emotions is still necessary. Furthermore, while mood can affect emotional mimicry, none of the previous studies controlled for mood. Facial electromyographic (EMG) reactions of the m. corrugator supercilii, the m. frontalis medialis, the m. zygomaticus major, and the m. levator labii to six dynamic, colored

facial expressions (anger, fear, sadness, happiness, disgust, and neutral), in 83 adolescents with a clinical diagnosis, and 55 nonclinical controls were investigated. In addition, effects of a neutral and a sad mood induction on the emotional mimicry were examined. Results indicated replications of the emotional mimicry effect for all emotions and their corresponding muscles, except for disgust and the m. levator labii.

The Cyberball paradigm considering different settings

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Background: Social rejection threatens human existence since social affiliation is one of our fundamental psychological needs. Objective: Psychological fundamental needs were assessed to examine the effects of cyberostracism using the Cyberball paradigm with four different paradigm settings (variability of team players, adding pictures, mood induction) among adolescents. Method: 117 adolescents (12-18 years) played Cyberball. Results: The induction of cyberostracism among adolescents has been successful. They reported a threat in all four fundamental psychological needs, an increase of anger (d = 0.61) and sadness (d = 0.57) as well as a reduction of happiness (d = 0.55) and excitement (d = 0.47). No benefit was found for the manipulations of the paradigm settings, in the contrary, playing Cyerball with three team players instead of two lead to a reduction of fundamental psychological threats. Conclusion: Cyberball is a valid paradigm to induce cyberostracism in adolescents.

Hot or Not? Experiencing physical warmth promotes women's ratings of male attractiveness

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Research has shown that interpersonal warmth and physical warmth are related, so that the sensation of physical warmth promotes the sensation of interpersonal warmth (Williams & Bargh, 2008). However, less is known whether physical warmth is also able to promote the evaluation of attractiveness. The aims of the present study were to examine (1) if different temperatures influence females' evaluation of male attractiveness and (2) if this effect is mediated by the evaluation of interpersonal warmth. Sixty-one women, aged 19 - 32 (M = 24.5, SD = 3.05), rated ten pictures of men regarding their attractiveness and interpersonal warmth while holding a coffee cup filled with cold water (6°C), hot water (37°C) or room tempered water (23°C). A one-way ANOVA indicates that women in the hot-condition rate the male targets as more attractive than women in the cold-condition and as women in the room-tempered-condition. Regression analysis shows that the sensation of temperature predicts attractiveness as well as interpersonal warmth. In addition, interpersonal warmth predicts attractiveness. However, the effect of physical warmth on attractiveness is not significantly mediated by the evaluation of interpersonal warmth. These results highlight the

role of physical sensation at person perception. Implications and future directions are presented.

Individual differences and the influence of second-order configuration on familiar face recognition: A priming study

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Whether facial shape information, especially in terms of second-order configuration (i.e. the metric distances between features) is important for familiar face recognition has been the subject of much debate. Recent evidence suggests that good face recognizers show less reliance on spatial information compared to poor recognizers. Using a priming paradigm, we investigated the role of second-order configuration on familiar face recognition, by increasing or decreasing the distances between facial features. Familiar face primes (S1) were presented as the following: Unaltered; increased interocular distance; decreased interocular distance; increased distance between mouth and nose; decreased distance between mouth and nose; or a different familiar identity (unprimed). Unaltered familiar and unfamiliar face targets (S2) followed S1, and participants performed a familiarity classification task on S2. Participants also completed a test battery comprised of three face identity processing tests. For the priming experiment, we assessed accuracies, reaction times, and inverse efficiency scores for familiar targets. To investigate individual differences, we correlated priming effects with test battery scores. Overall, we found significant priming benefits. Moreover, priming benefits were reduced only by those primes containing interocular distance manipulations. Importantly, participants with particularly good face recognition abilities were not affected by those interocular distance manipulations. Overall, our results suggest (1) that the importance of second-order configuration for familiar face recognition is limited to interocular distances and (2) that good face recognizers do not rely on those distances during face recognition.

Positive emotions or broad attention - Which is central for broadening cognition? The effects of broadened visual attention on the thought-action repertoire

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The Broaden-and-Build Theory states that positive emotions broaden cognition and therefore build physical, social, or intellectual resources, which explains the evolutionary adaptive benefits of positive emotional experiences. However, missing theoretical precision regarding the interaction of involved cognitive processes offers a variety of possible explanations for the processes of broadening and building. We tested the assumption that positive emotions first broaden visual attention which in turn leads to broadened cognition. The effects of a broadened, narrowed or neutral attentional scope of 72 non-psychology students (30 men, 42

women) on their momentary thought-action repertoire were examined while controlling attentional trait differences as a part of a between-subject design. Results showed that although attention induction worked for the broadening condition, there were no significant differences between groups regarding the thought-action repertoire. This indicates that visual attentional broadening does not broaden cognition which suggests that positive emotions influence all kinds of cognitive processes. In line with other empirical evidence, positive emotions seem to guide a variety of cognitive and behavioral processes that eventually build personal resources.

Bottom-up regulation of multitasking control

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Whether two tasks are scheduled to be processed serially or (in parts) in parallel is an open question in dual-task research. There is evidence, however, that the answer depends on several factors including instructions and other top-down influences. Here, I report evidence that bottom-up factors also determine the processing mode, and I focus on the impact of the immediately preceding trial. The backward-crosstalk effect (BCE) refers to the finding that Task 1 performance is often improved when Task 2 requires a spatially compatible response (i.e., one on the same side) compared to a spatially incompatible response (i.e., one on the other side). The BCE is taken as evidence that at least some of the tasks' response-selection-related processing occurs in parallel, and the size of the BCE has been interpreted as an index of how much Task 1 is affected by simultaneously ongoing Task 2 processing. In three experiments, I investigated whether the compatibility status of the previous trial influences the size of the BCE. In all experiments, the BCE was large following a compatible but absent (or reversed) following an incompatible trial, thus a sequential modulation of the BCE similar to the well-known Gratton-effect observed with standard conflict tasks. This result suggests rapid bottom-up adjustments of task-scheduling as a consequence of just-experienced incompatibility of responses. Various theoretical explanations of this finding are discussed.

Impact of information costs on the attraction search effect in multiple-cue decision making

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One common assumption of many established models for decision making is that information is searched according to some pre-specified search rule that is independent of the valence of the retrieved information. We show in two experiments that this fundamental assumption concerning information search is wrong. In choices between two options based on partially revealed probabilistic information, participants' search direction was influenced by the valence of revealed information. Specifically, we observe an attraction search effect in that information

search is directed towards the more attractive alternative given the available information. The attraction search effect was consistently observed for environments with varying costs for information search although the magnitude of the effect decreased with decreasing monetary search costs. We propose an extension to the parallel constraint satisfaction network model of decision making to include predictions for information search (PCS-DM+S) that can account for this attraction search effect.

Feasibility of web-based reaction time tasks: Comparing a laboratory and three web-based settings using the classical Stroop experiment

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Background and aims: Web-based experiments have the advantages of being easily accessible to a large audience, convenient, and economic. They can be used to recruit heterogeneous samples instead of the usual female psychology students and may increase external validity. However, reaction time measurements can be interference-prone due to distractions of the participants or technical reasons. Our study aimed at comparing results from a laboratory and three web-based settings using the well-established classical Stroop task. Method: There were four groups (N=170, age: 24.2±5.4, 18-52 years): Students from our university were assigned randomly to take part in the experiment in our laboratory or on their computer at home. Students from other universities were asked to take part through mailing lists and people from the general population were recruited in online forums. Both participated online. The participants took part in a classical Stroop (programmed with JavaScript) with incongruent colour words (e.g., 'green' in red) and numerals (e.g., 'five' in red). They had to indicate the font colour with a keypress and reaction times were measured. The words in both categories were matched for familiarity, number of letters, and syllables. All groups were expected to react slower to the colour words. Results: Levene's test indicated that variances were homogenous for the repeated-measures variable. The 4x2 mixed-design ANOVA yielded a main effect for word type, $F(1,166)=48.92$, $p<.001$, $\eta^2=.228$. Planned contrasts revealed that all participants reacted faster to numerals (628.9±52.3ms) than to colour words (654.2±55.3ms), $t(169)=7.99$, $p<.001$, $r=.52$. The other effects were non-significant. Discussion: The classical Stroop interference effect was found in all groups. Collecting reaction times from the web-based experiments was feasible, resulting in valid reaction times, even though potentially confounding variables could not be controlled for. We provide technical recommendations.

On the lexical representation and processing of complex words: Grammatical gender effects in noun-noun compound production

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We examined how compound nouns and their gender are lexically stored and accessed in speech production. In German, grammatical gender of noun-noun compounds (e.g., Teekanne[fem] – tea pot) is determined by the morphological head (Kanne[fem]), the gender of the modifier (Tee[masc]) is irrelevant. Using gender-marked determiner primes, we tested for specific effects from determiners in/congruent with the modifier to address the question of whether modifier and head are processed independently at a syntactic level (multiple-lemma representation). Compound targets were combinations of two nouns, differing in gender (e.g., Tee[masc]kanne[fem]). Experiment 1 assessed effects of auditory determiner primes in bare noun picture naming and Experiment 2 assessed effects of visual determiner primes in determiner-noun picture naming. Three prime conditions were tested: (a) determiner congruent with the compound / head (die[fem], for the given example), (b) determiner congruent with the modifier (der[masc]), and (c) determiner incongruent with both head and modifier (das[neuter]). We predicted faster responses in condition (a) vs. (c) and – if the constituents of the compounds are processed independently at a syntactic level – slower responses in condition (b) vs. (c). In both experiments, naming latencies were fastest with determiner primes congruent with the compound / head. However, naming latencies were not affected when determiners were congruent vs. incongruent with the modifier. The results corroborate a single-lemma representation of compound nouns in the German production lexicon.

Coalition formation in women with Borderline Personality Disorder (BPD): Evidence from a behavioral economic experiment with interaction in dyads and triads

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Introduction: Although interpersonal dysfunctions are central to Borderline Personality Disorder (BPD), a severe mental disorder, only a few studies have evaluated interactive behavior directly (Jeung & Herpertz, 2014). Studies show that BPD patients feel more excluded than healthy controls (Staebler et al., 2011), distrust partners, and interrupt cooperation (King-Casas et al., 2008). Still, they prefer close but problematic social contacts (Stepp et al., 2009). Since only few is known about social preferences in BPD, we want to examine coalition formation and partner preference in this study. Hypotheses: In contrast to healthy controls, BPD patients prefer dyads over triads. Similarly to healthy controls, they rate triads to be fairer than dyads (and thus, social exclusion of the third person). At the same time, differently from healthy contrasts, they choose an interaction partner with a preference for dyads. Methods: Sample: 30 female BPD patients vs. 30 female healthy women Measure: Behavioral economic experiment (adapted from Okada and Riedl, 2005) with two games. *Game 1 - Coalition Formation:* Each game consists of three

rounds. In each round, (1) participants are proposers, (2) two responders are randomly assigned to each participant, (3) proposers can choose between dyads (value: 2100 points) and triads (3000 points) and they propose a share, (4) chosen responders can accept or reject the share, (5) according to acceptance or rejection, all players receive their shares or earn nothing. *Game 2 - Partner Preference:* Participants watch game histories of three proposer types (Type A: Formation of dyads; Type B: Formation of dyads in 50%, of triads in 50%; Type C: Formation of triads). Before each round, participants can choose the most likely outcome. After having watched all game histories, participants are asked to rate the fairness of each proposer type and their preferred interaction partner.

Neural correlates of error processing in a complex motor task – An EEG-study

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Neural error processing can be measured by event-related potentials in the EEG. Among these potentials, the ERN is a negative deflection in fronto-central regions that emerges with or shortly after an erroneous motor response, even prior to sensory feedback about the movement outcome such as knowledge of results (KR; Falkenstein et al., 1991; Gehring et al., 1993). The functional significance of the ERN is discussed in light of different aspects of error detection and error processing, all of which include prediction about the movement outcome. The current study strives to quantify the ERN in self-induced errors in a relatively complex motor task where KR is delayed with respect to movement termination allowing to discriminate between error prediction and processing of error KR.10 participants (4 males; M_{age} = 22.7 years, SD_{age} = 3.4) performed a semi-virtual goal-oriented throwing task for 1600 trials on 4 days total. They manipulated a real lever to throw a virtual ball displayed on a computer monitor with the aim to hit a virtual target as often as possible. While performing the task, EEG was recorded from 12 scalp electrodes (reference: averaged mastoids). For each subject, the EEG signals were filtered (0.3-20 Hz bandpass), corrected for ocular artifacts and then segmented into epochs from 600 ms before and 1500 ms after ball release of successful trials hitting and error trials missing the target. The grand average of the FCz electrode of all subjects showed a significant negative deflection in error trials relative to hit trials occurring 200-350 ms after ball release, which is 500 ms before KR feedback. The data was analyzed by confidence bands generated using a resampling technique (Rodgers, 1999). Since the negative deflection appeared independent from any visual feedback about movement effect, we suggest that it represents an ERN signal strongly related to error prediction. In order to confirm these interpretations, further experiments are planned.

Effects of NeuroBike cycling on EEG brain activity and mathematical performance: An intervention study

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Current research demonstrates effects of cycling on EEG brain activity and cognitive functions. Behavioral studies have demonstrated beneficial effects of cycling on a NeuroBike on cognitive performance. The NeuroBike is an instable system applied in sports therapy and sports training as well. It has high affordances on balance control due to the joint in the center of the bicycle frame. In the present study, we investigated effects of training on the NeuroBike on spontaneous EEG brain activity, and on mathematical performance. Participants performed different trainings (NeuroBike, common bicycle, control) for twenty minutes six times per week within a two-week intervention. Mathematical performance (algebra, geometry, arithmetics) was assessed before, and after the intervention. Spontaneous resting EEG was recorded before and after each training session at rest, and during the mathematical tests before and after the two-week intervention. Behavioral data show reduced mathematical performance in algebra and geometry after the NeuroBike intervention. EEG data reveal increased parietal theta power at Pz after NeuroBike intervention, and during post-intervention algebra performance. Further, increased resting-state frontal alpha power, and decreased parieto-occipital gamma power was obtained after the intervention. We hypothesize that training on the NeuroBike fosters a beneficial brain state for learning at resting state, but does not lead to an optimum brain state for active spatial processing in mathematical problem solving.

Control over timing of utility-based response activation

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In choice reaction time tasks, such as the Eriksen flanker task, performance is often influenced by the presence of nominally irrelevant stimuli, referred to as distractors. Recent research provided evidence that distractor processing is enhanced, when high contingency between distractors and targets allows predicting the correct response on the basis of distractor information. Aim of the present ERP-study was to examine to what extent distractor processing can be adjusted not only to the experienced utility of the distractor but also to the temporal requirements of the task. In a temporal flanker task, in which a distractor stimulus preceded the target, we manipulated distractor utility (75% vs. 25% congruent distractor-target combinations) as well as the SOA between distractors and targets (350 vs. 1000 ms). Distractor utility affected early visual processing of the distractors (evidenced by amplitude modulations of the P1 and N1) independently of the SOA. Importantly, the distractor-locked lateralized readiness potential – an online marker of response activation – occurred overall later when the SOA was long and not reliably when the utility was low and the SOA was long. These findings suggest that distractor-based response activation is not just an immediate obligatory consequence of

distractor perception, but can be postponed and thus temporarily adjusted to contextual factors.

Initial upper case letters in German: What makes it difficult?

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Initial upper case letters within sentences account for the largest portion of misspellings in German (Günther & Nünke, 2005). Research on influences of writing performance has focused on either cognitive (e.g., phonological awareness, etc.) or item-related factors (e.g., frequency, etc.), and was mainly applied to single word level. But this approach might not be suitable for predictions on upper case writing as almost each word can occur as a noun if this is required by the syntactic structure. Thus, we analysed both individual and linguistic factors in a writing-to-dictation task at sentence level. Spelling performance of 418 (227 female) 5th and 6th-grade children (Haupt-/Realschule) was assessed, together with non-verbal intelligence, working memory (WM), and language background (LB). Overall, 237 words (121 nouns, 53 verbs, and 63 adjectives) on five linguistically matched test sheets were presented, using an anchor-test design. Generalised linear mixed models (GLMMs) were used for data analysis. Data of 374 children were analysed. The person related factors gender, grade, school type, LB, and WM turned out to be significant predictors. Model estimate for grade (0.258) revealed that girls (1.577) have an advantage of one grade as compared to boys (1.316). Separate GLMMs for each word class yielded following significant item-related effects: nouns: concreteness and word composition, verbs: markedness (e.g., to run - runs), and adjectives: acquired vocabulary and word usage (i.e., attributive, etc.). Well-known person related factors (e.g., working memory) have been identified. Item-related factors inherently depend on the natural differences of word classes: Concrete and compound nouns are easier to be recognised as nouns. Infinite verbs as well as adjectives used as attributes (e.g., the hardworking girl) are more difficult. Since these predictors only appear on syntactic level, our results argue for a grammatical perspective in teaching capitalisation rules.

Unconscious processing of affective information in antisocial personality disorder

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Antisocial personality disorder (ASPD) belongs to the most severe and treatment-resistant psychopathologies, characterized by particularly detrimental outcomes, a high degree of chronicity, and delinquency. In recent years, a great deal of effort has been put forward to investigate etiological factors contributing to the development of this disorder spectrum, with several influential theories stressing the role of deficiencies in social information processing. Accordingly, a deficient processing of affective stimuli has been documented in ASPD,

particularly in subpopulations exhibiting psychopathic traits. However, it remains unclear whether the observed deficits are limited to specific emotional categories or are more general in nature. Furthermore, there is an ongoing debate regarding the underlying mechanisms, as some studies suggest that attention-related deficits may account for the observed difficulties associated with emotion recognition. To address these questions, we employed continuous flash suppression to investigate early processing of emotional stimuli (neutral, happy, angry, fearful, disgusted, surprised, sad faces), their relationship to aggression as well as psychopathic traits in a group of violent offenders with ASPD and a healthy control group. The results revealed a relationship between unemotional traits and a processing disadvantage for fearful facial expressions in the ASPD sample. These findings indicate that an emotion processing deficit in antisocial individuals is present even at the most basic levels of processing and closely related to psychopathic traits. Furthermore, this early processing deficit appears to be highly specific to fearful expressions, which is consistent with predictions made by influential models of psychopathy. The clinical significance and potential implications of the results will be discussed.

Mental rotation in 6-month-old infants

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Several studies revealed that even infants are able to master a mental rotation task with some evidence suggesting a sex difference favoring boys during infancy (e.g. Quinn & Liben, 2008). In the Quinn and Liben study, infants were familiarized with the number “1” in seven different orientations presented in random order, and then preference-tested with a novel rotation of the familiar stimulus paired with its mirror image. Experiment 1 of the present study replicated this design with 96 infants at the age of 6 months as exactly as possible. Neither male nor female infants showed any preference for the novel or the familiar stimulus indicating that the task was too difficult indeed. In Experiment 2 (N = 96 6-month-old infants) all stimuli of the habituation trials and the test trial differed by 45° in clockwise order thus introducing an expectation about the orientation of the forthcoming stimulus. Now infants showed a trend towards a novelty preference that was gender dependent: Male infants displayed a novelty preference of the mirror-image over the familiar stimulus whereas female infants did not discriminate. The present study suggests that male infants only are able to rotate mentally under certain conditions only. Even male infants were critically dependent upon forming an expectation about the forthcoming stimulus orientation, since the equivalent effect was absent when the stimulus orientations were presented randomly.

Being moved by music and movies

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Piloerection is the condition where the hair stand on ends. It is known as in indicator of strong emotional experiences. It has been suggested that piloerection marks peaks in emotional

arousal (Rickard, 2004). An alternative view is proposed by Panksepp (1995). He suggests that piloerection is linked to certain sad emotions and is originally a response to the perception of social loss (separation call hypothesis). We recorded piloerection, heart rate, respiration, and skin conductance in response to music and the sound tracks of movies for fifty participants. We found an increase in heart rate, skin conductance, and respiration depth together with a slight decrease in respiration rate shortly after the onset of piloerection. The overall pattern of the physiological response fits better to Panksepp's separation call hypothesis than to the peak arousal hypothesis. The decrease in respiration rate together with the increase in respiration depth could also be interpreted as a mild form of a gasp. Following to Huron (2006), this could indicate the feeling of awe which results from the perception of a sustained danger (such as a social loss). This fits nicely with the rating results of our participants, with higher ratings of being moved when stimulus elicited piloerection than when it did not.

The wisdom of simulated crowds in emergency medicine

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A correct diagnosis is the basis of good patient care. Diagnostic errors thus contribute substantially to (preventable) medical mistakes, especially when the context is dynamic and time is scarce like in any emergency room (ER). With the current study, we test whether a collective intelligence (CI) approach can improve medical diagnoses and thus enhance patient safety. Research on CI has shown for a wide range of tasks and domains, including medicine, that aggregating independent individual decisions can outperform even the best individual member. Aggregating individually made diagnoses through a CI-rule may be a time-saving alternative to traditional face-to-face interactions, which require extensive coordination and may suffer from process losses. Aggregating decisions, however, is only efficient if not too many individual opinions are needed and if a reliable aggregation rule can be easily identified and applied. In our experiment, advanced medical students (n = 300) diagnosed six simulated cases of respiratory distress. Per case, participants watched a short video presentation of a prototypical (actor) patient and then could select from 30 diagnostic tests as many as desired. The diagnosis had to be selected out of a list of 20 diagnoses. These diagnoses as well as the related confidence ratings, Big 5 data and data gathering statistics are the basis of simulations aimed at answering the question how diagnostic accuracy changes with increasing group size and usage of different CI-rules (including majority rule, follow the most knowledgeable, follow the most confident). Results reveal that with increasing group size, diagnostic accuracy increases, though with diminishing returns. The power of the majority rule as compared to other CI-rules is demonstrated. The role of diversity (with regard to expertise and personality characteristics) is discussed.

The impact of incidental visual cues on the perception of written texts

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Text-based communication is a central form of spreading information. However, beside individual interpretations of texts, incidental visual cues might also systematically bias text evaluation. The present line of research examines how incidental visual cues affect the perception and evaluation of written texts. Experiment 1 focused on the impact of serif versus sans-serif fonts on reading speed and the evaluation of scientific abstracts. 188 participants read three scientific abstracts in random order and were randomly assigned to a serif font or to its sans-serif counterpart. We found that the sans-serif font elicited a faster reading speed, contradicting the notion that serifs facilitate letter discrimination and the identification of the position of letter strokes. However, in contrast to the perceptual fluency hypothesis, the presence of serifs positively influenced the evaluation of the scientific abstracts and of the presented research on all evaluation dimensions. In Experiment 2, we investigated the impact of peripheral color cues on text evaluation. 369 participants read two invented reports about new scientific findings while the texts were framed by a red, blue, or gray border. Supporting previous studies that showed a striking effect of red color on several mental processes such as attention and motivation, we found that red color, compared to a gray, increased the perceived relevance of the news content and participants' motivation to read more about the presented topic. However, the contrast between red and blue did not reach statistical significance. Also, the color manipulation did not interact with the effect of the motivational framing of the text (approach vs. avoidance motivation).Overall, the present results show that the visual appearance of written texts as well as the visual context in which the texts are embedded significantly influence the text evaluation. The results have practical importance for media designers and producers.

How the quest for significance becomes a need for sex: Why radical groups use sexual lures as means of recruitment

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Along with other means of recruitment, groups like the Islamic State of Iraq and the Levant, or the Islamic group Boko Haram in Nigeria are offering sexual rewards for people joining their ranks. But how does the promise of sex promote radicalism? Building on the quest for significance theory (Kruglanski et al., 2013), we argue that sexual promises may appeal to individuals in need of restoring their self-esteem by providing a sense of power and affiliation. In order to test this hypothesis, an experiment was conducted in which male participants were primed with power or affiliation sexual motives, and tested for implicit evaluation of sexual stimuli in an affective priming procedure. Consistent with our hypothesis, we found that power or affiliation primes led to a more positive evaluation of sexual stimuli compared to other stimuli, but only in participants with low self-esteem. However, for participants high in

self-esteem, the priming of sexual motives did not lead to a more positive evaluation of sexual than non-sexual stimuli. These findings suggest that, by conveying a sense of affiliation or power, sex can be appealing to individuals who pursue the attainment or restoration of self-esteem. Implications of the link between individual needs and the appeal of sexual propaganda for understanding radicalization and terrorism are discussed.

A CPM-GOMS-model of lane changes on highways

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As multitasking in the real world often does, driving a car manually requires an orchestrated effort of motoric, perceptual and cognitive faculties. As Neisser already pointed out with the Perception-Action-Cycle (1967), actions must be described and explained both regarding these faculties and the situational context they are rooted in. Especially highly dynamic environments such as the domain of public traffic require using and integrating manifold data sources. To this end, the Critical Path Model - Goals, Operators, Methods and Selection Rules (CPM-GOMS; John & Gray, 1995) provides a strong methodological and theoretical framework. It allows to understand, explain and predict driver actions regarding their time course as well as in their context. In an explorative study, one female and two male subjects (23-33 years of age) drove a passenger car on a two and a three lane motorway, without receiving explicit instructions. Based on video and vehicle data, we modelled drivers' motoric actions, perception and cognition for different lane change manoeuvres. For this we employed the CPM-GOMS-approach as analysis and modelling technique. Here, we present our approach and first models.

Stimulus specificity of intradimensional and extradimensional transfer effects in associative learning

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In line with attentional accounts of associative learning (e.g., Mackintosh, 1975), discriminations are often learned more rapidly when the observer previously learned to discriminate different stimuli along the same dimension (intradimensional shift, ID), as compared to when a different dimension was relevant in previous learning episodes (extradimensional shift, ED). Specifically, the superiority of an ID shift suggests that previous associative learning produced an attentional bias toward the relevant stimulus dimension (Sutherland & Mackintosh, 1971). More recent data, however, indicate that attention may be enhanced only for specific stimuli rather for entire stimulus dimensions. In a series of associative learning tasks with multidimensional visual and auditory cues, we tested this assumption by manipulating the similarity distance between the stimuli presented in the two learning stages. Faster learning rates after an ID shift (as

compared to an ED shift) were consistently found only for transfer stimuli in a specific region along the previously relevant dimension (e.g., more extreme stimuli), but not for stimuli that lay between the ones that were discriminated in the previous learning stage. These results indicate that the associative learning history biased participants to attend to a specific set of stimuli which enable discriminating, whereas stimuli in less informative areas along the relevant dimension have been ignored.

Somatosensory delay period activity and its link with selective attention

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Contralateral delay activity (CDA) that emerges in the event-related potential (ERP) during the retention of information in working memory (WM) is a standard marker of WM research. In lateralized change detection tasks, the sustained CDA component appears during the retention period as a relative negativity over the hemisphere contralateral to memorized information. However, it is not clear whether the CDA indexes information storage processes, or processes that regulate the attentional activation of WM content. The evidence presented in this talk suggests that tactile contralateral delay activity (tCDA), which is elicited during WM tasks for tactile locations, reflects the allocation of attention - and not the storage of information in WM per se. Study 1 confirmed the load-sensitivity of the tCDA component, which was larger in size when two rather than one stimulus locations were memorized. In Study 2, we sequentially presented two tactile sample sets, and asked participants to memorize a single stimulus from each set. If the two memorized sample stimuli were located on different hands, the polarity of the tCDA changed after the second sample set had been presented. This result demonstrates that the tCDA marks the focus of attention in WM. In Study 3, a perceptual attention task was performed during the retention period of a WM task, and importantly, both tasks were always performed on opposite hands. The finding that the tCDA was elicited contralateral to the currently prioritized task indicates that this component reflects a domain-unspecific attention mechanism, and not a process that is specific to the domain of WM. In conclusion, contralateral delay activity reflects the allocation of attention to internal (mnemonic) as well as external (perceived) stimulus representations, demonstrating strong functional overlap between the domains of WM and perception.

Individual differences in the contribution of shape and texture to personally familiar face recognition

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It has been suggested that texture information contributes more to familiar face recognition than shape. In two experiments, we tested the effects of reduced identity information in either

the shape or the texture dimension on the recognition of personally familiar faces. Stimuli were derived from images taken with a 3D camera system, and both behavioural data and event-related potentials (ERPs) were analysed. In Experiment 1, participants performed a face familiarity task on images of five personally familiar and five unfamiliar faces, which were shown as i) original images, including both shape and texture information, ii) shape only "masks", based on the 3D vertices, and iii) texture only, flattened surface maps. Performance was best for original faces, followed by texture only, and worst for shape only stimuli. The N250 familiarity effect was largest for original faces and non-significant for shape only stimuli. Experiment 2 used a similar design, with the only difference that shape only stimuli now consisted of the individual shape combined with an average texture, and texture only faces showed an individual texture combined with an average shape. Again, performance was best for original images, followed by texture only, and worst for shape only faces. Significant N250 familiarity effects were found for all three face conditions, but the effect was smallest for shape stimuli. Furthermore, performance and ERP familiarity effects for all conditions correlated positively with scores in a face learning (Cambridge Face Memory Test, CFMT) and a face recognition test (Bielefelder Famous Faces Test, BFFT). Overall, our results suggest that recognition of personally familiar faces is mainly, albeit not exclusively driven by texture information, and that good recognizers are characterized by a larger processing flexibility, possibly enabling them to cope better with reduced identity information in either dimension.

Anodal transcranial direct current stimulation (tDCS) over the right primary motor cortex (M1) inhibits implicit motor sequence learning

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Transcranial direct current stimulation (tDCS) can be used to modulate motor learning. Anodal tDCS applied to the left primary motor cortex (M1) facilitates implicit motor sequence learning of the contralateral hand. Given that the excitability of bilateral M1 is delicately balanced, it is likely that tDCS applied to one hemisphere may also affect the excitability of the corresponding homologue. Thus, we investigated the effect of anodal tDCS to the right M1 on the implicit motor sequence learning of the ipsilateral right hand and on subsequent performance of the left contralateral hand. In a double-blind, within-subject design, 24 healthy right-handed subjects (9 male) received anodal vs. sham tDCS to the right M1 in a counterbalanced order. TDCS was delivered 8 minutes prior to and during training on a serial reaction time task (SRTT) resulting in a mean stimulation duration of approx. 10 minutes. The SRTT consisted of a fixed eight-digit sequence which was interleaved by a randomly varying sequence (control condition). Training on the SRTT was performed with the right hand only. Reaction times of both hands were assessed before and immediately after training on the SRTT (end of acquisition (EoA)). Reaction times of both hands decreased significantly from baseline to EoA in sequential and random trials independent of tDCS condition. However, at EoA reaction times of sequential trials were significantly slower in the anodal as compared to the sham condition. In contrast, reaction times of random trials were not differentially modulated by tDCS. The present data indicate that

anodal tDCS applied to the right M1 impairs implicit motor sequence learning suggesting a modulation of the interhemispheric M1-interaction. Thus, the effect of tDCS on implicit motor sequence learning varies with the stimulated hemisphere. The data support the hypothesis that tDCS does not only affect the excitability of the stimulated area but also that of functionally connected areas.

The flexibility of models of recognition memory: The case of confidence ratings

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The normalized maximum likelihood (NML) index is a model selection index derived from the minimum description length principle. In contrast to traditional model selection indices, it also quantifies differences in flexibility between models related to their functional form. We present a new method for computing the NML index for models of categorical data that parameterize multinomial or product multinomial distributions and apply it to comparing the flexibility of major models of recognition memory for confidence rating based receiver operating characteristic (ROC) data. In an NML based meta-analysis of 850 ROC datasets, versions of the dual process signal detection models received most support followed by the finite mixture signal detection model and constrained versions of two high threshold models.

Do the data look as they should? Types of expectation differ in efficiency of truth value assessment in graphs

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Researchers can display a graph with predictions before presenting the graph containing the research results, can verbally cue the audience or, alternatively, can have the audience generate predictions for themselves. Prior studies have documented stronger behavioral and EEG effects of self-generated as compared to cue-induced expectations. While participants presumably cannot help but use their own predictions, they might sometimes ignore cues, especially when they are of low validity. In the current study, ignoring cues semantically was not possible. As stimuli we used graphs showing either a linear upward or downward trend. In each trial, participants first dealt with an expectation (self-generated, verbal cue, visual cue – varied between blocks) and then had to indicate with a key press, whether or not the stimulus fits the current expectation. Self-generated expectations had a stronger impact on verification times as compared to cues, while visual and verbal cues did not differ. Thus, self-generated vs. cue-induced expectations differ in how they are being processed, rather than just in whether they are semantically processed.

Attentional suppression occurs in singleton detection, but not in feature search mode

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When observers search for a shape singleton, RTs increase when an irrelevant, but salient color singleton is added to the display. The initial interpretation of this finding was that attention is always captured by salient stimuli. However, subsequent research showed that the search strategy modulates the effects of saliency. In particular, it was demonstrated that interference from irrelevant color singletons occurs when observers look for any odd stimulus (singleton detection mode), but not when they look for a specific stimulus (feature search mode). Singleton detection mode was induced by presenting singleton targets of variable shapes among nontargets of fixed shape. Feature search was induced by presenting a target of fixed shape among nontargets of various shapes. In both cases, the additional color singleton needs to be rejected in order to focus on the target. We measured event-related potentials (ERPs) to the distractor and focused on the contralateral positivity from 200 to 350 ms after stimulus onset, referred to as PD. The PD is thought to reflect active suppression of distractors. We observed a PD to the distractor in singleton detection mode, but not in feature search mode. Thus, the explanation for the greater interference in singleton detection mode is that the active suppression of distractors takes time. In contrast, no lateralized ERP to the distractor occurred in feature search mode, suggesting that it was successfully ignored. Stimulus saliency produced an early positivity from 100 to 200 ms, which may signal saliency, in both search modes. However, suppression of the saliency signal is only necessary in singleton detection mode.

Neural correlates of the maintenance of constructed objects in visual working memory

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How are mental images that have been constructed from their constituting elements maintained as a coherent representation in visual working memory (vWM)? Here, we compared two conditions of vWM maintenance that only differed in how vWM contents had been created. Participants maintained visual objects that they either had to construct from single features or that were presented to them as complete objects. Object complexity varied between two and four features. We analyzed EEG phase coupling as a measure of cortical connectivity in a time interval immediately before a probe stimulus appeared. We assumed that during this time both groups maintained essentially the same images, but that images constructed from their features require more neural coupling than images based on a complete percept. Increased coupling between frontal and parietal-to-occipital cortical sources was found for the maintenance of constructed in comparison to non-constructed objects in the theta, alpha, and gamma frequency bands. A similar pattern was found for an increase in vWM load (2 vs. 4 features) for non-constructed objects. Under increased construction load (2 vs. 4 features for constructed images), the pattern was restricted to fronto-parietal couplings, suggesting that the fronto-parietal attention network is coping with the higher attentional demands involved in

maintaining constructed images, but without increasing the communication with the occipital visual buffer in which the visual representations are assumed to be stored. We conclude from these findings that the maintenance of constructed images in vWM requires additional attentional processes to keep object elements together as a coherent representation.

Excess attention assessed by masked priming

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„The world beyond focused attention is not in total ´darkness´"(Cohen & Dennett, 2011). Some aspects of the scene which is gazed upon remain at least partially aware to the observer. Therefore, although attention is focused on a primary task, excess attentional resources may be distributed across the whole scene in a gradual manner. To examine this degraded attention hypothesis in unconscious processing, we developed a response priming paradigm in which subjects were to covertly attend to two possible target locations while primes occurred randomly either at one of the attended positions or at one of six unattended positions located at different distances from the attentional window. Specifically, we expected to find strong priming effects at attended positions versus degraded effects at unattended positions. Results show that priming effects on response times do not differ for attended positions and, as predicted, decrease linearly with increasing distance from the attentional window. Interestingly, priming effects on error rates are larger when the prime occurs at the non-target position. Altogether, these findings suggest degraded processing of unconscious stimuli beyond focal attention as described by Cohen & Dennett (2011) and may be interpreted within the framework of the Perceptual Load Hypothesis: due to the simple nature of the priming task in terms of perceptual load, leftover attentional resources might have spilled over to unattended positions.

Experience-dependent representation of object concepts in the sensory and motor brain systems

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Classical models assume that conceptual knowledge is represented in an amodal format distinct from the sensory and motor systems. Based on more recent models, however, we propose that concepts are embodied in the sense that interactions with objects form their conceptual memory traces in distributed sensory or action-related modality-specific systems. These predictions were tested in neurophysiological experiments with novel objects, for which new concepts had to be acquired under different sensory-motor interactions, and with real objects in experts, who had more detailed sensory-motor experiences with the objects compared with lay persons: A conceptual categorization task activated a given sensory and motor area only

when participants had rich opportunities to interact with the object through the corresponding sensory and motor channel during concept acquisition. Furthermore, the importance of experience for the formation of concepts is also demonstrated by a study in deaf participants, which revealed plastic changes in the activity of the sensory-motor systems during object categorization compared with hearing controls. The specificity of activity in sensory and motor areas during conceptual processing, as well as its experience-dependent plasticity strongly suggest that conceptual features are represented in a modality-specific fashion within the sensory and motor systems. These findings support the view that concepts are grounded in perception and action as a function of the sensory-motor experience during concept acquisition.

Mousetrap: Free, open-source, and cross-platform mouse-tracking and analysis plug-ins

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Mouse-tracking – the analysis of mouse movements in computerized experiments – is becoming increasingly popular in the cognitive sciences. Specifically, mouse movements are taken as an indicator of commitment to or conflict between choice options during the decision process. Using mouse-tracking, researchers are gaining a better understanding of the temporal development of cognitive processes in a growing number of psychological domains. In the current contribution, we present plug-ins that offer easy and convenient means of recording and analyzing mouse-movements in laboratory experiments. First, we introduce plug-ins and corresponding Python packages that add mouse-tracking to OpenSesame, a popular general-purpose graphical experimental builder for the social sciences. In contrast to existing mouse-tracking implementations, mousetrap seamlessly integrates with existing experimental software and, besides, does not require programming skills as it can be easily handled via its graphical interface. Thus, researchers can benefit from the core features of a validated experimental software package and the many extensions available for it (e.g., the integration with auxiliary hardware such as eye-tracking, and the creation of interactive experiments). Second, we introduce the mousetrap library for the statistical programming language R. This library can import, preprocess, aggregate, and visualize mouse trajectories and calculates a variety of established measures for curvature, complexity, velocity, and acceleration of movements. Importantly, the data need not be collected using the plug-ins presented in the current article, but can, in principle, stem from any mouse-tracking implementation. All plug-ins as well as the associated software are cross-platform, open-source and available free of charge from https://github.com/pascalkieslich/mousetrap-os.

Die Worst Performance Rule: Reaktionszeiten, Intelligenz und Task-Unrelated Thoughts

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Lässt man eine Gruppe von Personen eine Reihe von Reaktionszeit- und Intelligenztestaufgaben bearbeiten und korreliert man diese miteinander, stellt man fest, dass überraschender Weise ausgerechnet ihre schlechtesten Reaktionszeiten besonders indikativ für den allgemeinen Faktor g der Intelligenz sind. Dieses Phänomen wird als worst performance rule (WPR) bezeichnet, und kann bisher noch nicht ausreichend erklärt werden. Unter anderem wird diskutiert, dass weniger intelligente Personen mehr attentional lapses haben, die zu langsameren Reaktionszeiten führen. Um diese Hypothese zu testen, wurden in dieser Studie attentional lapses - gemessen als task unrelated thoughts (TUTs) - manipuliert. 58 Probanden aus einer studentischen Stichprobe bearbeiteten zunächst Reaktionszeitaufgabe und einen halben APM, gefolgt von einer Version der Stroop Task, die die Probanden in Kontroll- und Experimentalbedingung teilte. Die Stroop Task soll bei der Experimentalgruppe zu Ego Depletion führen, wodurch TUTs vermehrt auftreten sollen. Anschließend wurde die Reaktionszeitaufgabe erneut bearbeitet. Entgegen der Erwartung hatte die experimentelle Manipulation keinen Effekt auf die gemessenen TUTs; es konnte aber eine Zunahme der TUTs von MZP 1 zu MZP 2 beobachtet werden, gleichzeitig vergrößerten sich auch die Korrelationen bei der WPR. TUTs scheinen demnach einen Einfluss auf die WPR zu haben, jedoch werden weitere Untersuchungen benötigt, um das Ausmaß des Einflusses zu klären.

The red romance effect and sexual orientation

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On a universal level, multiple series of studies have shown that the color red leads to enhanced attractiveness perceptions of other-sex individuals (red romance effect). So far, the impact of red on perceived attractiveness has been studied only in heterosexual but not in homosexual individuals. The current study aims to fill this research gap. 491 participants (161 heterosexual and 120 homosexual females, 105 heterosexual and 105 homosexual males) were presented with a male and a female moderately attractive stimulus person, who was displayed in either a red or a white shirt. Overall, the woman was perceived as more attractive in red than in white by heterosexual males (hereby replicating the effect). Interestingly, the woman displayed in red was also perceived as more attractive by homosexual females, whereas an attractiveness diminishing effect was found in heterosexual females and homosexual males.

Oxytonergic modulation of psychomotor functions under alcohol intoxication

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It has been recently shown in rodents that oxytocin (OT), beside its well-known effects on social and emotional processing, is also suitable to attenuate motor impairments induced by alcohol intoxication. The present study was conducted to test whether this effect can also be observed in humans. 15 healthy volunteers participated in a double-blind crossover study where they received either 24 IU of intranasal OT or a Placebo. Then the participants consumed alcohol up to a breath alcohol level about .6 per mil and after 45 min, they conducted a battery of locomotor and visual motor tasks. The battery consisted of a finger tapping task with different frequencies (2 Hz vs 3 Hz) that was presented with and without an auditory pacing stimulus, a visuospatial pointing task and an eye-tracking paradigm consisting of a pro-saccade, an anti-saccade and a smooth pursuit eye movement task. One participant had to be excluded from the analysis due to missing data. First analysis of the finger-tapping task reveal a slight increase of timing precision (standard deviation of the inter-tap interval) under OT in the non-paced condition at 2 Hz ($T(12)=1.9$, $p<.05$, one-sided). We found an increase of timing precision under OT for the paced conditions as well, however, this was only observed in those participants who received OT during the second assessment. In those participants who received OT first, the precision was even reduced under OT compared to placebo, as reflected in a significant substance by order interaction ($F(1/12)=23.1$, $p<.001$). Our findings provide first evidence for an effect of OT on locomotor function under alcohol. The significant effect of substance order might indicate that the effect is particularly observable in an overlearned, automated behavior. The analysis of the other experimental paradigms, which are currently conducted, shall provide further insights into specific psychomotor functions that might be vulnerable for OT effects under alcohol intoxication.

Nutzerzentrierte Gestaltung und Evaluation eines Wearable zur Stressreduktion

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In diesem Beitrag wird die Entwicklung eines mobilen interaktiven Systems vorgestellt, mit dem Anwender ihre Selbstwahrnehmung und ihr Management in Bezug auf Stress verbessern können. Das mobil tragbare System besteht aus verschiedenen Sensoren, die physiologische Reaktionen des Nutzers registrieren (z.B. Pulsfrequenz und elektrodermale Aktivität), sowie aus unterschiedlichen Aktoren, die eine periphere sensorische Stimulation ermöglichen (z.B. LED-Lichter, Wärme-, Kälte- und Vibrationskomponenten). Über ein Interface entscheiden die Nutzer, ob und welche der Komponenten sie als kurzzeitige Entspannungstechnik anwenden wollen. Die Gestaltung des Systems erfolgte von Beginn an unter Mitwirkung potenzieller Nutzer. Erfordernisse wurden durch eine Online-Umfrage erhoben und der Prototyp mittels Beobachtung und Interview zur weiteren Optimierung begleitend bewertet. Zum Abschluss

wurde ein Akzeptanztest durchgeführt, mit dem der Prototyp in einer kontrollierten Nutzungssituation untersucht wurde. Durch die Erledigung eines zeitkritisch zu bearbeitenden Aufgabensatzes wurde bei insgesamt n = 24 Probanden (12 weiblich, 12 männlich) Stress induziert. In einem Between-Vergleich nutzte die Hälfte der Probanden während des Versuchs das neu entwickelte System, während der anderen Hälfte das System nicht zur Verfügung stand. Anschließend bewerteten beide Gruppen ihre subjektive Stresswahrnehmung und die erlebte Beanspruchung. Außerdem wurden Maße der objektiven Performanz beider Gruppen verglichen. Die Teilnehmer, die das System nutzten, beurteilten zudem das Interaktionserleben mit dem Prototyp. Aus diesen Informationen konnten wichtige Gestaltungsempfehlungen sowohl hinsichtlich der verschiedenen Module als auch hinsichtlich des Aufbaus der Interaktionsoberfläche abgeleitet werden.

A common neural substrate of processing symbolic and non-symbolic proportions – Evidence from fMRI

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Recent neuro-imaging research indicates that processing fraction magnitude is associated with neural activation in the intraparietal cortex – an area commonly observed to be activated when it comes to the processing of number magnitude information. Importantly, intraparietal activation in fraction processing was not influenced by fraction notation (i.e., symbolic fractions vs. number words: ¼ vs. one-fourth). Yet, symbolic fractions and number word notations are not commonly used to teach and learn fractions and proportions. Rather, in school settings, non-symbolic proportions such as pie charts are typically employed for a better learning and understanding. Accordingly, we investigated whether there is a common neural substrate of processing symbolic fractions (i.e., fractions and decimals) and non-symbolic proportions (i.e., pie charts and dot patterns). To pursue this issue, we conducted an fMRI study using four different magnitude comparison tasks with fractions, decimals, pie charts, and dot patterns, respectively. A conjunction analysis on these four tasks revealed several areas of significant joint activation, including the intraparietal sulcus (IPS), bilaterally. This indicates that identical cortical areas respond to both symbolic and non-symbolic proportions, irrespective of their notation. For the IPS, this may reflect the processing of numerical magnitude information of fractions and proportions – suggesting a notation-independent neural substrate for processing fraction and proportion magnitude.

Dishonesty for profit or a good deed? A comparison of pro-self, cooperative and altruistic cheating behavior

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Dishonesty often entails individual gains but also poses a threat to a positive self-image. According to self-concept maintenance theory, threats to the self-image induced by dishonest behavior should be reduced when the dishonesty can be morally justified. Hence, cheating should be more prevalent when an opportunity for justification exists. Indeed, empirical evidence suggests a higher willingness to cheat when others additionally profit from an individual's dishonesty. However, evidence on cheating behavior in larger groups compared to pro-self or pro-others cheating is missing so far. The purpose of the present study was to fill this gap by comparing cheating behavior for oneself, in larger groups and for others only. In an online survey, participants (N = 166) were randomly assigned to one of three conditions and completed a well-established cheating paradigm with actual incentives. In the pro-self condition participants kept the gain for themselves. In the cooperative condition the money was added to a collective amount of a group of 12 participants (who all played the same cheating paradigm), which was equally split between these participants at the end. In the altruistic condition the gain was donated to a charity organization. The results show a significant linear trend in cheating behavior across conditions with most cheating in the pro-self condition and least cheating in the altruistic condition. In contrast to self-concept maintenance theory, people hence seem to weigh their personal profit higher than the opportunity to justify their dishonest behavior.

Incorrect guesses but not denied choices reduce switch costs

Thomas Kleinsorge & Juliane Scheil

IfADo

Recently, we reported a series of task-switching experiments demonstrating that guessing an upcoming task diminishes switch costs in case of an incorrect guess (Kleinsorge & Scheil, 2015). In the present study, an experiment was designed in which participants specified the upcoming task in 75 % of trials, whereas a different task was presented in 25 %. Two groups of participants differed only regarding the information they got at the beginning of the experiment: In the Choosing condition, participants were informed about their choices influencing the task sequence, while in the Guessing condition participants were told that all tasks were presented at random and that the task sequence cannot be influenced. While we replicated our previous findings in the Guessing condition (switch costs were smaller for incorrectly as compared to correctly guessed tasks), in the Choosing condition accepted choices and denied choices did not differ in terms of switch costs, that is, the effects of choosing and task switching were additive. These findings are discussed in terms of different functional consequences of expectation mismatches based on guessing versus choosing an upcoming event.

Eye tracking gives insight into the processes of diagnostic reasoning

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When finding a best explanation for observed symptoms, a multitude of information has to be integrated and matched against explanations stored in memory. Although process models exist that make assumptions about ongoing memory processes during diagnostic reasoning (e.g., the construction of a situation model consisting of preassigned explanations), little process data exists that would allow to sufficiently test these assumptions. In order to explore memory processes in diagnostic reasoning, 29 participants were asked to solve a visual reasoning task (the Black-Box paradigm) where critical information had to be retrieved from memory. This study presents new prospects to assess reasoning processes by different eye tracking measures such as monitoring the gaze over time or memory indexing, a method that allows exploring memory processes in complex cognitive tasks by utilizing the human ability to spatially index information held in memory. By applying these eye tracking methods on a memory based reasoning task, we were able to gain new process data that provide insights into ongoing memory processes (i.e., automatization, the construction of a situation model). It will be discussed to which extend this methods are able to improve our understanding of diagnostic reasoning.

Comparing the perception of duration during self-rotation and circular vection

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Effects of motion on temporal perception are relevant in everyday life and have been examined in recent research. Mostly, motion is found to be accompanied by longer temporal ratings as well as by increased rating variability. In order to disentangle influences of the somatosensory and the vestibular system, Capelli and Israël (2007) examined rhythm production not only during states of stationarity and self-rotation in darkness, but also during the post-rotatory illusion following self-rotation. The aim of the present experiment was to supplement previous findings by replicating Capelli and Israël's study, but focusing on the effect of circular vection on duration perception as another kind of motion illusion. To this end, 24 participants were seated on a turning chair and asked to produce a regular rhythm of 1s by pressing a button. Each production period lasted for 30 s and was repeated 4 times in each of the 4 experimental conditions. The motion conditions (real self-motion and circular vection) were always preceded by the respective baseline condition (stationarity in total darkness and with ceiling illumination). In line with current literature, results show that self-rotation leads to the production of longer and more variable temporal intervals compared to baseline. However, in contrast to the post-rotatory illusion, circular vection did not cause significant differences of the temporal ratings in comparison to the baseline. Possible mechanisms causing these differences are

discussed and the results are interpreted in the framework of common models of temporal perception.

The role of contextual factors on the use of allocentric reference frames for reaching

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To encode the spatial location of objects in our environment, we make use of two broad classes of reference frames, namely the egocentric and the allocentric reference frame. So far it has been repeatedly demonstrated that both are used when subjects had to perform reaching movements toward a target location. However, which factors actually determine whether an object is used as allocentric cue or not, remained unclear. In a series of experiments we aimed to fill this gap. Moreover, by using naturalistic scenes as stimuli, we wanted to increase the ecological validity of our outcomes. Subjects had to encode object arrangements of a breakfast scene on a computer screen. After a brief delay with a blank screen, a test scene reappeared for a short period but with one object missing (= target) and other objects systematically shifted either to the left or to the right. After the test scene vanished, participants had to perform an immediate reaching movement towards the target location on a gray screen. By measuring reaching endpoints and calculating reaching errors, we were able to quantify to which extend participants took the object displacements and thus, the allocentric information, into account for their reaches. We found that reaching errors varied systematically with object displacements only when task-relevant objects, i.e. objects serving as potential reach targets, were shifted. This suggests that the task-relevance of an object is a major factor that determines the use of an object as allocentric cue. Moreover, the effect was highest when objects were shifted coherently and vanished when objects were displaced in a random fashion. We conclude that the coherence of a scene and thus, the reliability of object locations, is another import factor on the use of allocentric reference frames for reaching.

Parametric assessment of cerebral information processing capacity in Multiple Sclerosis and its relations to cognitive fatigue

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Multiple Sclerosis (MS) is a chronic, demyelinating autoimmune disease, representing the most disabling neurological pathology of non-traumatic origin in young adults. Major cognitive impairments are a reduction of processing capacity and mental fatigue, i.e. an “abnormal sense of tiredness or lack of energy”. Thus, the present study assessed the associations between fatigue and visual processing capacity based on a ‘theory of visual attention’ (TVA, Bundesen 1990, 2005). 36 relapsing-remitting MS patients were tested in a whole report task and

compared to healthy control subjects matched for gender, age and education. Additionally, the sustained attention test PASAT-3 served as a measure of objective fatigue, and the self-report questionnaire MFIS as a measure of subjective fatigue. Results show decreased processing speed and iconic memory as well as elevated perceptual thresholds of MS patients compared to healthy controls and in particular decreased processing speed in the second half of the test for patients with high vs low objective fatigue. These findings indicate that fatigue mainly affects specific aspects of processing capacity. However, further investigations are crucial to disentangle the mechanisms of processing capacity and cognition in MS.

Sticky bias in crossmodal attention shifting: Perceptual learning of sequential modality predictability reveals crossmodal attentional inertia

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Perceptual learning of stimulus modality sequences was examined using a numerical-spatial serial reaction-time (SRT) task with manual responses. The stimuli were number words (referring to the numbers 1-3), which were presented either in the visual or auditory modality. The number sequence and thus the response sequence were random, but the stimulus modalities followed a predictable 6-element sequence. We assessed modality sequence learning by replacing the predictable sequence with a random sequence at the end of training. Experiment 1A and 1B examined effects of learning instruction (intentional vs. incidental, respectively) and found predictability-based benefits for visual processing that were outweighed by corresponding costs for auditory processing. This modulation of the modality-dominance pattern did not depend on task instructions. In Experiment 2, we used a shorter response-stimulus interval (reduced from 500 ms to 200 ms) to enhance sequence learning and found the relative predictability costs for auditory processing increased to a degree that resulted in general performance costs of learning overall. This modality-specific cost-benefit pattern of endogenous, sequence-based modality predictions was independent from trial-to-trial, exogenous modality-shift effects. Taken together, the data are consistent with a "sticky bias" model of crossmodal attention shifting. This model proposes that endogenously triggered crossmodal attention shifts may be not fast enough to allow time-sensitive efficient preparation for both modalities, so that modality-specific processing weights favor the task-specific default (i.e., visual processing), even though this comes at the cost of impaired processing in the non-dominant auditory modality. This sticky bias causes crossmodal attentional inertia.

The effects of red on cooperative behavior

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The present research aimed to clarify the effects of the color red on cooperative behavior. In line with color-in-context-theory, we proposed that red, presented as colored light, would have different effects on cooperative behavior, depending on light distribution (direct versus indirect) as a context effect. We also expected that red indirect light (cozy atmosphere) would promote higher levels of cooperativeness than blue indirect light (distant atmosphere). We hypothesized that the consequences of specific lighting conditions on cooperativeness would depend on the activated cognitive, affective, and motivational states and processes, as well as on perceived room atmosphere. As expected, indirect red light (cozy atmosphere) promoted cooperative behavior to a higher degree than direct red light and indirect blue light. Only cognitive processes and the perception of room atmosphere were activated by lighting conditions and were tested as potential mediators. The results will be discussed with regard to their implications for color research and embodiment as well as for the design and architecture of social places.

When are eye movements related to attitudes towards vegetables during food choice? A comparison of choice tasks using mobile eye tracking

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Computer-based studies suggest a top-down control of attention in choice tasks. Recent technological developments now allow to test this assumption in more naturalistic settings by using mobile eye tracking. The present study thus aimed to examine the relationships between dwell time, attitudes, and food choice in a conventional computer-based task and a naturalistic food buffet task. Vegetable choice was assessed using a paired comparison task on a computer and a naturalistic yet standardized food replica buffet from which participants (N = 83) were asked to serve themselves a meal they would usually eat for lunch. During the tasks, the participants' eye movements were recorded with a mobile eye tracker. In addition, explicit attitudes towards vegetables were measured. Path modelling revealed that dwell time on vegetables is related to attitudes and choice in both tasks (ßs ≥ .21, ps ≤ .025). However, when reaching induced eye movements were excluded, dwell time was significantly related to attitudes and choice in the computer task only (ßs ≥ .24, ps ≤ .031). Compared to computer-based tasks, eye movements in naturalistic tasks have multiple functions due to a more complex task structure. The present results underline the importance of taking bodily movements into account when using mobile eye tracking: in tasks involving interactions with objects, the relationship between eye movements, attitudes, and choice might be overestimated when reaching induced gazes are included. Furthermore, the results suggest that findings from conventional computer-based tasks may not be fully transferable to naturalistic settings.

Rational approach to cross-attribute inferences from uncertain categorization

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How do categories affect feature inference? We consider settings where people observe a feature (X) of an object and predict the value of an unobserved feature (Y). In a productive research program initiated by Murphy and Ross, researchers have found that categories sometimes affect these feature inferences: in some settings, people behave as if they use the observed feature to infer the likely category of the object and then in turn use this single inferred category to make a prediction about the presence of the unobserved feature. In other settings, people do not seem to engage in this category-based inference and instead are sensitive to the ecological correlation between features. We propose a computational model that generalizes the feature inference component of Anderson's (1991) rational model of category learning. Contrary to Anderson's model, our model assumes that people are sensitive to both within category feature correlation and between category feature correlation. Our model includes a parameter that characterizes participants' propensity to rely on single category versus multiple categories when making feature inferences. Our model predictions are consistent with almost all previous findings. Besides, it leads to distinct predictions in settings where features are continuously valued. In 5 new experiments, the behavior of the participants conformed to the predictions of our rational model: people were sensitive to within category and between category correlations which closely corresponded to the predictions of the model. Furthermore, model estimations were sensitive to manipulations that consisted in nudging people to rely on just one category or multiple categories when making feature inferences. Finally, we discuss the implications of our model for the literatures on the reliance of category-level versus exemplar-level correlations, pseudo-contingencies, the halo effect in person perception and the stability of stereotypes.

Costly search benefits from repetition

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When we search the same display repeatedly for different targets with covert attention (i.e. without eye movements), search does not benefit from repetition (Kunar, Flusberg, & Wolfe, 2006). We investigated whether increasing the cost of the search would result in a repetition benefit. In two experiments, participants searched repeatedly for different target letters among distractor letters. The task required costly arm/hand or body movements, respectively. In Experiment 1, participants searched circular arrays of 3, 6, or 9 film canisters that were arranged on a tabletop. There was a small and a large search array. Participants had to reach out and turn over the canisters to make the search letters visible. In the repeated search condition the array did not change between searches; in the unrepeated search condition there was a new array for

each search. In Experiment 2, participants searched in circular arrays of computer monitors that were arranged in a room. Again, there was a small and a large array and a repeated and unrepeated search condition. Participants had to walk from one monitor to the next and to press a button to make the search letters appear. We found no differences between search in small and large arrays in both experiments. However, we found that search rates (based on search times and the number of search steps necessary to find the target) improved dramatically in the repeated compared to the unrepeated search condition. This suggests that participants use memory to improve repeated search in the same environment if the cost of searching makes the usage of memory worthwhile.

Sex differences in delay of gratification in 40-month-old children and the relation to prenatal testosterone levels

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Over three decades ago, Walter Mischel (1970) introduced the “Marshmallow Test” which measures children’s ability to delay gratification by either choosing an immediate smaller or a later larger reward (e.g. one vs. two marshmallows). It is assumed that the waiting time for the larger reward reflects the amount of self-control. Looking at sex differences in this task, some studies showed a female advantage in the ability to delay gratification whereas others did not. A meta-analysis (Silverman, 2003) found a small female advantage. In this context, sex hormone exposure could be a possible explanation for sex differences. Consistent with this explanation female prepubertal rats that were neonatally exposed to testosterone showed more impulsive choices than female control rats and their behavior was comparable to male rats (Bayless, Darling, & Daniel, 2013). Additionally, a study with children revealed that the second-to-forth-digit-ratio, often interpreted as a marker for prenatal testosterone exposure, predicted the ability to delay gratification (Da Silva, Moreira, & Da Costa, 2014). In our longitudinal study, we used prenatal testosterone levels from amniocentesis samples as a more direct measure and conducted a modified version of the Marshmallow Test with 40-month-old children. Girls waited significantly longer than boys providing further evidence for sex differences in delay of gratification. Importantly, in the male sample waiting time was negatively correlated with prenatal testosterone levels, underlining the organizing effect of testosterone as an explanation for observed sex differences.

Auditory taboo words are more difficult to ignore

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It is well established that background speech adversely affects serial short-term memory for visually presented items compared to a quiet control condition. For a long time the prevailing

view was that this irrelevant speech effect is primarily determined by the acoustic variability of the to-be-ignored sound and that its semantic content only plays a minor role, if at all. Recently, however, evidence has accumulated that content may indeed have a marked effect on how difficult it is to shield working memory performance against the disruptive impact of irrelevant speech. Sentences containing the own name, for example, produce a considerably larger amount of disruption than sentences containing the name of a yoked-partner (Röer, Bell & Buchner, 2013). There is ongoing debate, however, whether this effect represents a special form of distraction which is restricted to a small set of highly overlearned stimuli that are known to break through the barrier (e.g., the own name), or whether the semantic content of a distractor sequence determines its potential to interfere with the focal task as a standard feature. In two experiments, we asked our participants to remember visually presented items while ignoring so-called steady state sequences in which the same distractor word was repeated eight times and so-called changing state sequences in which eight different distractor words were presented. Changing state disruption was larger for taboo words than for neutral words, which is clear evidence for a semantic-based irrelevant speech effect. Implications for working memory theories are discussed.

Doing all at once? Modeling driver workload in an abstract multitasking scenario

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On the highway, drivers are not only engaged in lane keeping, but perform an array of other tasks such as having a conversation, route planning or texting. Therefore, driving is a prime example for multitasking in an applied context. A modelling approach to realize multitasking in general is “Threaded Cognition”, first introduced by Salvucci and Taatgen in 2008. “Threaded Cognition” uses no explicit resource allocation but chooses the task, which has not been executed longest during conflicts and allows for parallel processing of non-conflicting tasks. For exploring the limits of “Threaded Cognition” in an applied setting, modelling approaches in ACT-R were realized and compared with data from a laboratory multitasking experiment. 45 Participants dealt with tasks related to driving in a single modus and in double and triple combinations. The experimental tasks chosen for the paradigm were the critical tracking task (CTT) simulating steering, a two-level Working Memory Updating task (WMU) mirroring traffic complexity and the Peripheral Detection Task (PDT) corresponding to irregularly occurring events in traffic, which require the driver’s attention. The experimental data showed that the performance in the CTT-task decreased with the number of executed tasks. In the WMU and PDT task the reaction times as well as the error rates increased with the number of tasks performed simultaneously. The modelling approaches match the general trends of the experimental data but show a more distinctive drop in performance for the CTT task and a less drastic increase in the percentage of errors during the difficult WMU over the number of performed tasks. One explanation could be an insufficient resource allocation mechanism offered by the “Threaded Cognition” approach which could be improved with an explicit prioritization of the CTT task over the other two tasks.

Introspection reloaded: Dimensions of subjective experience of masked visual stimuli

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In response to the questionable reliability of introspective research of old days' psychology, for decades studies on conscious visual perception have focused on objective measures of perception. Consciousness, however, is clearly concerned with subjective experience. Therefore, various attempts have been made in recent years to complement objective measures of perception by simple reports of subjective experience. Several studies reported parallel findings with objective and subjective measures, but some reported differences between different types of measures. Here, we present a new approach to the multidimensionality of perception in a simple visual stimulus sequence with subjective measures. We used a metacontrast masking paradigm and asked our participants to report their subjective experience in terms of multidimensional response alternatives. Results indicated specific dynamics of different aspects of the conscious visual experience. These findings suggest that the same objective measure of perception may bear on different subjective experiences that result from the multidimensionality of conscious perception.

Investigating embodied choice in the Guided Movement Task

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In a recent extension of the idea of embodied cognition, the proponents of embodied choice (Lepora & Pezzulo, 2015) argue that there is a bidirectional influence between decision making and action performance. According to them, the decision making process not only affects the bodily movements through action preparation strategies, but the action dynamics (i.e., the current trajectory and kinematics of the movement) also exert a backward influence by dynamically changing the biomechanical costs and values of the response options. As a consequence, a central prediction of embodied choice is that a commitment effect to the initially preferred option is observed. In this study, we developed a Guided Movement Task to test whether an enforced initial movement towards one response option actually increases the likelihood of ultimately choosing this option. More importantly, through different experimental conditions we explored whether this commitment effect was also observed when the initial movement did not increase the costs of switching to the other option. Thereby, we aimed to determine the degree to which embodied choice is, in fact, cognition (i.e., whether the movement actually influences the preference development) rather than response switching inertia. This design can also be extended to the investigation of other effects of action performance, such as the development of decision confidence and changes of mind.

On the influence of practice on the activation of facial muscles

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Recently, it has been shown that humans are able to modulate their unintentionally activated emotional responses by strategical practice or even mere will-power. In a seminal study by Eder and colleagues (2010), participants were asked to conduct manual approach and avoidance movements via joystick to categorize a non-valence stimulus aspect of positive and negative pictures presented on the screen (affective Simon task). Interestingly, the stimulus–response assignments that had been practiced in a prior evaluation task had an influence on the performance in the affective Simon task: Practicing compatible S–R assignments enhanced the affective Simon effect whereas practicing incompatible S–R assignments completely reversed the affective Simon effect. However, manual approach/avoidance movements have been repeatedly shown to be flexibly linked to the processing of affect. In order to test whether this flexibility would be a necessary precondition, we transferred these results to the domain of facial muscle contractions which have been discussed to be much more inflexibly linked to the processing of affect. In two experiments, we have found evidence that even facial muscle contractions can be influenced by practice – but their controllability seems to be much more limited as compared to manual emotional responses.

Threat sensitivity in borderline personality disorder – An eye tracking study

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In the natural environment, initial, reflexive saccades towards the location of threats are the very first natural response to potential danger and are considered to be a biologically relevant measure for immediate shift in visual attention. Threat sensitivity is regarded as one of the most prominent predictors of interpersonal dysfunctions in Borderline Personality Disorder, leading to intense and aversive feelings of threat, anxiety, and anger, and eventually dysfunctional behaviors, such as reactive aggression. In the present eye tracking study, 20 unmedicated female patients with BPD and 24 healthy women matched for age and intelligence had to classify the emotion of angry, fearful, happy, and neutral facial expressions that were presented either briefly (150ms) or for a longer duration (5.000ms) to investigate alterations in initial, reflexive saccades and face scanning along with response latencies and error rates. Patients with BPD more often wrongly identified anger in facial expressions, responded slower to all facial expression, and, made faster saccades towards the eyes of briefly presented fearful faces and slower saccades away from briefly presented fearful and neutral faces compared with healthy women. Interestingly, latency of initial saccades and fixation duration correlated negatively with trait aggressiveness in patients with BPD. The present results confirm that

patients with BPD do not experience general deficits in facial emotion processing, but rather suggest a specific hypersensitivity for and an avoidance of or deficits in the detailed evaluation of social threat cues. This seems to be particularly enhanced in highly aggressive patients confirming a central role of threat sensitivity in interpersonal dysfunctions.

Fahrereigenschaften, Anthropomorphismus und Vertrauen: Ein integrierendes Rahmenmodell effektiver Kooperation mit hochautomatisierter Fahrassistenz

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Die Forschung zu erfolgreicher Kooperation mit hochautomatisierten Fahrassistenzsystemen ist zumeist experimenteller Natur. Auf diese Weise wurden sowohl Gestaltungsmerkmale auf Seiten der Technik (z.B. Usability) als auch relevante psychologische Einflussfaktoren auf Seiten des Nutzers identifiziert (Vertrauen, Akzeptanz, etc.). Angesichts des Fortschritts in der Entwicklung automatischer Fahrassistenzen stellt das Verstehen des komplexen Zusammenspiels der verschiedenen Variablengruppen im realen Nutzungskontext des Fahrens eine Herausforderung dar. Integrierende Untersuchungen sind innerhalb der experimentellen Methode mit hohem Aufwand verbunden und wurden deshalb bislang kaum realisiert. Dieser Beitrag stellt ein Rahmenmodell vor, welches die verschiedenen Einflussfaktoren einer effektiven Kooperation zwischen Fahrern und hochautomatisierten Fahrassistenzsystemen integriert. Das Modell fokussiert sich hierbei auf die psychologischen Prozesse, die bei den initialen Interaktionen mit automatischen technischen System stattfinden. Es hypothetisiert, dass die wahrnehmbaren Systemeigenschaften in Abhängigkeit von technikbezogenen Persönlichkeitseigenschaften und Präferenzen des Nutzers zur Entwicklung von Überzeugungen über das System führen. Diese wiederum schlagen sich in der weiteren Interaktion in stabileren Einstellungen und einem Muster von Kooperationsverhalten nieder. Der Beitrag stellt eine quasiexperimentelle Onlinestudie vor, in welcher die Modellhypothesen erstmals untersucht wurden. Die Studienteilnehmer lernten ein Fahrassistenzsystem kennen, welches das Fahrzeug autonom über die Autobahn steuert. In verschiedenen Fahrszenarien hatten sie die Möglichkeit, über die Nutzung des Systems zu entscheiden. Auf Seiten des Systems wurde die Transparenz der Funktionsweise sowie der Grad der Menschlichkeit der Benutzeroberfläche experimentell manipuliert. Die übrigen Modellvariablen wurden nach der Interaktion mit dem System abgefragt.

Smaller scaling of error feedback facilitates automatization in motor skill learning

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In motor learning, automatization seems to be dependent on the design of augmented feedback. Error feedback may help to reduce errors, but is known to induce attention

dependent cognitive processes (Seidler et al., 2013) and to impede motor automatization. Smaller deviations might not be necessarily perceived to be relevant, whereas larger deviations might be classified as correctable errors. We tested different scalings of visual error feedback on automaticity in learning a motor skill. Participants (n=38) practiced an elbow-extension-flexion-task with 3 reversal points in five sessions with 720 trials in a pretest-posttest design. They were instructed to execute the movement as precise as possible with regard to the reversals at 70°, 20° and 70° in relation to the starting position within a maximum movement time of 1200 ms. Automatization was measured according to the secondary-task paradigm (priorization of the primary task) with a visual-spatial n-back task. Feedback frequency was set to 14% as this seems to allow automatization to occur within this practice setting (Krause, Agethen & Zobe, 2015). Visual feedback was given on a computer screen with one bar for each reversal. The scaling of feedback bars was varied, as the height of error bars in the small-error-group was reduced by the factor 0.4 in relation to the large-error-group. In contrast to the large-error-group, p=.468, η^2_p = .03, the small-error-group reduced dual-task-costs from pre- to retention-test, p=.045, η^2_p =.20, which is interpreted as a higher degree of automaticity. There are no group differences in pre-post change with regard to performance precision or consistency, p=. 294, η^2_p = .03.

The impact of time perception and stress monitoring on decision-making under time pressure

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Time pressure is often considered the most stressful occupational strain (Ahlers, 2010). Hence, there is an urgent need to examine underlying mechanisms between time pressure and performance to provide appropriate support for employees. According to Zakay (1990), editing complex tasks with time restriction results in an increased time awareness and prospective estimation of time. This monitoring of time represents a secondary task which depletes resources from the decision process as primary task. Feeling time pressed with its typical stress symptoms may in turn constitute a secondary task for itself as trying to cope with one's stress reaction also requires resources at the expense of the decision process (Klein, 1996). In a decision study, participants were asked to consider different attributes in order to choose the best option out of five either with or without time restriction. Based on this study, data concerning (1) decision quality, (2) stress symptoms, (3) physical, mental and temporal demand, performance, effort and frustration, (4) time perception and (5) stress monitoring were collected. The results are discussed with regard to the role of time perception and stress monitoring in time-restricted decision processes.

Modulation of motor learning by transcranial alternating and direct current stimulation

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Plenty of everyday activities rely on motor learning characterized by fast performance gains followed by motor consolidation, finally resulting in long-term stabilization. The primary motor cortex (M1) contributes to the initial acquisition and early consolidation of motor sequences. Although the significance of M1 excitability for motor learning is well-established, the relevance of M1 oscillations remains less clear at present. In two experiments, we applied non-invasive transcranial alternating current stimulation (tACS) to the left M1 during or after motor sequence acquisition with the right hand. Synchronized oscillations at alpha (8-12 Hz) and beta (13-30 Hz) frequencies are of particular relevance for motor control. In the first experiment, we applied tACS with alpha (10 Hz) and beta (20 Hz) frequency and sham during a serial reaction time task (SRTT) interleaved by a random pattern. Both 10 Hz and 20 Hz tACS facilitated the SRTT acquisition compared to sham. Moreover, 20 Hz tACS boosted SRTT consolidation by less susceptibility to interference by the random pattern. In the second experiment, left M1 tACS was applied immediately after the SRTT. Again, 20 Hz tACS facilitated consolidation compared to 10 Hz and sham tACS. Both experiments highlight that 20 Hz tACS stabilizes a newly learned motor sequence independent of stimulation timing – supporting the relevance of beta oscillations for the stabilization of motor programs. In order to investigate to what extent these effects were associated with altered motor-cortical excitability, we performed a third experiment using transcranial direct current stimulation (tDCS). We modulated left M1 excitability by tDCS immediately after SRTT acquisition. Effects on early motor consolidation were comparable between tACS and tDCS suggesting that both 20 Hz tACS and tDCS support motor consolidation likely due to neuroplastic reorganization.

Not quite so blind: Semantic processing despite inattentional blindness

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We often fail to detect clearly visible, yet unexpected objects when our attention is otherwise engaged, a phenomenon labelled as inattentional blindness. The mediators of such failures of awareness and their potentially devastating consequences have been studied extensively. Surprisingly, however, hardly anything is known about whether and how we process the objects that go unnoticed during inattentional blindness. Using a straightforward semantic categorization task, we demonstrate that the meaning of objects that remain unconscious due to inattentional blindness interferes with the classification of attended stimuli. Responses were significantly slower when the content of an unnoticed stimulus contradicted that of the attended, to-be-judged stimulus. We clarify the depth of the “blindness” caused by inattention, as we provide compelling evidence that failing to detect unexpected stimuli does not preclude their processing, even at post-perceptual stages. Thus, despite inattentional blindness, our mind obviously still has access to something as refined as meaning.

Cognitive control and modality dominance relations in spatial and temporal tasks – Empirical data and a formal model

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Flexibility of cognitive control is a decisive factor in the adaptation of behavior. Modality appropriateness (i.e. the idea that performance is determined by the extent to which modalities and tasks "align") is assumed to influence cognitive control. We investigated the flexibility of switching between modalities in different processing requirements using the task switching paradigm. Participants had to switch between simultaneously presented visual and auditory stimuli in a spatial and a temporal task. The spatial task asked for a location judgment and the temporal task for a duration judgment of congruent or incongruent visual objects and sounds. A cue indicated the relevant stimulus modality. Modality-pure blocks were included as baseline. Results indicated asymmetric modality congruency effects, the direction of the effect depending on task requirements: In the spatial task, congruency effects were larger for the auditory modality. However, in the temporal task, they were larger for the visual modality. Interestingly, performance in modality-pure blocks indicated a benefit for visual stimuli in the spatial task and for auditory stimuli in the temporal task, determining the direction of asymmetric congruency effects in crossmodal blocks. Modality switch costs did not differ with respect to task requirements. We present a first approach to generate these modality-specific effects by a formal model.

Which parts of data graphs contribute much when estimating the average?

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Data graphs are often used to present the means of different conditions and are supposed to convey more than single values. For example, they should also convey group information, such as variability across conditions, as well as the grand average. It is, however, not clear, with which weight different portions of graphs contribute to the estimated mean. Replicating and extending work showing that bar graphs (but not point graphs) lead to a systematic bias in form of underestimating the mean, we experimentally varied format (bar graph vs. point graph, within subjects) and graph extension (wide vs. narrow scaling on the X-axis, between subjects) in a N=38 students sample. Participants were asked to indicate the mean in bar graphs and in equivalent graphs displaying points instead of bars. Apart from replicating underestimation of the mean in bar graphs, we determined for each participant (by within subjects correlations) with which weight each of the eight bars (or points) influenced the mean estimate. Each of the experimental condition led to the same pattern: the mean estimate was predominantly influenced by the left-most, the right-most and the left-to-the middle data points of the graphs. We discuss the results in terms of primacy and recency effects in scanning the graphs (from left

to right) and left-to-the-middle fixation tendencies documented for fixation positions within words in eye tracking reading studies.

Preschoolers are reluctant to posit the existence of another identical object based on spatio-temporal evidence

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Observing object motion that violates the core principle of continuity, young infants appear to be able to posit the existence of another identical object. In previous research, we investigated whether preschoolers would do the same in their verbal explanations. Using video clips and life events involving self-propelled toy locomotives as stimuli, we found virtually no evidence for spontaneous two-object explanations of an apparent continuity violation. The present study was designed to rule out possible artifacts caused by familiarizing children with single-object events. For this purpose, 79 children aged 3 to 6 years were presented with two test trials without any prior familiarization. In both test trials, children saw video clips showing how a toy locomotive (apparently) passed through a tunnel without appearing in a large opening in the lower middle. In the second test trial, a preview phase was included, in which the tunnel was temporarily removed to reveal a second toy locomotive near the tunnel exit. After the presentation of each video clip, children were first asked for a description of the seen event and then for a plausible explanation. In good agreement with our previous results, we found that only one 4-year-old and three 6-year-olds ever referred to a second locomotive in the critical first test trial. In the second test trial, most of the older preschoolers gave a correct two-object explanation, while the 3-year-olds never mentioned the second locomotive in their answers and even mostly claimed that they had seen the locomotive in the tunnel opening. We conclude that preschoolers´ encoding and interpretation of physical events does not appear to be tightly constrained by spatio-temporal cues and core knowledge about object motion, rather it seems to be strongly dominated by prior beliefs about how particular kinds of objects typically behave.

Showing “action” in moral judgments

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Sometimes, people judge it morally acceptable to sacrifice one person’s life in order to save several other lives, while in other cases they make the opposite judgment. These responses to moral dilemmas are guided by two moral principles: The principle of deontology states that the morality of an action depends on the intrinsic nature of the action; the principle of utilitarianism implies that the morality of an action is determined by its consequences. The dual-process model of moral decision making from Greene, Sommerville, Nystrom, Darley and Cohen (2001) states that affective reactions are immediately elicited by moral stimuli, and then (given

sufficient time, motivation, and resources) sometimes overridden by cognitive processing. However, in all moral dilemmas used so far, utilitarian judgments always included "acting" in some way (e.g., harming others to increase the well-being of a greater number of people), whereas deontological judgments never require any form of action. In one experiment, we tested if acting alone has an influence on moral decision making. Results show that acting indeed influences moral judgments.

Mortality salience attenuates the in-group bias of costly punishment: A functional MRI investigation

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When individuals are reminded of mortality, social norms and worldviews that reflect group membership become more salient. Although the need to defend against conscious awareness of mortality plays a critical role in various aspects of human behaviors, its underlying psychological and neural signatures remain obscure. Here, we combined a second-party punishment task (i.e., ultimatum game) with functional MRI to examine the behavioral and neuropsychological correlates of costly punishment to racial intergroup interactions. After either negative-affect or mortality-salience priming, participants received fair and unfair offers from racial in-group and out-group proposers and decided how much to punish them by reducing their payoffs. Results showed that out-group members received harsher punishment than in-group members after negative-affect priming, with activation in regions implicated in encoding aversive feelings (anterior insula, thalamus). This in-group bias was attenuated after mortality-salience priming, with stronger functional connectivity between anterior insula and regions important in emotional regulation (ventromedial prefrontal cortex), and between thalamus and mentalizing regions (dorsomedial prefrontal cortex, dmPFC). The stronger the connectivity between thalamus and dmPFC, the less out-group members were punished after mortality reminders. Our findings elucidate the behavioral and neuropsychological underpinnings of the effects of mortality reminders on intergroup interactions and support the notion that socially constructive behaviors such as showing tolerance to out-group members are an important way to buffer existential anxiety. Our findings have significant implications for understanding real-life intergroup interactions in the context of existential threat and provide a neuropsychological mechanism for socially constructive behaviors that can be initiated by mortality salience.

A precise quantitative model of salience: The Theory of Visual Attention

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Can salience from different dimensions be represented on a common salience scale? Up to now,

answers to this question are incomplete. While computational models such as different varieties of Itti's models (e.g. Itti & Koch, 2001) can provide a quantitative description of salience, they still have problems in adequately predicting human behaviour. On the other hand, behavioural approaches concerned with such a quantitative measure of salience usually relate salience from one dimension to salience of another dimension (Nothdurft, 2000). A general salience measure is, however, not established. A promising quantitative approach is Bundesen's Theory of Visual Attention (TVA). The formal mathematical description of attentional processes predestinate TVA for quantitative analysis. Recently, Bundesen's Theory of Visual Attention (TVA) has been extended by a factor modeling salience from feature differences (Nordfang, Dyrholm, & Bundesen, 2013). We combined this TVA variant with a newly developed experimental paradigm allowing to apply TVA to stimuli of gradually varying orientation differences. The salience factor of TVA modelling increased logarithmically with orientation contrast. This relation was modeled explicitly such that the feature contrast is included in the TVA model.

Immediate and delayed testing effects in action memory

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Retrieving information from memory enhances future retention more than restudying it. This testing effect has been shown to be reliable, however, it could not yet be demonstrated for motorically performed phrases (e.g., "light a candle). One potential reason is that previous research has not clearly distinguished direct from indirect testing effects. In this series of experiments, we selectively examined the direct testing effect in action memory. To test the predictions of the bifurcated-distribution model (Kornell and Bjork, (2010), we provided both measures of recall performance and recall speed. The results showed that repeated testing mitigated forgetting over 1 week as compared to repeated restudying, and increased recall speed for tested items already after 2 minutes. We observed both immediate and delayed benefits of repeated testing irrespective of how the phrases were encoded (verbally vs. enactively), and how they were recalled (i.e., noun-cued recall of verbs vs. verb-cued recall of nouns). These results were discussed in terms of the bifurcated-distribution model.

Modulation of dual-task performance by transcranial magnetic stimulation of the lateral prefrontal cortex

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Performance in dual-task situations is usually impaired compared to performance in single-task situations which is reflected in prolonged reaction times as well as increased error rates. These dual-task costs can be explained by the requirement to recruit additional task-order control processes that are crucial for scheduling, monitoring and regulating the processing order of two

temporally overlapping tasks. Recent neuroimaging studies with functional magnetic resonance imagery (fMRI) could show that the lateral prefrontal cortex (lPFC) may play an essential role for implementing these control processes. However, the association between prefrontal activity and task-order control remains only correlational due to the nature of the fMRI method. Thus, the aim of this study was to provide additional evidence for the causal involvement of prefrontal activity in dual-task processing by applying transcranial magnetic stimulation (TMS). Participants performed a dual-task consisting of two simple choice reaction tasks. Demands on task-order control processes were manipulated by introducing dual-task blocks with either fixed or random order of both tasks. We compared the effects of TMS over the lPFC to two control conditions. As a result, we could show that in the stimulation condition dual-task performance decreased compared to control conditions only if demands on task-order control processes where high. This pattern of results supports the conclusion that the lPFC plays a crucial role for the implementation of task-order control processes in situations with temporally overlapping tasks.

Beware of free recall! Age-related deficit in adapting study behavior to the memory-test format

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Freely recalling from memory is much more difficult than mere recognition. Are adult learners aware of this difference and do they adjust their study strategy to the expected test format? Many studies, dating back as early as the 1930s (e.g., Meyer, 1934, 1936), found recall-expecting undergraduates to outperform recognition-expecting peers on either test format; some studies further provide evidence that younger adults vary their study strategy depending on the expected test format (e.g., Leonard & Whitten, 1983). Memory-performance differences between younger and older adults are larger on recall than recognition tests (Craik, 1986) and older adults have been found to use encoding strategies that support recall less frequently (e.g., organizational strategies; Taconnat et al., 2009). Reduced adaptation to free recall in older adults might contribute to their greater deficit in this format but has not been systematically studied. In the present study, 60 younger (M = 21.65 years) and 60 older (M = 69.27 years) adults were instructed to either expect a recall or recognition test for a word list but were then all tested with recognition. Younger adults were aware of the greater difficulty of recall compared to recognition after only reading the format description; older adults required practice with the test format to appreciate the recall's greater difficulty. Recall-expecting younger adults outperformed their recognition-expecting peers in item memory but not in source memory for the words' spatial positions. In older adults, memory performance did not vary with test-format expectancy. Age-group differences in strategy use depended on test-format expectancy: When expecting recall, younger adults more frequently used deep imagery and sentence strategies than older adults; when expecting recognition, they more frequently used personal associations and repetition. Thus, older adults did not appropriately adapt their study behavior to the expected test-format.

Illusory correlations emerge through positive experience sampling

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Humans' operant learning is well described by the law of effect, leading to avoidance of unfavorable and approach of favorable outcomes. This hedonically driven information search process leads individuals to observe predictably biased information samples. Among other biases, this model proposes that two unrelated variables will be related in the sample, if positive outcomes are conditional on the combination of both variables (Denrell and Le Mens 2011). In an information foraging game, we empirically test whether certain sampling strategies produce these illusory correlations by incentivizing different variable combinations. As predicted, if people are rewarded whenever at least one of the two variables is positive (compensatory reward scheme), we find positive illusory correlations in the samples. If people are rewarded whenever both of the two variables are positive (non-compensatory reward scheme), we find negative illusory correlations in the samples. This sampling based approach supports an alternative explanation for illusory correlations that does not rely on biased information processing or selective attention.

Sequence learning in the Change Blindness paradigm

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Change Blindness is the relative inability to detect changes between visual scenes, when they are masked by a global transient (blank screen, saccade, eye blink; Simons, 2000). Performance for change detection can be improved if the surrounding spatial context is predictive for target location. In this so-called Contextual Cueing, participants are said to increase detection rates through implicit learning of the invariant spatial context which draws attention to the target location (Chun & Jiang, 1998). The present study observes if change detection performance can also be enhanced by combination with the serial reaction task (SRT). Implicit learning in the serial reaction times task is a stable phenomenon over a variety of stimulus-response-formats. Thus, it is assumed that participants implicitly learn the inherent sequence of change positions and change blindness decreases over time if the sequence is present. The results demonstrate the importance of attention allocation to successfully detect changes.

Effect monitoring in multitasking

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Humans aim to produce intended effects in the environment. To do so, we must not only

generate motor output that will produce currently pursued effects with some reliability, rather we must also monitor that these effects eventually do occur. Multitasking basically means to produce, and thus also to monitor, more than one effect at a time. We will discuss the role of such effect monitoring for dual-task performance. Basically, we suggest that monitoring can barely occur in parallel with the production or monitoring of another action effect. Finally, we will consider some factors which likely shape the burdens of effect monitoring (such as action-effect compatibility).

The effects of attentional focus manipulations and distracting information at encoding on age-related deficits in recognition memory: An ERP study

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Older adults are more susceptible to interference from irrelevant information. Previous research has indicated that this inhibitory deficit can negatively affect their performance in recognition memory tasks. In the present event-related potential (ERP) study, we examined the effects of attentional focus manipulations at encoding on the subsequent recognition of relevant study items and simultaneously encoded irrelevant distractor items. In an intentional study phase, younger and older healthy adults were presented with pairs of familiar visual objects. For each pair, participants were instructed to only memorize the item highlighted by a spatial cue and to ignore the uncued item as irrelevant. Spatial cues were either presented 500 ms prior to the item pair (Pre-Cue) or added to the item pair display after 500 ms (Post-Cue). In a subsequent test phase, we asked participants to distinguish between relevant, i.e. cued, study items and irrelevant or new items. In addition to behavioral measures, we analyzed ERP correlates of attentional processes (P2), familiarity-based memory (FN400) and recollection-based memory (LPC). Both age groups showed equivalent performance benefits when relevant items were highlighted by a Pre-Cue at encoding. Across all conditions, older adults were slower and more error-prone than younger adults. These age-related performance deficits were more pronounced for irrelevant and new items compared to relevant items. Irrespective of item status, P2 amplitudes were larger in older compared to younger adults, suggesting an increased recruitment of attentional resources at retrieval. LPC old/new effects for relevant items were diminished in older adults, especially when items had been studied under Post-Cueing conditions. Age-related deficits in recollection-based memory were thus reduced when participants were able to utilize a Pre-Cue to screen relevant from irrelevant encoding information.

What the pupil can tell us about conflict processing in the Simon task

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Some researchers promote conflict trials in the Simon task to elicit increasing cognitive demands compared to non-conflict trials and thus trigger a negative affect (Van Steenbergen & Band, 2013). From pupillometry research we know that pupil size is sensitive to emotional arousal and cognitive demands leading to an increase of the pupil size with increasing arousal/demands. Previous findings using pupillometry in the Simon task suggest that increasing pupil size can serve as an indicator for conflict trials compared to no-conflict trials whereas others failed to show this effect. It is under debate whether emotions initiated by this conflict caused this effect. To obtain further insights into the characteristics of pupil size in conflict paradigms, a Simon task was conducted where emotional pictures served as stimuli. Hereby, it is possible to consider the appearance of positive, negative or neutral stimuli in the scope conflict and no-conflict trials. Behavioral and pupil data were analysed and discussed in terms of emotional background of conflicts in the Simon task.

Linguistic context effects on lexical activation patterns during sequential picture naming

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While it has been shown that the preceding linguistic context influences the eventual choice of a particular word, and thus prevents that inadequate naming alternatives are produced, recent investigations suggest that these alternatives are not successfully inhibited at the lexical level. The current experiment used a sequential picture naming task (in which the pictures were presented one by one) in order to test whether a constraining linguistic context, generated by the participants themselves, can prevent the phonological activation of the target picture's basic level object name (e.g. fish) during subordinate naming (e.g. shark). To this end, the target was either preceded by a picture from the same basic-level category (e.g. eel before shark), rendering "fish" a locally inadequate response, because both objects belong to the category fish, or the target was preceded by a picture from a different category (e.g. jeans before shark), rendering "fish" an acceptable naming alternative, because reference to the target object is unambiguous. Acoustic distractors during target picture presentation were either phonologically related to the target picture's basic-level object or unrelated (e.g. "finger" vs. "book"). If the inappropriate basic-level naming alternative is successfully prevented from activation after the constraining condition, then no interference effect due to basic-level related distractors compared to unrelated distractors should arise in this context. Phonologically related distractors interfered with naming responses, irrespective of their inadequacy in the constraining context. This finding suggests that inadequate naming alternatives at the basic level are not successfully prevented from phonological activation and compete for selection, even if they are locally inadequate competitors given the preceding linguistic context.

No correlation, no evidence for attention shift in category learning: Different mechanisms behind illusory correlations and the inverse base-rate effect

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When common and rare attributes are equally prevalent for frequent and infrequent categories, the frequent categories (e.g., majority groups) are associated more strongly with the common attributes (e.g., positive valence) than infrequent categories (e.g., minority groups). Such a frequency-based illusory correlation (IC) effect has been shown to arise through unbiased learning, which is less complete for infrequent than for frequent categories. On the other hand, when frequent categories are always paired with corresponding common attributes and infrequent categories with corresponding rare attributes, an inverse base-rate effect (IBRE) arises. The association of the infrequent categories with the rare attributes is stronger than the association of the frequent categories with the common attributes. Recently, it has been proposed that the attention shift mechanism that produces the IBRE is also essential to explaining IC effects (Sherman, Kruschke, Sherman, Percy, Petrocelli, & Conrey, 2009). No evidence was found for this explanation of standard IC effects across 4 experiments and related computational modeling of attention shift (using a model called EXIT, derived from “extended ADIT” model, where the name ADIT is an acronym for “attention to distinctive input”). In a fifth experiment, evidence for attention shift was found for perfect category-attribute correlations. In sum, incomplete learning continues to offer a sufficient and parsimonious account of IC effects.

Priming effects between linguistic and numerical meaning referring to vertical space

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A recent study showed that processing high numbers (8, 9) results in shorter reaction times (RT) to up-nouns like “sky” and longer RTs to down-nouns like “floor”. The reversed pattern held for low numbers (1, 2). A follow-up study also showed that number primes can affect the processing of action-words (e.g. “rise”, “fall”). This effect was reversed, showing longer RTs in congruent compared to incongruent conditions. Both effects for nouns and verbs are proposed to be due to a neuronal overlap of meaning attributes in vertical space of numerical and linguistic representations (cf. Lachmair et al., 2014). The aims of this study were (1) to examine if noun and verb processing also affect number processing, and (2) if so, how different time intervals moderate this effect. In two experiments, subjects read centrally presented up- or down-words. As word primes, nouns (e.g., “bird”, ”root”; Experiment 1) and verbs (e.g., “rise”, ”fall”; Experiment 2) were used. Afterwards, during a variable time interval (TI), a number (8, 9, 1, 2, 5) was presented. Subsequently, participants had to respond with the spacebar to a white square as quickly as possible to all numbers, except to 5. Pairs of up-words/high numbers and

down-words/low numbers were considered as congruent, the remaining pairs as incongruent. The results showed a significant interaction of congruency (congruent or incongruent word-number pairs), word-categories (nouns, verbs) and TI (300 ms, 500 ms, 800 ms). For nouns, we found no differences for the three time intervals. However, RTs of congruent verb-number pairs were significant longer in short TI compared to incongruent pairs. This pattern reversed in longer TI. The data suggest different processes when representing nouns and verbs. But crucially, together with the results of Lachmair et al. (2014), the reported effects provide strong evidence for a neuronal overlap of numerical and linguistic representations according to their grounding in vertical space.

All of us - Tapping into the content of the superordinate human ingroup

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Research has established a consensus on the dynamics and underlying processes of major social identities like national or ethnic identities. However, only a few studies have looked at identification with the largest possible ingroup, the human ingroup (McFarland et al., 2012, Reese et al., 2015). So far, it is conceptualized and operationalized without addressing the actual meaning that is inherent in this concept that might provide cues to consequences caused by identification with this group. Identification with a group manifests itself through several characteristics (e.g., shared values, essentialism). Therefore, we want to take a closer look at the essence of the superordinate human ingroup. Although the usual mechanisms proposed by Social Identity Theory (Tajfel et al., 1987) are applicable to this largest ingroup, a unique characteristic is that there is no clear outgroup and that the group itself might not even be represented coherently among the “ingroup members”. Due to the inclusion of all human beings in the own ingroup, we assume more positive and supportive attitudes towards other groups (e.g., minorities) and a link between identification with the ingroup and e.g., lower social dominance orientation. To explore this issue, we conducted three studies in Germany and the US. To form a basis to build on, we applied a bottom-up approach to gain access to this space of meaning. Therefore, in our first study, we asked participants for their personal conceptualizations of the ingroup of all humanity, and possible outgroups to it. Based on the results of the first study, we developed a scale measuring participants’ attitude to mankind in general and their identification with the human ingroup. We used this scale in a subsequent study to explore the relationship between identification with and attitudes towards the human ingroup on the one hand and several generalized political attitudes, as well as behavioral intentions concerning prosocial behavior on the other hand.

Decomposing performance on the Wisconsin Card Sorting Test: Effects of working memory load and age-related changes

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The Wisconsin Card Sorting Test (WCST) is often regarded as a prototypical neuropsychological test of set-shifting ability. However, it has been proposed that WCST performance involves cognitive processes other than set shifting, such as set maintenance and rule inference. Distinguishing between these processes is necessary for the meaningful interpretation of WCST performance deficits in neuropsychological populations. In the present studies, we aimed to concurrently measure processes of set shifting, set maintenance and rule inference in a computerized version of the WCST, and to dissociate these processes based on their dependence on working memory capacity. In Study 1, we manipulated the number of WCST rules to vary the demands placed on working memory-dependent processes of rule inference. As predicted, integration errors as a novel measure of rule-inference efficiency were selectively affected by increasing the number of rules from three to four. In Study 2, we examined age-related changes in set shifting, set maintenance and rule inference in the WCST. We found a specific association between age and integration errors, indicating that rule inference, but not set shifting or set maintenance, is affected in older individuals. Rule inference on the WCST appeared to be selectively impaired when the amount of information to be integrated in working memory increases or when working memory capacity is reduced (as in older individuals). Our findings indicate that measuring integration errors as an index of a distinct rule-inference process can improve the understanding and interpretability of WCST performance.

Perception in the somatosensory domain is modulated rhythmically by subliminal stimuli: Evidence for discrete perception?

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For centuries, philosophers and (neuro)scientists have dealt with the question whether our perception is a continuous or discrete process. While our subjective experience seems to imply a continuous process, recent neuroimaging studies provided evidence for a discrete perception. These studies were mainly conducted in the visual domain. Recently, however, an MEG study provided evidence that a discrete perceptual process also exists in the somatosensory domain (Baumgarten et al., 2015). This study argued that perception is sampled discretely and rhythmically by neuronal oscillations in the beta-band (13-20 Hz). Here, we tested the above mentioned question whether perception is discrete or continuous. Subjects received two supra-threshold electrical pulses at the left index finger with varying stimulus onset asynchronies (SOAs) and reported the number of perceived stimuli. In a pre-experiment, SOAs were determined for which subjects reported to perceive one stimulus in ~50% of the trials. In

the main experiment, we applied an additional stimulus before these two stimuli with varying SOAs (20-600 ms). Importantly, the intensity of the additional stimulus was subliminal so that this stimulus was not consciously perceived. Despite not being perceived consciously, the subliminal stimuli rhythmically modulated perception of the following supra-threshold stimuli as a function of SOA. The main rhythmic components were found in the theta- (~3 Hz) and in the beta-band (~16 Hz). In combination with our previous MEG study (Baumgarten et al., 2015), we argue that the results demonstrate a rhythmic and discrete perceptual sampling in the somatosensory domain in the beta-band. In addition, the results in the theta-band might be explained by attentional sampling of perception (Landau & Fries, 2012).

The effect of cognitive load and predictability on multitasking while driving

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Driving requires coordination skills due to inherently multitasking characteristics of the task. In addition to primary driving tasks such as longitudinal and lateral control, monitoring and reacting based on surrounding traffic and route planning, drivers tend to do to secondary tasks. Commonly, they are able to handle such multitasking situations by adaptively coordinating their attention and behavior based on an inherent representation of the situation. However, sometimes multitasking performance breaks down resulting in critical situations or even crashes attributed to distraction. Predictability of the situation and cognitive load are considered to be possible influencing factors of the breakdown process and were investigated in a low fidelity driving simulator. 27 participants had to repeatedly change lanes by reacting on predictable or unpredictable cues and performing either a low or high cognitive demanding visual search task. Results indicate a decreased coordinating performance in the high load condition. Hence, the advantage of predictability of the situation is deteriorated by high cognitive distraction.

Infants' perception of unexpected actions: A comparison to adult data

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Previous research found that 14-month-old infants predominantly imitated an unusual and inefficient action (turning on a lamp with one's forehead) when the model's hands were free, i.e., other means were clearly available (Gergely, Bekkering, & Király, 2002). Rational imitation accounts suggest that infants evaluate actions by the rationality principle, which states that people achieve goals with the most efficient means. Thus, infants form expectations on others' actions, possibly influencing their imitative behavior. We conducted an event-related potential (ERP) study to investigate whether infants experience violation of expectation when observing the unusual head touch. This should be indicated by increased Negative central (Nc) amplitude in response to the unexpected action, as the Nc has been related to the amount of attentional

engagement directed toward a visual stimulus in infants (Reynolds, 2015). Twelve- to 14-month-olds (N = 13, 6 girls, further data collection is ongoing) watched videos of models demonstrating that their hands were free. Subsequent test frames showed that the model had performed either a hand or head touch action. We found that the Nc amplitude (350-650 ms) was enhanced on central channels (C3, Cz, C4) in the head touch condition (M = -18.66, SD = 10.47) compared to the hand touch condition (M = -14.38, SD = 9.21), $t(12) = -2.228$, $p = 0.046$, $d = 0.41$. This indicates that infants discriminated head and hand outcomes with differences in the allocation of attentional resources. The increased Nc for the unexpected head touch action may illustrate an orienting response reflecting mismatch detection. In a second study, the same action sequences were presented to adults (N = 28, analysis is ongoing) to compare cognitive mechanisms underlying violation of action expectations across development.

Measuring the control effort induced by the instruction to stay stock-still

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While being engaged in cognitive tasks, students in school and university are required to sit still in order to provide a quiet working atmosphere. However, it is often neglected that this setting may have a potential disadvantage. By following this instruction, students manage a motor-cognitive multitask situation by solving mental problems while concurrently inhibiting movements actively. Costs in motor-motor dual-tasking involving movement inhibition have been studied by Huestegge and Koch (2014). They found increased movement errors when eye or limb movements had to be suppressed. In our study, we induce a 3-step gradation of inhibition from free to stock-still. If we assume that suppressing movements may generate additional work load, negative effects on cognitive performance should appear in these specific motor-cognitive dual-tasks. Cognitive and motor performance, as well as neural activity [fNIRS] are monitored in 15 subjects executing mental subtractions for 60 s while A: being instructed to stay stock-still compared to two control conditions (B: no specific movement related instruction, C: active motor task [swinging, cycling, walking]). The range of motion caused by these instructions is 0.97 m (mean integrated movement path) in A. In B this is expanded by factor 1.8 and in C by the factor 137. Cognitive performance is measured by the number of correct calculations and work load is expressed by changes of oxygenated and deoxygenated hemoglobin concentration in the right prefrontal brain area. We expect no significantly reduced cognitive load in any of the conditions assuming that subjects operate with maximal exploitation of their capacity. Most crucial to our hypothesis is whether cognitive performance in A is reduced compared to B and C. The final results will be presented at the conference.

Multitasking and healthy aging: Differential age effects on dual-tasking and task switching

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Meta-analytic evidence indicates age-related increases in both dual-tasking and global task-switching costs, suggesting a deficit in coordinating two tasks in parallel or in close succession with advancing age. Here we tested this hypothesis in a sample of young (n = 20, mean age = 25.7 yrs.) and older (n = 20, mean age = 57.4 yrs.) adults using two classical multitasking paradigms: psychological refractory period (PRP) and alternating-runs task switching. In contrast to previous reports, older (vs. young) adults did not show an increased PRP effect on response speed, neither in Task 2 nor in Task 1; they did show a stronger PRP effect on accuracy in Task 2, though. As for task switching, we observed no age-related increase in local switch costs (i.e., the difference in response speed between task-switch and task-repeat trials). In line with previous work, there was, however, a significant increase in global switch costs (i.e., the difference in response speed between task-repeat trials in mixed blocks and trials in single-task blocks). Additionally, local but not global switch costs were found to co-vary with the PRP effect. Collectively, our results indicate that multitasking is not generally impaired in older age. Rather, healthy aging appears to bring about specific limitations in the active maintenance and differentiation of multiple task sets.

Reminders of the recent and distant past: Odor-based context dependent memory

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It has been proposed that the preconditions for episodic olfactory memory may not be optimal. For example, environmental olfactory information often goes unnoticed and barely evokes attention in humans and semantic activations that are a prerequisite for optimal episodic memory functioning are typically restricted. Still, as all environmental spaces contain odor information, it is highly likely that olfactory information will become part of a memory representation that is linked to a specific event. This implies that an event-congruent exposure of an odor carries the potential to trigger all, or parts of, a previous episode. In this presentation, I will highlight evidence showing that odors may serve as powerful reminders of both the recent and the distant past. This is demonstrated by studies exploring odor-evoked autobiographical memories and by controlled experimental paradigms where odors have been embedded in a learning context and later reinstated at retrieval where an increased memory recollection for the target information often is observed. Overall, these observations converge on the notion that odor memories are retained over long periods of time.

Semantic consistency effects in real-world and synthesized scenes using object thumbnails

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It has been shown that objects are identified more accurately and faster when they appear in a semantically consistent rather than inconsistent setting. Does this consistency effect apply to object thumbnails that are not embedded in a scene but merely placed on it? And are the summary statistics of a scene sufficient to affect object processing? To address these questions, we paired indoor and outdoor scenes, which convey different summary statistics, with either consistent or inconsistent objects. We created a synthesized texture for each scene with identical summary statistics but no semantic meaning, resulting in three types of backgrounds: real-world scenes, textures, and gray controls. In Experiment 1, object processing was measured using an un-speeded defragmentation task where objects were successively revealed. Participants defragmented the objects naming them at the earliest defragmentation level. Consistent objects were recognized at lower levels of defragmentation compared to inconsistent objects. Moreover, an interaction between consistency and the type of background indicated that the consistency effect was strongest when thumbnails were placed on real-world scenes. Textures did, however, not differ from the control condition. In Experiment 2, the same objects were now only briefly presented (50 ms) on the backgrounds in a fully defragmented manner. Consistency effects in textures were not distinguishable from the control condition (here a colored checkerboard) as opposed to real-world scenes, which showed a higher percentage of correct responses for consistent versus inconsistent objects. Therefore, we conclude that object thumbnails are perceived interactively with their real-world setting although they are physically not integrated in it. This type of object processing does not seem to be affected by summary statistics alone. Future electrophysiological investigations may test these behavioral findings by providing a more sensitive measure.

Einsatz einer nach chronobiologischen Erkenntnissen modifizierten LED-Kabinenbeleuchtung: Komfortgewinn für Passagiere auf Langstreckenflügen

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Das Licht in der Flugzeugkabine spielt eine wichtige Rolle für das Komfortempfinden auf Langstreckenflügen. Der Einsatz nach chronobiologischen Erkenntnissen modifizierter Kabinenbeleuchtung auf LED-Basis verspricht einen Komfortgewinn an Bord solcher Flüge. Eine zu diesem Zweck initiierte experimentelle Validierungsstudie vergleicht die Nutzung aktuell verwendeter Kabinenbeleuchtung mit solcher nach chronobiologischen Erkenntnissen modifizierter LED-Technik und unterstützt die Annahme, dass mithilfe der Kabinenbeleuchtung der Komfort auf Langstreckenflügen erhöht werden kann. Großen Nutzen bieten die Resultate für die weitere Erforschung präventiver Jetlag Reduktion.

Connection between preschool children`s performance in theory-of-mind and mental rotation tasks

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Between the age of 3 and 5 years, children develop the ability to adopt other perspectives: they can differentiate false beliefs (Theory of Mind, ToM) and acquire the ability to take over spatial perspectives, as in mental rotation (e.g., Estes, 1998; Frick et al., 2013). The present study investigates the relationship between the development of these two abilities. In total, 83 children (M = 3.45, SD = 0.52) were tested in false-belief-tasks (ToM-scale) and mental rotation tasks (Picture-Mental Rotation-Test, PRT). Results show that 4-year-old children solve significantly more tasks in the ToM-scale ($t(81)=-4.140$, $p <.05$, $d=-0.909$) and the false-belief-tasks of the ToM-scale ($t(81)=-3.649$, $p<.05$, $d =-0.801$) than 3-year-old children. The mental rotation task showed a marginally significant difference between those two age groups ($t(81)=-1.987$, $p=.050$, $d=-0.436$). When regarding only those children who answered above chance level in the mental rotation task, significant differences between the two age groups were found for the ToM-scale ($t(15)=-4.559$, $p<.05$, $d=-2.314$), the false-belief-task of the ToM ($t(15)=-2.540$, $p<.05$, $d=-1.289$), as well as for the PRT ($t(15)=-2.943$, $p<.05$, $d=-1.494$). When analysing the relationship between mental rotation and ToM further in this selected sample and with age as control variable, a correlation analysis revealed no significant relationship between mental rotation and ToM ($r = .443$, $p = .086$). The present findings, on one hand, may indicate that mental rotation and ToM have no common underlying process, although both abilities necessitate a takeover of perspective. On the other hand, the large effect sizes suggest that the lack of significance might be due to the small sample size and may reach significance when increasing the sample.

Judging people and their language use: How attitudes towards languages and speakers' nationality influence speaker evaluations in multilingual contexts, using Luxembourg as an example.

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University of Luxembourg

In social encounters, language is one of the most salient cues eliciting evaluative responses. According to models on language attitudes (e.g., Cargile, Giles, Ryan & Bradac, 1994), listeners` attitudes towards the speaker`s language influence the evaluation of this speaking person. However, linguistic stimuli might evoke additional inferences, e.g. on speaker`s nationality. We are therefore experimentally testing whether attitudes towards languages and attitudes towards speaker`s nationality are two distinguishable constructs which has not been addressed in previous research. Furthermore, the distinction between implicit and explicit attitudes is examined, resulting in a theoretical framework of four distinct types of attitudes influencing speaker evaluations. Luxembourg`s linguistic context is determined by the existence of various languages spoken by different inhabitants. In the present study, the model is tested with

Luxembourgish and French. Using a combination of explicit measures and an adapted audio Implicit Association Test (IAT; Greenwald et al., 2002), language and national attitudes of Luxembourgish university students are assessed. According our hypotheses, it is expected that language attitudes correlate moderately with national attitudes, providing evidence for the factorial separability. Results of regression analyses are discussed to give insight into the predictive impact of the four attitude types on speaker evaluations. A comparison between implicit and explicit attitudes is put into focus to demonstrate the model's relevance. Overall, this study contributes to ascertaining the complexity of influencing factors on person perception based on linguistic cues by treating language and national attitudes as distinguishable constructs.

Extending the diffusion model to paradigms with slower responses

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While the diffusion model has been applied to diverse experimental paradigms, its preconditions have only been scarcely investigated. One such precondition regards the duration of trials. As has often been stated (e.g., Ratcliff & McKoon, 2008), the diffusion model should only be applied to tasks with mean response times of at maximum 1.5 seconds per trial. In two experimental validation studies, we question this arbitrary limit. In particular, we used an anagram task and a figural task that both produce response latencies of several seconds per trial. The validity was tested for each of the four main diffusion model parameters (speed of information accumulation, threshold separation, decision bias and non-decisional component) by a specific experimental manipulation.

The influence of semantic information on early visual processing in natural scenes

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Universität Tübingen

Recent research has demonstrated that early visual processing can be influenced by contextual and semantic effects in natural scenes, presumably via feedback mechanisms. Here, we investigate semantic influences on orientation sensitivity on the level of single trials using a dual-report paradigm. In a temporal 2AFC, observers identified the relative orientation of a peripherally-presented (7 degrees from the fovea) Gabor probe embedded in a natural scene, and identified the object (16 alternative discrimination) on which the probe was superimposed. We experimentally varied the amount of scene context by changing the area of the image presented around the probe, and disrupted semantic processing while preserving local image structure by presenting scenes both upright and inverted. Including more scene context improved object identification performance while inverting the scene impaired it. Orientation sensitivity was largely unaffected by scene manipulations, and there was weak evidence that

thresholds were invariant to whether the object identification was correct on a given trial. The results suggest that either scene context does not affect the precision of orientation coding, or that in our experimental paradigm observers were able to segregate the probe from the surrounding scene, thus mitigating any contextual influence. We plan further experiments to discriminate these possibilities.

Signals influencing indentation force in softness exploration

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An object's softness is stereotypically judged by pressure movements indenting the surface. In exploration without movement constraints, participants repeat such indentation movements. We investigated how people modulate executed peak forces for different indentations depending on stimulus softness. Participants performed a 2AFC discrimination task for stimulus pairs from one of 4 softness categories. We assumed that movement control is based on variations in the predictive and sensory signals available. We manipulated availability of predictive signals on softness category, by presenting either stimuli of the same category in a blocked fashion (high predictability) or by randomly mixing stimuli from different categories (low predictability). Effects of sensory signals were examined by contrasting first and last indentation, as sensory signals are hardly available when initiating exploration but gathered during exploration. The results show that participants systematically apply lower forces when sensory or predictive signals indicate softer objects as compared to harder objects. We conclude that softness exploration can be considered as a sensorimotor control loop, in which predictive and sensory signals determine movement control. Further, the results indicate a high importance of predictive processes throughout the entire exploration, as effects of predictive signals maintain in the last indentation.

Effects of social inclusion and exclusion on expectations of acceptance and on behaviour in Borderline Personality Disorder: A virtual reality approach

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Background: Only a small number of studies addressed the important issue of social interaction behaviour in Borderline Personality Disorder (BPD) by directly measuring behaviour and its modulating factors in experimental settings. Therefore, the aim of the present study is to extend our understanding of reactions to social inclusion and exclusion in BPD by using a virtual reality context. Methods: Under a cover story, BPD patients and healthy control participants (HCs) got acquainted to alleged other participants in virtual reality. Afterwards they rated their affiliation towards the interaction partners and were asked about their feedback expectations. In a

double-blind design, they actually received feedback, which was randomly assigned to being either positive (social inclusion) or negative (social exclusion). Subsequently, subjects played a trust game which assesses cooperative and aggressive behaviour. Rejection sensitivity was measured using the Rejection Sensitivity Questionnaire. Results: Affiliation ratings showed no difference between the two groups. However, BPD patients expected less positive social feedback from their interaction partners than HCs. They adjusted their expectations to negative, but not to positive feedback. Following social inclusion, but not after social exclusion, BPD patients were less cooperative. Alterations were particularly pronounced in patients high in rejection sensitivity. Conclusions: The unexpected situation of being socially included seems to be more challenging for BPD patients than social exclusion. Positive social experiences do not improve reduced expectations of being accepted by others and result in less trustful interaction behaviour towards unknown others.

How joint action changes valence-based action coding

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Recent studies suggest that co-acting with another person induces a problem to discriminate between one's own and the other's actions, which can be resolved by emphasizing action features that discriminate best between both persons' actions in a given task context. Mostly, overt action features like the spatial position of responses have been suggested as discriminating action features. In the present study, we tested whether non-externally perceivable, covert action features can be used for resolving the action discrimination problem during joint action. Therefore, we compared task performance between a joint and an individual version of the Go/Nogo Association Task, a task requiring the association of a valence to the response. We found a larger implicit attitude effect in the joint than in the individual setting for person-related (self and other, Experiment 1) as well as for non-person related attitude objects (fruit and insect, Experiment 2), suggesting that the weight of valence information is increased in the internal coding of responses when valence discriminates between both responses. In contrast, we found a smaller implicit attitude effect in a person present setting than an individual setting (Experiment 3) indicating that the enhanced implicit attitude effect observed in the joint settings of Experiments 1 and 2 is not merely due to social facilitation. Our results suggest that action discrimination during joint action can rely on covert action features. The results are in line with the referential coding account, and specify the kind of action features that are represented when sharing a task with another person.

‘Hurts like Heaven’ - An experimental investigation on the pain-reducing effect of listening to music

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Background: Music listening is associated with pain-reducing effects. It is unclear, however, whether music exerts either direct or indirect effects on pain; previous research has linked factors associated with the music (e.g., liking, familiarity, music-induced emotions) to this pain-reducing effect. It has been further discussed whether music listening might have an indirect effect on pain by activating strategies to better cope with pain. We therefore examined in an experimental study both direct and indirect effects of music listening on pain. Methods: In an ongoing study, n=48 (of a planned total of 62) healthy participants performed the ‘cold pressor test’ on three different days. During pain induction participants either listened to self-selected relaxing music, experimenter-selected relaxing music or to the sound of rippling water in randomized order. Afterwards, participants rated liking, familiarity, music-induced emotions, music-induced autobiographic memories, and pain coping strategies (e.g., relaxation, distraction, control over pain). Results: Preliminary analyses using hierarchical linear modeling revealed that pain tolerance was highest for self-selected relaxing music. However, this effect was mediated by the liking of the music, as a higher liking predicted higher pain tolerance – independent of experimental condition. Familiarity, music-induced emotions, and music-induced autobiographic memories had no direct effect on pain tolerance. However, they indirectly affected pain tolerance by activating coping strategies that increased relaxation, distraction and control over pain. Discussion: Our findings indicated that there was no direct effect of music listening on pain, but that music listening exerted indirect effects on pain by activating adaptive coping strategies. These coping strategies facilitated relaxation, distraction from and control over pain. Future experimental studies should shed further light on mechanisms underlying these effects.

Methods of boosting individual decision making: Judgment aggregation with subjective confidences

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The aim of the present research is to investigate within-subjects confidence judgment aggregation methods for binary decisions. Our research is inspired by the phenomenon of the wisdom of crowds, where major accuracy gains can be achieved through aggregating and combining multiple independent judgments. The idea is to apply judgment aggregation methods in the within-subjects context with the motivation to investigate whether individual decision making can profit from those methods. The question is how can we meaningfully process multiple confidence judgments from one person regarding one issue? Two possible algorithms analysed here are averaging — taking the mean of two confidence judgments — and maximum confidence slating (MCS) — picking the judgment with the highest confidence. Following

questions guide our analysis: How does averaging and MCS influence performance? Where do possible performance gains come from? Is there evidence for the use of different knowledge bases? Do the different aggregation methods perform differently in diverse environments? Is there an overall good-enough strategy? Based on the nature of the brier scoring function, which exponentially punishes deviations from the truth, we expect that MCS will improve diagnostic accuracy only for largely discriminable stimuli, but impair diagnostic accuracy in the case of indistinguishable stimuli, resulting in a poorer overall performance of MCS relative to averaging and relative to the first estimate.

Can walking forward and backward change the answer to ambiguous temporal and spatial questions?

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Embodied cognition posits that abstract conceptual knowledge such as mental representations of time and space are at least partially grounded in sensory-motor experiences. If true, then the execution of whole-body movements should result in modulations of temporal and spatial representations. To test this in two experiments participants either walked forward, backward or stood on a treadmill and responded either to an ambiguous temporal question (Experiment 1) or an ambiguous spatial question (Experiment 2) at the end of the walking manipulation. Results of Experiment 1 revealed that walking forward and backward systematically modulated responses to the temporal question. However, walking forward and backward resulted in answers pointing into the same temporal direction. In contrast to Experiment 1, Experiment 2 did not show any effects of movement on answering the ambiguous spatial question. Together, these findings seem to indicate a selective effect of whole-body movements on temporal but not spatial representations. We discuss these findings in the light of current theories of embodied cognition. We suggest that whole-body movements, independent of the movement direction, seem to activate a temporal ego-moving reference frame.

Embodied social spaces: Implicit racial bias modulates spatial perspective taking

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According to theories of embodied cognition, cognitive functions are rooted in the interactions between an agent and its environment. Besides the sensorimotor component, these interactions comprise social aspects. Hence, we hypothesized that interpersonal attitudes should affect cognitive processes to some degree, even if the task itself is not social. To investigate this hypothesis, we conducted a spatial perspective taking (SPT) experiment in an immersive virtual reality. Participants had to localize an object from the perspective of a light-, a dark-skinned, or an artificial avatar. In addition, we measured the racial bias of the participants

with a racial Implicit Association Test (IAT) before (pre-IAT) and after (post-IAT) the experiment. Higher pre-IAT scores yielded slower RTs for the dark-skinned avatar, compared to the light-skinned one. A subgroup analysis, based on a median-split between participants with high and low pre-IAT, showed that this effect was only present in the high pre-IAT group. Furthermore, the correlation between pre-IAT and the differences in RTs for the dark- and light-skinned avatars was significant. There was no correlation between post-IAT scores and RT differences. Apparently, the IAT scores changed over the course of the experiment, even if the mean of the IAT scores remained the same. Participants with high pre-IAT scores produced low post-IAT scores, for participants with low pre-IAT scores the opposite was true. This negative correlation between pre-IAT scores and changes in the IAT scores was significant. Further experiments are necessary to clarify if this reflects an overall regression towards the mean, or if the SPT task selectively changes the IAT scores. The results show that performance in a purely spatial task (SPT) is modulated by interpersonal attitudes and that performing the task affects these attitudes. Implications of the results for theories of embodied and social cognition are discussed.

Touching the embodied mind: Selective interference between mental rotation and tactile stimulation

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University of Tübingen

Theories of embodied cognition propose that cognitive skills are acquired from sensorimotor interactions with the environment. Even higher cognitive functions are often assumed to be grounded in these interactions. Mental rotation is one example of such a grounded, high-level process, as influences of the motor system have been shown. If mental rotation is indeed grounded, other, compatible modal codes should be able to affect mental rotation as well. We conducted two experiments to assess this hypothesis with a dual-task interference paradigm. In the primary task, participants had to perform a parity judgement, which required a mental rotation. We used letters in normal or mirror-reversed orientation as stimuli. Participants responded with the right arrow key to normal and with the left arrow key to mirror-inverted stimuli. In the secondary task, participants had to detect changes in the direction of a tactile rotation applied to their palm. The results confirmed the expected congruency effect between visual and tactile rotation, but only if the tactile rotation direction changed during the course of a trial. Further, the results indicated a compatibility effect between mental rotation and parity judgement: participants responded faster with the right key, if they had to mentally rotate clockwise, for counter-clockwise rotations the opposite was true. To replicate and extend these findings, we conducted a second experiment where we varied the response mapping for the parity judgement. The results yielded the same congruency effect between mental and tactile rotation and the response-respective compatibility effect changed its direction with the variation of the response mapping. Thus, our results show that tactile rotation can affect mental rotation selectively and that mental rotation activates compatible motor responses. This suggests a close coupling between amodal, mental rotation and sensory, as well as

motor-grounded forms of representations.

Eye-tracking's comparison research of planar and volumetric images perception among art orientations students

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Humans' adequate visual perception of environment is formed by cognitive and changing world activity. The purpose of this research is to compare the features of planar and volumetric images perception made by students from the Academy of architecture and arts. Photos of the architectural model and the drawing of halls space were used as stimuli. The assessment of visual perception of students was carried out by system of high-speed remote binocular tracking of eyes - eye-tracking - SMIRED 500 in the Laboratory of psychophysiology and psychophysics UrFU on the sample of 21 students-architects. The thermal cards of perception were composed taking into account the duration and frequency of fixations on the allocated details of images. Data of average fixations durations are presented in the general table. During the perception of both visual stimuli, tested-persons are focused on the same objects in spite of this the structure of perception is differed. During the perception of the photo of the architectural model, the attention is concentrated on holistic objects. During the perception of the photo of drawing of halls space, the attention is concentrated on lines and contours of objects the attention zones are going on lines of borders of space (joints of walls and a ceiling). The analysis of the obtained data of perception of planar and volumetric images allows assuming that students use two various strategy of perception of objects. In case of the volumetric image allocation of holistic objects with the attention which is evenly distributed on them assumes the involvement of the laws of a gestalt (law of closure and law of proximity) in perception. In case of the two-dimensional image, cognitive information processing for mental construction of object and integration of missing details is involved when the tested-person looking at the lines indicating contours seeks to define their meaning.

A new approach to investigate the development of intuitive rationality in pre-schoolers and adults

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Economic and intuitive decisions play a major role in our daily life. Both kinds of decisions can be considered as possible indicators for a person's rationality and transitivity in decision-making, referred to here as intuitive rationality. We investigated the development of intuitive rationality by presenting pairs of items on a computer screen to 5-to 6-year olds and adults. Participants' task was to choose their preferred item from each pair. There were six categories of objects with five items per category. Half of the participants received all item pairs

in a completely randomized order, for the other half they were sorted by category. For data analysis, we counted the number of intransitive decisions, that is violations of transitive relations. For example, an individual with a high level of intuitive rationality who preferred item A over item B and item B over item C should also prefer item A over item C. With respect to the condition, we expected more inconsistent decisions for the randomized compared to the categorical condition because of the possibility to compare current decisions with previous ones in the categorical condition. Results revealed that almost one third (31.1%) of the preschoolers and virtually all (91.2%) adults made transitive decisions. The age groups differed significantly in their sums of intransitive decisions, and for adults, age correlated negatively with the mean sum of intransitive decisions. There was a significant difference between conditions only for adults: they chose more transitively in the categorical than in the randomized condition. These findings suggest that already preschool children are rational decision makers when expressing their own preferences intuitively, and that intuitive rationality increases with age, even in adults. The possibility to compare current decisions to previous ones has a positive effect only for adults, possibly due to demands for working memory embedded in the task.

Towards an associative account of behavioral mimicry - The role of contingency and contiguity for social affiliation

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Human beings have the tendency to imitate other people in social interactions. This has been shown in reaction time tasks in which one's own movements and observed movement of somebody else match or mismatch. Recently, it has been proposed that performance difference in imitation behavior can be traced back to principles of associative learning. Interestingly, imitation has also social consequences and is known to affect social affiliation towards others. For instance, people report more social affiliation when being imitated and also when imitating another person. The present research aimed to find out whether social affiliation is also ruled by associative learning principles. Therefore, two experiments manipulated the contingency and contiguity between one's own movements and the movements of a co-actor while assessing social affiliation with liking ratings of the co-actor. In Experiment 1, movements of a co-actor matched the participant's movements in 100%, 75% or 50% of the cases. In Experiment 2, movements of a co-actor matched the participant's movements in 84% of the cases and we manipulated the delay between the participant's response and the movement of the co-actor (0ms; 800ms; 3000ms). Results revealed that ratings of social affiliation increased linearly with higher contingency (Experiment 1) and with higher contiguity (Experiment 2). Together, these results suggest that the social consequences of imitation behavior are based on principles of associative learning.

Wer hat Furcht vor Misserfolg? - Einfluss eines impliziten Motivs auf die Informationsverarbeitung

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Unsere Studie untersucht die Auswirkung von intraindividuellem Leistungsfeedback und der impliziten Furcht vor Misserfolg auf die Informationsverarbeitung. Im Rahmen einer dichotomen Entscheidungsaufgabe erhielten 148 studentische Versuchspersonen nach jedem von 5 Aufgabenblöcken ein manipuliertes Leistungsfeedback. Dieses wies entweder einen positiven oder einen negativen Trend auf. Als abhängige Variablen wurden zusätzlich zu den klassischen Reaktionszeitmaßen (Reaktionszeitmittelwert und Fehlerrate) Parameter des Diffusionsmodells betrachtet (Schwellenabstand und Driftrate). Die von uns erwartete Zweifachinteraktion aus Furcht vor Misserfolg und Leistungstrend (positiv/negativ) zeigte sich nur bei den Frauen. So waren Frauen mit hoher impliziter Furcht vor Misserfolg bei negativem Leistungstrend vorsichtiger als bei positivem Trend (höherer Schwellenabstand), bei Männern hingegen war es umgekehrt (signifikante Dreifachinteraktion).

Comparison of neural correlates after positive, negative and neutral feedback during speech – non-speech discrimination

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The adaptation of behavior as a consequence of feedback processing is a key requirement for learning. Previous research has shown that positive compared to negative feedback is processed differently in the brain. In particular, the feedback related negativity (FRN) occurs about 270 ms after negative feedback. So far, this ERP component was investigated mostly in gambling experiments or trial-and-error learning tasks. These tasks are considerably complex and may employ a multitude of cognitive processes. Therefore, we used a simple discrimination task (speech vs. non-speech) to examine the neural correlates of positive, negative and neutral feedback. The German vowels /a/ and /a:/ were used as speech sounds and their spectrally rotated versions were used as non-speech sounds. Each vowel and their spectrally rotated counterpart were morphed into each other in 10% steps. Participants were asked to indicate via button presses, whether the stimulus contained more speech or more non-speech sound. Afterwards, participants received feedback: a green smiley for correct answers and a red smiley for incorrect answers. In 20% of the trials, an uninformative neutral, yellow smiley was presented, which was not informative with respect to correctness. We compared ERP averages after positive, negative and neutral feedback. In accordance with the existing literature, we found an FRN with larger negativity for negative compared to positive feedback. Nevertheless, the FRN was observed after positive as well as after negative feedback and thus, may reflect surprise rather than negative feedback. The neutral feedback resulted in a larger negativity compared to the positive feedback, but did not differ significantly from the negative feedback.

However, we found a difference between negative and neutral feedback 400 ms after feedback onset. These results suggest that in addition to positive and negative feedback, neutral feedback can also elicit a distinct neural signature.

Influence of different emotion inductions on mathematical performance in school children

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In the current research of emotions and cognitions, there is no doubt that the two concepts are entangled and influence each other in many aspects. Thus, emotions have become an important part in the research of school performance. In general, two main results have been consistently shown: Positive mood enhances creativity, affects people's judgments in the way that they think more superficially, and reduces perseveration errors. In contrast, negative mood leads to focussing on more detailed information, enforces more analytic processing and less distractibility. In the current study, we aimed to investigate further details of how emotions can influence school performance, especially mathematical performance. To this end, we influenced the mood of school children with two approaches: In the first experiment, the children heard either a sad or a nice story and were subsequently asked to perform tasks of the DEMAT 4. In the second study, the math problems were directly manipulated: Children had to solve three different math story problems. The math story was either positive, or sad, or neutral. The read story did not have any effect on math performance. However, performance of the emotional story problems differed from that of the neutral story problems. Implications and further research are discussed.

Replication Bayes factors: Bayes factors to assess whether a study replicates

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The Reproducibility Project: Psychology of the Open Science Framework aims to assess the replicability of research findings in psychology. This large-scale project involves over 150 scientists from around the world who attempted to reproduce the findings from approximately one hundred and fifty studies published in JEP:LMC, JPSP, and Psychological Science. Comparing results from the Reproducibility Project with those from the original studies is a complex undertaking and requires an analysis that connects the original findings to the data observed from the replication attempt. By framing the problem in a Bayesian context, one naturally ends up with replication Bayes factors. Replication Bayes factors are constructed from priors that summarise the original research findings. These prior not only incorporate the effect found in the original study, but also take into account the precision with which the effects were measured. By taking the uncertainties of the original study and the replication attempt into

account, replication Bayes factors lead to a fair comparison between the two studies. We extend the work of Verhagen and Wagenmakers (2014) to other common designs and give a re-interpretation of replication Bayes factors. Moreover, the analyses are incorporated in the free and open-source statistical software package JASP, and allows readers to reproduce the analyses and results that are discussed.

Two equal halves are less than a whole: Evidence from pointing to the position of repeated or different operand additions

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Performance with nonsymbolic numerosities showed that sums of addition problems tend to be overestimated while sums of subtraction problems tend to be underestimated (reviewed by Fischer & Shaki, 2014). However, results of addition problems with repeated symbolic operands (e.g. “24+24”) are underestimated when compared to a standard (Charras et al., 2012, 2014). In the current study, we generalized underestimation of sums from repeated symbolic operands to spatial behavior by letting healthy adults point to the internally computed answer of addition problems on a horizontal number line. Repeated operand results were located to the left of different operand results, indicating an underestimation bias even without a comparative task component.

Reading dirty words impedes picture processing - Taboo interference effects with verbal and manual responses

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Picture naming latencies are longer when socially inappropriate distractor words (taboo words, e.g., swearwords) compared to neutral distractor words are presented together with the pictures. This taboo interference effect has been attributed to verbal self-monitoring in the language production system, i.e., control processes scrutinizing well-formed verbal responses before articulation (Dhooge & Hartsuiker, 2011). In the present study, we investigated whether taboo interference is also observed in tasks requiring no verbal response. We contrasted three tasks, picture naming, phoneme decision, and size decision. In phoneme decision, participants decided via button press whether a picture name starts with “B” or ”K”, i.e., lexical processing of the picture name but no verbal response was required. In size decision, participants decided via button press whether a pictured object would fit into a shoebox, i.e., semantic but not lexical processing of the picture was required. We replicated the taboo interference effect in the picture naming task. Most importantly, taboo interference was also observed, albeit reduced in size, in phoneme decision and, further reduced, in size decision. These results suggest that the taboo interference effect cannot solely be attributed to verbal self-monitoring. Instead the

effect seems to reflect, at least in part, interference at earlier processing levels caused by general conflict-monitoring processes or increased attentional capture by taboo words.

Replicability of Maier et al.'s 2014 "Feeling the future" article Exp. 4

Markus Maier

LMU Munich

In this poster, data of a pre- registered replication attempt of Maier et al.'s (2014) study 4 will be presented. In this study 4, a small anticipatory effect of random future affective events has been reported (see also Bem, 2011). The analysis of the actual data are performed by using Bayesian statistics which work with a stopping rule and allow for adding new subjects data after an hypothesis test. In this way, evidence for H0 and H1 can be accumulated over time. At the moment of the poster presentation we expect to be able to present data from more than 1000 participants.

Is error monitoring automatic? - Working memory load impairs the evaluation of error significance

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The ability to detect and evaluate one's own errors is crucial for the optimization of performance. Automatic error monitoring would be beneficial because non-automatic processes can interfere with task-related processing. To test this hypothesis, we investigated whether early error monitoring is affected by working memory load. In previous studies, we have shown that the error-related negativity, an electrophysiological marker of early error monitoring, is increased for more significant errors and hence represents a mechanism that evaluates error significance. In the present study, we combined a flanker task with a Sternberg working memory paradigm to investigate whether this evaluation process deteriorates under high working memory load. On each trial of the experiment, participants received a small or a large memory set, followed by a flanker task. After providing the flanker task response, participants had to indicate whether a memory probe was part of the memory set. Because it required holding the memory set in working memory during the flanker task, this design allowed investigating effects of working memory load on error monitoring in the flanker task. The results showed that the error-related negativity differentiated between error types of different significance only with low, but not with high working memory load. This shows that working memory load impairs the evaluation of error significance, and thus that early error monitoring is not truly automatic.

A serious caveat on using implied base rates to manipulate response bias in recognition

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The experimental manipulation of response biases in recognition-memory tests is an important tool for comparing rival measurement models and estimating their associated parameters. A widely accepted procedure to prompt response shifts is varying the base rate of old items at test, as large (small) proportions of old items evoke liberal (conservative) old-response biases. However, extreme base rates always imply extreme ratios of old and new items, such that even small changes in the response behavior can heavily affect the estimated model parameters. To prevent extreme ratios, Dube and Rotello (2012) proposed an implied base-rate procedure, in which participants always judge 50% old items, but are asked to respond "old" in a specified percentage of cases (e.g., 15%). We argue that this procedure leads to an inner conflict: Participants who recognize a moderate number of old items are forced to respond "new" to items recognized as old. To gain insights in such unwanted response behaviors, we replicated Dube and Rotello's (2012) procedure and expanded it by a post-experimental interview. The interview data clearly show that the majority of participants solve the conflict by ignoring their memory. This has severe implications for estimating memory performance. We therefore strictly advice researchers against using implied base rates. In particular, empirical ROCs may become more curved, thus producing artifactual support for the signal-detection model of recognition memory.

Stress effects on the temporal dynamics of cognitive control

Thomas Maran, Pierre Sachse, Nicola Hutzenthaler, Nora Peglow, Christoph Herz & Marco Furtner

University of Innsbruck

The dual-mechanisms framework proposed by Braver (2012) postulates two modes of cognitive control: a proactive mode which maintains goal-relevant information actively in a sustained manner to bias cognitive processes in anticipation of a conflicting situation and a reactive mode as a 'late correction' mechanism where task sets are activated by detection of a cognitive conflict. Although evidence exists for cognitive control impairments in various stress-related disorders, no study to date explores the influence of exposure to highly stressful events on the temporal dynamics of cognitive control. A sample of 89 healthy young adults was randomly assigned to three affect groups and performed a modified AX-continuous performance task (AX-CPT). To effectively manipulate stress-levels, participants were exposed to either a violent film clip, an explicitly erotic clip or a neutral control clip. Errors and reaction time data were analyzed to calculate indices for proactive and reactive control performance. Results showed increased proactive control in both stressful conditions as compared to the control condition, without any change of reactive control performance. Our findings provide evidence for a shift toward proactive control in highly aroused states, regardless of valence. We conclude that exposure to stressful events enhances proactive control and thereby strengthens maintenance

of goal-related information to reduce distractibility in biological relevant situations (e.g. threat, reproduction).

Storage and retrieval processes in item-method directed forgetting: A model-based approach

Ivan Marevic & Jan Rummel

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Intentionally attempting to forget information that has been rendered as irrelevant (e.g. information from an unreliable source) reduces recall of that information compared to relevant information. Intentional forgetting can be studied using the item-method directed forgetting (DF) paradigm, in which items are presented for study, with some items being post-cued as to-be-forgotten (TBF) and others as to-be-remembered (TBR). The typical finding of reduced recall of TBF-items compared to TBR-items is thought of to arise from selective rehearsal (Basden, Basden, & Gargano, 1993) of TBR-items and the withdrawal of attention from TBF-items (Taylor, 2005). These current theories of DF stress the point that DF in the item-method is caused by storage processes only. The current investigation applied the storage-retrieval model (Riefer & Rouder, 1992) to data from a standard DF paradigm to investigate this claim. The results show that not only storage, but also retrieval processes are underlying the DF effect and that the reinstatement of context for some TBF-items reduces the DF effect significantly. Importantly, the model-based results show that such a reduction, due to context reinstatement, is limited to retrieval processes in the model. Implications for theories of item-method DF are discussed in the light of related accounts of forgetting that emphasize the importance of semantic and episodic context.

Serotonin and the brain's rich club: Association between molecular genetic variation on the TPH2 gene and the structural connectome

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The brain's rich club is a bilateral set of brain regions that are heavily connected and serve as processing hubs in the connectome - the brain's intricate wiring diagram. We assessed the impact of normal variation of the tryptophane hydroxylase 2 gene's promotor region (TPH2 rs4570625) on structural connectivity of the rich club by means of a candidate gene association design. Carriers of the rare TPH2 T-variant showed increased mean connectivity in the rich club independent of mean overall network connectivity and participants' age. Based on previous findings we speculate that the observed association is the result of an effect of serotonin levels on brain development. TPH2 is the rate limiting enzyme in the biosynthesis of serotonin and the T-variant leads to a decrease in TPH2 mRNA expression, thereby reducing serotonin levels. Serotonin inhibits axonal and dendritic growth, which might explain the increased structural

connectivity in TPH2 T-allele carriers. By the investigation of edge-removal metrics, we were able to show that the association between TPH2 and the rich club is of importance for the functioning of the entire structural network. Our findings may account for the wide range of TPH2 associations with behavioral phenotypes reported in the literature and may contribute to the assessment of psychiatric disorders such as major depression and schizophrenia.

From conscious thought to automatic action: Action planning binds motor components to anticipated cues

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The causal role of conscious thought on actions is highly debated and frequently questioned as explanations of this causal role tend to rely on a scientifically questionable mind-body dualism. Based on modern simulation theories of cognition and language comprehension, we will present a theory and provide initial evidence on how conscious thought (in the form of verbal if-then action plans) unobtrusively binds motor components of an intended action to an anticipated cue. More specifically, we expect that planning to "grab" versus "point at" something to eat involves the simulation of salient motor components. On the one hand, "grabbing" something to eat involves an elbow flexion (pull) movement as the intended action refers to an action that usually entails an arm movement towards the body (e.g., one's mouth). On the other hand, "pointing at" something to eat involves an elbow extension (push) movement as the intended action refers to an action that usually entails an arm movement away from the body. In three experiments, we show that having planned to "grab" versus "point at" a fruit systematically facilitated elbow flexion versus elbow extension movements, respectively, when encountering the fruit in a subsequent, unrelated categorization task. Thus, systematic differences (i.e., exchanging the word "grab" with "point at") in otherwise equal, verbally formulated action plans (i.e., conscious thought) have systematic consequences on subsequent actions. We discuss this evidence with regard to how conscious thought can produce "automatic" actions and how action planning in an if-then format constitutes a fundamental form of action control.

Multi-feature attentional control sets

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Top-down control over stimulus-driven attentional capture, as postulated by the contingent capture hypothesis, has been a topic of lively scientific debate for a number of years now. According to the contingent capture hypothesis, a stimulus has to match the feature of a top-down established control set in order to be selected automatically. Today, research on the

topic of contingent capture has focused almost exclusively on the manipulation of only a single feature separating the target from the distractors (the selection feature). The present study aims to examine the compilation of top-down attentional control sets having multiple selection features. Therefore, the feature overlap between the distractor and the top-down sets was manipulated on different perceptual features (e.g., color, orientation, and location). Distractors could match three, two, or one of the features of the top-down sets. In line with our hypotheses, the strength of the distractor interference effects decreased linearly as the feature overlap between the distractor and the participants' top-down sets decreased. These results therefore suggest a decline in the efficiency with which distractors involuntarily capture attention as the target-similarity decreases. The data support the idea of multi-feature attentional control sets.

Grasp selection for two-step object manipulation: When does the second step really matter?

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In everyday life, we frequently interact with objects. Thereby, objects are already grasped in a way that facilitates the intended interaction with the object. Anticipatory grasping has been extensively studied for one-step object manipulations whereas grasp-selection for multi-step object manipulations has received comparatively little attention. One challenge when planning grasp selection for a multi-step object manipulation is that the competing requirements of individual object manipulation steps need to be integrated. For example, individual steps might be best performed using different grasps. Interestingly, it is often observed that the first step predominantly determines the grasp. Later steps play at best a minor role. We address whether the initial object manipulation step necessarily determines grasp selection. To this end, we asked participants to rotate a dial by a small extent (e.g. from a 0° position to 30° position) and then immediately afterwards in the opposite direction either to the -30°, -90° or -150° position. When the requirements of both object manipulation steps were comparable (e.g. 30° to -30°), the object is grasped almost as if there was no second object manipulation step. If the second target was at the -90° position, participants adopted an initial grasp considering both movement targets equally. If the second movement target was at the 150° position, the initial grasp selection was primarily aligned to the second movement target, even though it deviated considerably from the grasp that would have been used for a direct rotation to the 150° position. In sum, the higher the demands of later object manipulation steps, the more they are reflected in initial grasp choices. Nevertheless, the demands of later steps have to outweigh the demands of earlier steps considerably to affect initial grasp substantively. Thus, our results are in line with previous findings indicating a steep planning gradient.

Impaired working memory encoding and false memory errors in schizophrenia: Behavioral evidence and electrophysiological correlates

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Working memory (WM) impairment is a core cognitive feature of schizophrenia. Despite the well-replicated findings of impaired WM maintenance in schizophrenic patients, the impact of impaired WM encoding and its neurophysiological basis are poorly understood. In the first part of my talk, I will present a behavioral approach that allows one to dissociate encoding and maintenance processes in the spatial delayed response task by analyzing response accuracy in combination with confidence ratings (i.e., correct/confident, correct/not-confident, incorrect/confident, and incorrect/not-confident responses). I will demonstrate that incorrect/confident errors (="false memories") are increased in schizophrenic patients and reflect a failure of WM encoding rather than maintenance. In the second part, I will discuss the electrophysiological correlates of false memories. Electroencephalography was recorded in healthy participants while performing a delayed response task for spatial orientations. Neural activity at posterior electrodes was investigated during the encoding and maintenance phases in relation to correct/confident (i.e., false memory) and incorrect/confident responses. During the encoding phase, the amplitude of the N2pc component (pc = posterior contralateral), which is considered as an index of attentional processing of the stimuli, was reduced for false memories vs. correct/confident responses. In contrast, the contralateral delay activity (a sustained negativity that indexes WM maintenance) did not differ between these response types. These findings suggest that false memory responses in the delayed response task reflect reduced attentional processing of the stimuli during WM encoding rather than a failure of WM maintenance. Together, the behavioral and electrophysiological findings help to better understand the cognitive and neurophysiological processes that lead to inefficient WM encoding and may explain the severe WM impairment of schizophrenic patients.

Empathic competencies and prosocial behavior in healthy individuals compared with antisocial violent offenders

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Empathy as key factor for successful social interactions has also been shown to be predictive of prosocial gambling behavior in the Dictator Game (DG). In order to gain a deeper understanding of the relationship between empathic competencies and selfish versus prosocial behavior, we compared social decision-making between healthy controls (CTLs) and individuals with a profound lack of empathy (antisocial violent offenders; AVOs). Recent research indicates that antisocial individuals offer less money in the DG than CTLs and exhibit more rational, selfish behaviors regardless of emotional motives. To investigate the influence of empathic feelings on decision-making, we extended the classical DG by employing a task including video sequences with varying degree of emotional content that have been shown to evoke empathic feelings in

healthy individuals and compared subsequent DG shares. We found that both groups shared more money following high emotion videos. Overall, however, despite comparable self-report empathy ratings, AVOs exhibited lower shares than CTLs, irrespective of emotional video content. These results indicate that increased empathic feelings may lead to more prosocial behavior even in AVOs, however, the relationship seems to be weaker in these individuals.

Reading from computer screen or reading from paper? - A re-assessment of the differences in proofreading performance and subjective well-being

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Based on research from the 1980s and 1990s, reading from screen is supposed to be slower and more error-prone than reading from paper. However, display technology has tremendously changed in recent years, and humans have become accustomed to work with electronic devices. The present series of experiments was intended to test whether these recent developments have helped to close the gap between reading from screen and paper. In four experiments, participants proofread texts that were either presented on a state-of-the-art TFT-LCD or printed on paper. Regardless of reading duration, proofreading performance and speed were comparable in both conditions, but participants reported more eyestrain symptoms in the screen condition and preferred reading from paper (Experiment 1 and 2). Possible reasons for the stronger eyestrain symptoms reported in the screen condition were tested in two further experiments. In Experiment 3, the luminance of the emissive screen was reduced to match the luminance of the reflective paper. The match in luminance had no effect on the pattern of results. In Experiment 4, a paper-like positioning of the screen in a 15° inclination angle resulted in a comparable level of reported eyestrain symptoms as well as a proofreading speed advantage in the screen condition. Modern TFT-LCDs that are positioned in a paper-like manner seem to enable reading that is – qualitatively and quantitatively – comparable to reading from paper.

And the two will become one: Ability to emotionally discriminate is reduced in romantic relationships

Friedrich Meixner & Cornelia Herbert

Ulm University

Research Background: Commonly known as „rose-tinted glasses“, there is evidence for substantial shifts in emotional and attentional processing when a person is in love and/or entering a romantic relationship (Fisher, 2004). Nevertheless, the precise influence love has on our personality, emotional experience and behavior remains uncovered. In the present study, we compared people living in a relationship and singles in their judgment of emotional words concerning the self or another person. Method: Word phrases consisting of possessive

pronouns and nouns were presented on a computer screen. Nouns varied in valence (positive/neutral/negative), pronouns in self-reference (self/other), article-noun phrases served as controls, resulting in a 3*3 design. The subject's task was to judge the emotional valence of the words. Subject's relationship status and the intensity of love were assessed via questionnaire in combination with additional measures of empathy, depression, anxiety and facets of the self-concept. Results: In line with previous research, we discovered an overall self-positivity bias. Self-related pronoun-noun phrases with positive valence (e.g. my happiness) were judged and responded to the quickest and the most accurate (Herbert et al., 2011). Moreover, subjects in a relationship displayed the same enhanced reaction to other-related pronoun-noun phrases with positive valence. Conclusion: Being in a relationship and/or being in love extends the usually found self-positivity bias to positive other-related stimuli. The observed behavioral differences cannot be alternatively explained by other control variables. Our results show how positive emotions regarding another person gain in relevance (and are therefore judged faster and more precisely) if a person falls in love with another and enters a relationship.

Conducting smart experiments using Adaptive Design Optimization

Ulf Mertens & Andreas Voss

Heidelberg University

Adaptive Design Optimization (ADO) describes an algorithm that allows choosing for each trial of an experiment the stimulus or condition that is most informative in terms of model comparison. After each gathered datum, the ADO algorithm searches for the stimulus that results in the most pronounced differences among the different model's predictions. Due to this optimization procedure, the number of trials needed to choose the true model can be reduced significantly. Furthermore, model comparison becomes feasible on an individual level. We will introduce the algorithm and apply it to an experiment by Pratto and John (1991): They applied a variant of the Stroop task to adjectives, differing in their level of valence. Three different models describing response time as a function of valence were examined. In implementing ADO, simulation results indicate that the number of trials needed to distinguish among the models is reduced. A GPU computing approach to enable usage of the algorithm in empirical research is discussed.

A lack of re-orienting? How do elderly people deal with irrelevant information in visual search?

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During visual search different attentional processes are at work to guarantee a flexible adaptation of our behavior: Some that select potentially relevant information and others that enable a rapid recovery from attentional capture by irrelevant information. The present study

used a spatial cueing paradigm to investigate the effect of healthy aging on the attentional control of irrelevant visual information by means of event-related potentials (ERPs) of the EEG. An irrelevant color cue that was either contingent (color search) or non-contingent (shape search) on attentional sets was presented prior to a target with different stimulus-onset asynchronies (SOA; 200, 400, 800 ms). When the color cue was contingent on attentional sets, capture appeared independent from age and persisted over the different SOAs. However, spatial cueing effects were pronounced in elderly people. ERP analyses revealed that after the initial selection of the color cue (indexed by N2pc), only younger adults re-oriented their attentional focus, mirrored by a subsequently contralateral positivity referred to the irrelevant color cue (i.e. distractor positivity; Pd). A sustained contralateral negativity was observable for younger and older adults only in the contingent condition, indicating the transfer of spatial information into working memory. Inhibition of the irrelevant information was reflected by a second contralateral positivity after target presentation. Older adults revealed no cue-related attentional orienting in the non-contingent task. However, younger adults seemed to maintain a certain flexibility in the handling of distracting information, as they showed some attentional orienting towards the irrelevant cue in the shape task. These findings suggest that elderly people strictly adhere to the current attentional set and show a kind of stickiness of visual processing that has an impact on the cascade of cognitive control mechanism that are engaged during attentional capture.

Acute effects of training on a NeuroBike on EEG brain activity and attentional performance

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NeuroBikes are instable systems applied in sports therapy and sports training as well. The balance movement is similar to the cross-coat of the human due to the joint in the center of the bicycle frame. In the present study, we investigated acute effects of training on the SNAIX NeuroBike on spontaneous EEG activity, and on short-term attentional performance. Subjects performed two trainings (NeuroBike, common bicycle) at two training durations (10 and 20 minutes) followed by a short-term attention test (d2-test) in a within-subjects design. Spontaneous resting EEG was recorded before, and after each training session. Behavioral data show decreases in attentional performance with longer training durations on a common bicycle. EEG data reveal increased gamma power in parieto-occipital regions during the attention test after NeuroBike training. Increases in posterior theta activity were observed with longer training durations on a common bicycle. Our results demonstrate beneficial effects of training on a NeuroBike on short-term attentional performance. We hypothesize that training on a NeuroBike activates the brain towards an optimal state for short-term attentional performance.

Spatiotemporal predictability alters perceived duration of visual events: Memento effect revisited

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Does event perception alter perceived duration? Previous research has shown that the perceived duration of a short scene depicting a disc moving along a segmented path is reduced when the temporal order of the motion segments is reversed (Memento effect). This effect has been attributed to the idea that reversed segments give rise to the perception of distinct visual events, whereas continuous segments are perceived as a single event. It has been suggested that the reduction in perceived duration is a result of perceiving multiple distinct events rather than one. Here, we replicate and investigate the origin of the Memento effect. In four experiments, we explore the role of the spatiotemporal predictability of the disc's movement as well as the influence of the number of discrete events on perceived duration. Controlling for spatiotemporal predictability eliminates the Memento effect; however, controlling for the number of distinct events does not. Thus, our results suggest that violations in spatiotemporal predictability rather than a varying number of discrete events induce the Memento effect. We discuss the impact of these findings for the perception of more naturalistic events.

Assessing and explaining individual differences in use of the recognition heuristic

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University of Mannheim

When deciding between recognized and unrecognized choice objects, decision makers can follow the recognition heuristic (RH) and base their decision solely on recognition, or alternatively, integrate further knowledge retrieved from memory. Prior research has repeatedly shown substantial individual differences in RH-use, suggesting that individuals might have intra-individually stable strategy preferences that could be determined by cognitive abilities or personality traits. Prior to investigating possible personality determinants, we first assessed stability in individuals' RH-use across time, choice objects, decision domains, and presentation formats. Our positive findings ensured that it might be possible to find stable relations between strategy preferences and individual traits. Next, we investigated fluid and crystallized intelligence as potential determinants of individual differences in adaptive RH-use. As expected, RH-use increased with fluid intelligence when the RH outperformed knowledge-use in terms of validity, and decreased when the latter strategy outperformed the former. In contrast, we found no reliable effect of crystallized intelligence on RH-use. Thus, fluid (but not crystallized) intelligence was associated with better adaptation to the decision context. Finally, we assessed two personality traits as potential determinants of individual differences in RH-use: Need for cognition (i.e., enjoyment of cognitively demanding activities) and faith in intuition (i.e., trust in feelings and impressions). As expected, need for cognition reduced RH-use. However, faith in intuition did not substantially foster RH-use. In sum, we demonstrated that RH-use is determined jointly by contextual influences and stable individual differences that

are associated with fluid intelligence and need for cognition.

Altering infants' looking behavior by a gaze contingent reward

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Heidelberg University

The ability to follow another person's eye gaze is a crucial prerequisite of joint attention and language (Brooks & Meltzoff, 2005). Corkum and Moore (1998) hypothesized that infants learn to follow gazes through reward. Based on this idea, we test if looking behavior of 4-month-olds can be altered in a gaze-contingent eye tracking paradigm. Study 1 consisted of three phases (baseline, training, test). During baseline, infants saw the face of a person turning to one object and looking away from another one. If infants at 4 months of age are already sensitive to gaze cues, they should look longer to the cued than to the not cued object. In the subsequent training, infants were rewarded for gaze following behavior: whenever the infant looked at the cued object, the object started to move in an interesting way. The final test phase was identical to baseline. We compared infants' looking times and their preference to look at the cued compared to the not cued object in baseline and test to investigate the influence of reward on infants' behavior. 21 infants took part in Study 1 (mean age: 4 months 14 days, age range: 4 months 0 days–4 months 29 days). A repeated measures ANOVA with within-subject factors phase (baseline vs. test) and cue (cued vs. not cued object) revealed only a significant main effect of cue $F(1,20) = 18.52$, $p < 0.001$, $\eta_p^2 = 0.49$ with longer looking times to the cued than to the not cued object. Furthermore, the more infants were rewarded for their gaze following behavior, the more they preferred the cued object in test compared to baseline, $r=0.54$, $p=0.011$. Thus, already 4-month-olds show gaze following behavior. They also enhance this behavior dependent on the amount of reward they experienced. To test if the influence of reinforcement is strong enough to not only enhance but change the existing tendency to follow gazes, infants in Study 2 were rewarded if they looked at the object opposite of the eye gaze direction. Data acquisition is under way.

The nucleus accumbens and emotion recognition

Daniela Mier, Stephanie Schmidt & Peter Kirsch

Central Insitute of Mental Health in Mannheim

Dopamine is integral not only for motivation and reward, but also for motivational salience, with the nucleus accumbens being the core structure. Aberrations in the dopaminergic system are closely linked to psychiatric disorders, such as schizophrenia which is associated with impairments in social interaction, cognition and emotion recognition. Our fMRI study investigates the role of the nucleus accumbens for emotion recognition in a novel social jumping-to-conclusion paradigm, which combines emotion recognition and decision making. 47 Subjects looked at pictures of faces expressing two emotions with one of the emotions

increasing in intensity over trials. Subjects had to indicate in each trial whether they were certain about the dominant emotion. During the last face with a decision in comparison to the previous faces without a decision, activity in nucleus accumbens was increased bilaterally. Our data suggests an important role of the nucleus accumbens as part of the dopaminergic system in emotion recognition, which is relevant for the understanding and treatment of social cognitive deficits in schizophrenia.

Differential role of awareness in evaluative conditioning depending on the conditioned stimuli

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Published studies supporting unaware EC tended to use human-like CSs (e.g., faces, cartoon characters) whereas aware EC has been typically observed on non-human-like CSs (e.g., consumption products, geometric shapes). Based on this observation, we conducted three studies that compared the role of awareness in EC for faces versus objects. Over three studies, we meta-analytically found a triple interaction between US valence, awareness and CS type. The latter interaction suggested a stronger role of awareness for objects than for faces conditioning. However, no evidence was obtained for unaware faces EC. We conducted a fourth study to examine the possibility that a special holistic processing of faces accounts for the apparently lower impact of awareness in faces EC. We did so by examining EC for upright versus reversed faces. EC was observed only for aware pairings, independently of the presentation of the faces. We cannot reasonably conclude at this stage that unaware EC occurs for faces. Of note, however, we observed that EC was systematically stronger for objects than for faces. Based on these findings, we discuss whether faces EC may be distinct from objects EC.

Influence of cognitive load on memory in social interaction

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Heinrich-Heine-University Düsseldorf

Here, we examine the behavioral and cognitive mechanisms of social cooperation under cognitive load. Some researchers have suggested that people should be more egoistic under cognitive load, while others have suggested that people should be more altruistic. Furthermore, it has been proposed that cognitive load interferes with memory, which is essential for direct reciprocity. In the present study, participants were required to play a sequential prisoner's dilemma game. In a surprise memory test, participants were required to recognize their interactants, and to classify them as cheaters and cooperators. Cognitive load was induced by a continuous reaction time task which was shown to interfere with general working memory resources in a validation study. Old-new face recognition was decreased under cognitive load. In contrast, cognitive load had no detectable influence on game investments, likability judgments, source memory, and source guessing. We conclude that most behavioral and cognitive

mechanisms of social cooperation are not affected by cognitive load.

The censored shifted Wald distribution represents a Wiener diffusion model of choice response times: Evidence from simulations and a Go/No-go task

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Inferring processes or constructs from performance data is a major hallmark of cognitive psychometrics. Particularly diffusion modeling of response times (RTs) from correct and erroneous responses using the Wiener distribution has become popular because it provides a set of psychologically interpretable parameters. An important precondition to estimate these parameters, however, is a sufficient number of RTs from erroneous responses. To bypass this potential issue, we show by simulation that the parameters of the Wiener diffusion model can be recovered even from tasks yielding very high or even perfect response accuracies using the shifted Wald distribution. Specifically, we argue that error RTs can be considered as correct RTs that have undergone censoring. Such censoring can be accounted for by techniques of survival analyses that should also be applied whenever task trials are experimentally terminated prior to response execution. We illustrate our reasoning by fitting the Wiener and censored shifted Wald distribution to RTs from 6 participants who completed a Go/No-go task. In accordance with our simulations, Wiener diffusion and shifted Wald modeling yielded the same parameter estimates when the number of erroneous responses was predicted to be low. Moreover, the modeling of error RTs as censored correct RTs substantially improved the recovery of these diffusion parameters when premature trial timeout was introduced to increase the number of omission errors. Thus, censored shifted Wald distribution provides a suitable means for diffusion modeling in situations where the Wiener model is not applicable without parametric constraints.

Neural correlates of attention allocation during episodic long-term memory encoding and retrieval

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Directing mental resources, i.e. attention, to a relevant stimulus forms a critical part in the formation and retrieval of memory traces – be it in working memory (WM) or long-term memory (LTM). For the formation of episodic memories, the relevant stimuli furthermore need to be processed in relation to each other and/or to their context. Research into the neural correlates of the allocation of attention in mnemonic processing has received increasing interest in the last few years. The EEG correlates of attention allocation to item and context information during episodic encoding, on the other hand, are not yet fully understood. We designed an episodic LTM EEG experiment where we examined the activity in and interactions of prefrontal

and posterior cortical areas associated with WM and attention allocation as well as the binding of items and their context in episodic LTM encoding and retrieval. Participants saw a background picture of mountain scenes and a word in a central position on a computer screen and were instructed to memorise either the picture, the word, both individually or both and that they were presented together. Here, we will present evidence indicating that the manipulation of the distribution of attentional resources to the different stimuli and their relation led to differences in the performance on a later LTM recognition test. Furthermore, we will present EEG oscillatory correlates – on scalp as well as source level - for the different encoding strategies highlighting activity representing the binding of an item and its context in episodic memory encoding as well as retrieval. Interactions between various cortical areas will be discussed in terms of phase coupling within circumscribed frequency bands.

Zum Einfluss irrelevanter Schallquellen auf verdeckte Aufmerksamkeitsprozesse

Svea Missfeldt & Rainer Höger

Leuphana Universität Lüneburg

Mit einem einfachen Experiment konnten Posner, Nissen & Ogden (1978) zeigen, dass ein interner verdeckter Aufmerksamkeitsmechanismus existiert, der unabhängig von einer direkten visuellen Aufmerksamkeitszuwendung arbeitet. Für dieses Phänomen etablierte sich die 'Scheinwerfermetapher' in der kognitionspsychologischen Forschung. Eine verdeckte Aufmerksamkeitsverschiebung führt dazu, dass die sensorische Information im Zielbereich der Verschiebung schneller verarbeitet wird, als es ohne diese vorherige Zuwendung der Fall wäre. Posner et al. arbeiteten mit einem zentralen visuellen Hinweisreiz, der Informationen darüber enthielt, in welchem Bereich des peripheren Sichtfeldes ein Zielreiz auftauchen würde. Durch diesen Cue konnten die Reaktionszeiten auf periphere Reize um durchschnittlich 25ms verbessert werden. Es wird angenommen, dass verdeckte Aufmerksamkeitsprozesse an verschiedenen kognitiven Abläufen beteiligt sind, um beispielsweise beim Lesen eine schnellere Informationsverarbeitung und Vorausplanung der Augenbewegungen zu unterstützen. Dass dieser verdeckte Aufmerksamkeitsprozess durch irrelevante Schallquellen beeinflusst werden kann, konnte durch eine Erweiterung des Posner-Experiments gezeigt werden. Zusätzlich zu den zentralen Hinweisreizen wurden den Probanden Hintergrundgeräusche von sich bewegenden Schallquellen sowie statisches weißes Rauschen dargeboten. Die Reaktionszeiten auf die peripheren Zielreize wurden durch die im Mittelungspegel angeglichenen Geräusche in unterschiedlicher Weise beeinflusst. Die Leistung verschlechterte sich maßgeblich, wenn der Schall von sich bewegenden Objekten stammte. Es wird vermutet, dass die Bewegungsinformation der Geräusche eine entscheidende Rolle spielt und in diesem Fall einen größeren Einfluss auf die Störwirkung hat, als der Schallpegel, welcher normalerweise als Bewertungsmaßstab für störende Schallquellen herangezogen wird.

Factors that modify the effects of beauty

Aleksandra Mitrovic, Jürgen Goller, Pablo Tinio & Helmut Leder

University of Vienna

In our everyday life we are surrounded by beauty, which influences the way we perceive. Beauty seems to attract and bind our gaze, considering that we preferably inspect beautiful objects by looking at them longer. Human faces can be seen as a special object category, for which this attentional effects also emerge. An explanation for this behavior is the rewarding effect of attractiveness. Only little research addresses the question which situational factors and factors inherent to the perceiver modulate this attentional effect. We tested how perceiver characteristics and motives influence the amount of time more or less attractive faces are looked at. We used urban, real world scenes depicting two persons and recorded eye movements while participants viewed the scenes. In a first study, we analyzed the effects of the participants' sex and sexual orientation on their visual exploration of such scenes and found that attractiveness had the largest influence on attention, but that sexual orientation had a modulating effect. Heterosexual men and women and homosexual men allocated their attention to sexually relevant faces, whereas homosexual women did not. In another study, we manipulated our participants' motives through the presentation of pictures inducing either a feeling of threat or approach before seeing scenes. Again, we found that attractive faces were generally looked at longer than less attractive faces, but that the presentation of threatening images leveled differences in attractiveness (i.e., attractive and less attractive faces received a similar amount of attention). We conclude that attractiveness is not always equally important for everyone; perceivers' characteristics have an influence on the aesthetic sense, which in turn is adaptive to perceivers' motives and goals.

Examining the relationship between emotion and forgetting by a dual-process SAT model

Eda Mizrak & Ilke Öztekin

Koc University Istanbul

A major determinant of forgetting in memory is the presence of interference in the retrieval context. Previous research has shown that proactive interference has less impact for emotional than neutral study material (Levens & Phelps, 2008). However, it is unclear how emotional content affects the impact of interference in memory. Emotional content could directly affect the buildup of interference, leading to reduced levels of interference. Alternatively, emotional content could affect the controlled processes that resolve interference. The present study employed the response deadline speed-accuracy trade-off procedure to independently test these hypotheses. Participants studied 3-item lists consisting of emotional or neutral images, immediately followed by a recognition probe. By modeling the retrieval of emotional and neutral items, we showed that the previously shown effect was due to a slower rate of accrual for interfering material (lures from previous study list) and lower levels of interference for emotional than neutral stimuli, suggesting a direct impact of emotion on the buildup of interference. In contrast to this beneficiary effect, resolution of interference for emotional material was less effective than for neutral material.

Saccade and perceptual performance in simultaneous and sequential dual-task paradigms

Tobias Moehler & Katja Fiehler

Justus-Liebig-University Gießen

Covert shifts of attention and saccades are intimately linked. Especially saccade curvature represents a sensitive marker of covert spatial attention, which has been associated with oculomotor inhibition of a competing saccade plan. Previous studies showed that saccades curve away from covertly attended locations. Here, we investigated how saccade curvature depends on the time to prepare a saccade when a concurrent perceptual task is performed either during or before saccade preparation. Participants performed a dual-task including a visual discrimination task at a cued location and a saccade task to the same location (congruent) or to a different location (incongruent). Additionally, we manipulated movement preparation time (time between saccade cue and Go-signal) and the temporal occurrence of the discrimination task (during saccade preparation = simultaneous vs. before saccade preparation = sequential). Our results demonstrate that perceptual performance was deteriorated in incongruent trials in the simultaneous dual-task condition while perceptual performance remained unaffected by congruency in the sequential dual-task condition. Saccade accuracy and precision were deteriorated in incongruent trials in the simultaneous condition and, to a lesser extent, also in the sequential condition. In general, saccades curved away from the covertly attended non-saccade location. Saccade curvature was unaffected by movement preparation time in the simultaneous dual-task but decreased – specifically in incongruent trials – and finally vanished with increasing movement preparation time in the sequential dual-task. Our results indicate that a competing saccade plan to a covertly attended non-saccade location is maintained in the simultaneous condition until the perceptual task is solved while in the sequential condition, in which the discrimination task is solved prior to the saccade task, oculomotor inhibition decays gradually with movement preparation time.

What's the difference between Instances and Event-Files? Dissociation of binding and learning processes

Birte Moeller & Christian Frings

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A single encounter of a response and a stimulus results in short-lived binding between the stimulus and the response (i.e., in an event file, see Hommel, Müsseler, Aschersleben, & Prinz, 2001). The repetition of stimulus-response pairings results in longer lasting learning effects indicating stimulus-response associations (e.g., Logan & Etherton, 1994). An important question is whether or not binding is actually identical with processes of association learning (e.g., binding might be seen as single-trial learning). Here, we present evidence that short-lived bindings can be distinguished from learning of longer lasting stimulus-response associations. In two experiments, participants always responded to centrally presented target letters that were flanked by response irrelevant distractor letters. Experiment 1 (n = 67) varied whether distractors flanked targets on the horizontal or vertical axis. Binding effects were larger for a

horizontal than for a vertical distractor-target configuration, while stimulus configuration did not influence learning of longer lasting stimulus-response associations. In Experiment 2 (n = 36), the duration of the interval between response n-1 and presentation of display n (500 ms vs. 2000 ms) had opposing influences on SR-binding and association learning. Both experiments indicate that modulating factors influence SR-binding and incidental association learning in different ways. Implications of this finding for past and future research are discussed.

Opportunities and challenges of experimental designs using ecological momentary assessment

Markus Moessner, Johanna Köhling, Johannes C. Ehrenthal, Henning Schauenburg, Leonie Hosenfeld, Ulrike Dinger & Stephanie Bauer

University Hospital Heidelberg

Ecological momentary assessment (EMA) involves repeated sampling of subjects' momentary states in their natural environment. In contrast to experimental studies conducted under standardized conditions in a lab, EMA maximizes ecological validity. Intensive longitudinal data collected in EMA studies allow to investigate hypotheses that cannot be tested within cross-sectional designs. In this presentation, we will outline opportunities and challenges of combining experimental designs and EMA. Based on data from two EMA studies, we will exemplify how EMA can be used to complement cross-sectional research. The first study is an experimental study investigating effects of media exposure on body dissatisfaction. 65 female participants were prompted 7 times a day for 4 days and provided 1485 reports. The second study compares affect instability and relational affect patterns of patients with major depression (MDD) and patients with borderline personality disorder (BPD) within a quasi-experimental design. 41 patients (21 MDD, 20 BPD) were prompted 5 times a day for seven days and provided 1363 reports. We will show how EMA can be applied to differentiate between momentary and stable effects of experimental manipulation, and how longitudinal designs can help to operationalize variability and describe underlying relational patterns. Based on these illustrations, opportunities for future research will be outlined.

Kollisionswarnungen im Head-Up Display: Einfluss der Darstellungsgröße auf das Fahrerverhalten

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Technische Universität Braunschweig

Fahrerwarnungen können in kritischen Situationen essenziell sein, um einen Unfall zu vermeiden. Die Vermittlung solcher Fahrerwarnungen (z.B. Größe, Modalität) spielt dabei eine besonders wichtige Rolle. Um beispielsweise beim Fahrer eine Notbremsung hervorzurufen, muss die Warnung vom Fahrer rechtzeitig wahrgenommen sowie intuitiv verstanden werden. Das Head-Up Display (HUD) bietet sich dabei als Darstellungsort an, da derart in die

Windschutzscheibe projizierte Inhalte im direkten Blickfeld der Fahrer liegen. Unklar ist jedoch, inwieweit solche Warnungen neben anderen Inhalten (z.B. Navigation, aktuelle Geschwindigkeit) im HUD priorisiert dargeboten werden sollten. Daher wurde eine solche Kollisionswarnung in Form eines Stopp-Symbols mittels zwei eher kritischen und zwei weniger kritischen Stadtszenarien in einem dynamischen Fahrsimulator untersucht. Die Größe des Stopp-Symbols wurde in drei Stufen zwischen den Fahrern variiert. In zwei Stufen (klein, mittel) erschien das Stopp-Symbol mit und in einer Stufe (groß) ohne die anderen Inhalte des HUDs. Außerdem wurde in der Hälfte der Szenarien das Warnsymbol durch einen zusätzlichen Bremsruck ergänzt, mit dem Ziel, die Fahrerreaktionen auf die kritischen Situationen weiter zu verbessern. Insgesamt nahmen 48 Fahrer (M = 35.1 Jahre, SD = 10.4 Jahre) an der Studie teil. Es wurden Fahr- und Blickdaten sowie subjektive Daten erfasst. Die Ergebnisse zeigen, dass die Größe von Kollisionswarnungen im HUD von Bedeutung ist und eine Priorisierung sowie Prüfung der gestalterischen Integration im Fahrerassistenzspektrum erfolgen sollte.

Social influence in freely interacting groups: Biased information acquisition after group discussions

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Previous research shows that, when acquiring new information after discussion, groups consisting of members with the same decision preferences exhibit a stronger confirmation bias than groups consisting of a minority and a majority faction (e.g., Schulz-Hardt et al., 2000). Yet, it is unclear whether this effect is due to (a) majority members showing a more balanced information search than members of consent groups, (b) minority members showing a particularly strong confirmation bias which counteracts the bias of majority members or (c) both (a) and (b). To pit these hypotheses against each other, we conducted two experiments in which we formed consent and dissent groups by either composing groups of individuals with the same decision preferences or building groups with a minority and a majority faction. After discussion, group members had the opportunity to acquire additional information. For each group member, half of the information was in favor of his or her preferred decision alternative and the other half was in favor of the opposite alternative. Our results show that majority members conducted an almost balanced information search among the two alternatives whereas minority members who had resisted the majority influence during discussion exhibited a strong confirmation bias. However, if the minority members converted to the majority position, they selectively searched for information in favor of the majority position. Taken together, the evidence suggests that after simultaneous minority and majority influence in dissent groups majorities exhibit a balanced information search, whereas minorities tend to converge to their own position, and this can be the majority position if the minority has converted.

Distractor processing in the auditory modality: Evidence from the accessory Simon task

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In the accessory version of the Simon task, participants are typically required to perform left or right keypress responses to a non-spatial feature of a central target while ignoring a lateralised distractor. A common finding consists of facilitated performance in congruent trials in which the location of the distractor conforms to the side of the required target response as compared with incongruent trials in which distractor and response are in opposition to each other. However, recent studies reported slower responses in congruent as compared with incongruent trials when the distractor was presented shortly after the target. The reversal of the congruency effect has been interpreted as evidence for the inhibition of distractor-related activity. The present experiments investigated whether inhibitory processing also occurs when an auditory distractor is presented prior to the target. Participants either responded (by pressing a left or right button) to the shape of a visual stimulus presented at the centre of a screen (Experiment 1) or to the identity of an animal voice presented from a central speaker (Experiment 2). In both experiments, irrelevant white noise bursts were presented from a speaker positioned on the left, right, or in front of the participants. The interval between distractor sound and target onset was systematically varied so that the distractor could occur prior to or simultaneously with the target. Both experiments revealed a typical congruency effect when distractor and target were presented simultaneously or in close temporal proximity. Interestingly, a reversal of the congruency effect occurred in Experiment 2. The results suggest that inhibition (1) also operates on distractor events that are presented prior to the target and (2) is only triggered when target and distractor events are presented in the same modality.

Common genetic variation of APOE, personality and brain volume/cortical thickness

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Recent evidence suggests that common genetic variation of the APOE gene interacts with personality on cognitive decline in elderly persons. Although of high interest, such an interaction is not well understood on a neuroanatomical level. For the present study, we invited N = 105 participants (50 males, 55 females, mean-age: 22.74 (SD = 3.00)) after à priori genotyping to a structural brain scan (on a 3 Tesla scanner by Siemens) and asked them to fill in the NEO-FFI. By this approach we were able to include 54 epsilon 3/4 allele carriers vs. 51 homozygous epsilon 3/3 allele carriers for the present research endeavor. Cortical reconstruction and volumetric segmentation was performed with the Freesurfer image analysis suite. Briefly, processing included removal of non-brain tissue, automated Talairach transformation, intensity normalization, volumetric labelling, and cortical parcellation. Four different structural metrics were obtained for all cortical regions: volume, thickness, mean curvature, and surface area. For subcortical structures, only volumes were extracted. With the present study, we aim to understand if associations between personality and brain volume differ between participants at

high/low genetic risk for late Alzheimer's disease. Results will be presented in the talk.

Influence of free exploration on navigation skills in pre-school children in Namibia and in Germany: Cultural differences in exploration behavior

Sarah Monzel & Eva Neidhardt

Universität Koblenz-Landau

Preschool children are able to point to locations they cannot see, as for example to the starting point of the path they have just walked (e.g. Lehnung et al., 2003). Earlier studies have shown that pointing performance for this kind of path integration is influenced by one important factor: children, who have at least one location in their familiar outdoor environment where they can go alone, have significantly better pointing results. As free exploration has been demonstrated as a crucial factor, it was expected and shown that African – Namibian – pre-school children perform significantly better than German preschool children (Neidhardt & Popp, 2010). German children`s pointing performance gets better when they get older. Namibian children show perfect pointing results within measurement accuracy, in a Kalahari school environment. This was found even for the youngest children tested, who were two to three years old. Cultural differences in children`s everyday life between Namibia and Germany as well as within Namibia should influence children`s pointing performance. To prove this hypothesis we also tested about 80 pre-school children in an urban environment, in Windhoek, Namibia, supposing that they show comparable results to German preschoolers (n>100), because in Windhoek as in German cities free exploration is no option for children before the age of ten. The analyses also show that deviation with time differs between the groups. We discuss if these differences indicate different path information processing strategies, i.e. path integration for the city children and survey knowledge for the Kalahari children.

Scene integration without awareness: Are object-background relationships extracted for perceptually suppressed scenes?

Pieter Moors, David Boelens & Johan Wagemans

KU Leuven

Over the last decades, a great deal of research has been devoted to the scope and limits of unconscious visual processing. In this context, continuous flash suppression (CFS) has proven to be an influential and popular paradigm to render visual stimuli invisible and to tackle this research question. Using this paradigm, a range of studies claimed to have obtained evidence for extensive and complex visual processing for invisible stimuli. In this talk, I will challenge this view by presenting a replication study of a finding that has been particularly influential. That is, a recent study claimed that scene integration (i.e., extracting object-background relationships in a scene) did not require visual awareness of the scene. The major result of this study was that scenes containing an incongruent object-background relationship entered awareness faster

than scenes containing a congruent relationship. In our replication study, we included an inversion condition to control for low-level influences potentially driving the congruency effect. Our results indicated an absence of the previously observed congruency effect, a scene inversion effect, and no interaction between both factors. Furthermore, we obtained strong evidence for the absence of a congruency effect using Bayesian statistics. Third, at several steps during data collection, a traditional frequentist hypothesis test indicated a significant congruency effect whereas this was never the case for the Bayesian test. We will argue that this set of experiments provides a case study that advocates the use of high-powered experiments and proper statistical methods before strong claims on the scope and limits of unconscious visual processing can be made.

Including facilitation functionality in training increases task effectiveness in test: Evidence from interactive map use

Julia Moritz & Stephan Schwan

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Digital functionalities may simplify task solution by offloading required cognitive processing steps. While this should increase task effectiveness, it may prove detrimental if users subsequently have to solve the task without having the medium at hand (Gao, Liu, & Pass, 2015). The present study tested this notion of opposing effects with interactive digital maps. We hypothesized that interactive means for restructuring the spatial organization of thematic maps will be used for adapting map structure to task requirements and increase task effectiveness, but subsequently decrease task effectiveness if the interactive means are no longer available. In a first phase, participants were presented 24 pairs of maps of voting results in a fictitious country. For each map they had to compare the voting results of a particular party across type of vote or election period, respectively. In the interactive condition (n=40), participants could adapt map presentation to the task requirements, while in the non-interactive condition (n=40), participants did not have the possibility to adapt map presentation. A control group (n=40) did not take part in this first phase, and thus did not have the possibility to practice the task. In the second phase, all three groups had to solve a second set of similar tasks in a non-interactive condition. In the first phase, participants of the interactive condition outperformed those of the non-interactive condition regarding number of correct solutions. In the second phase, the participants of the interactive condition outperformed those of the non-interactive condition regarding number of correct solutions but were slower in solving the task. The study shows that by providing facilitating functionalities, thematic maps may afford flexible task-appropriate spatial reorganization of information, which in turn fosters task performance and has at least on the short term no detrimental effects on task performance in tasks without these functionalities.

Effects of acute stress on prospective memory monitoring and intention deactivation

Marcus Möschl[a], Moritz Walser[a], Franziska Plessow[b], Thomas Goschke[a] & Rico Fischer[c]

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We often form and postpone intentions until the appropriate retrieval and execution situation has come, an ability also referred to as event-based prospective memory (PM). After intention completion, our cognitive system has to deactivate no more relevant intention representations from memory to avoid interference with subsequent tasks. In everyday life, we frequently rely on these abilities also in stressful situations. In an initial study, we found intact PM performance and intention deactivation that were not affected by stress (Walser, Fischer, Goschke, Kirschbaum, & Plessow, 2013). In the present study, we extended this approach by a) increasing processing demands during intention deactivation using salient focal PM cues and b) by implementing a design that targets different degrees of PM monitoring via PM load (i.e., participants maintained one or six syllables that might occur as non-focal PM cues within ongoing-task stimuli). Eighty participants underwent the Trier Social Stress Test, a standardized stress protocol, or a standardized control situation, before performing a computerized PM task. The stress group showed elevated levels of salivary cortisol as marker of a stress-related increase in hypothalamus-pituitary-adrenal axis activity throughout cognitive testing compared to the no-stress group. First, we replicated findings of the previous study. That is, intention deactivation and PM performance with focal PM cues were preserved under stress. Secondly, PM load reliably increased monitoring for non-focal PM cues. Most importantly, however, and independently of the PM load manipulation, the stress group showed less monitoring costs. This suggests that stress induced shift towards more resource saving processing strategies under conditions that support PM monitoring.

The effect of metacognitive training and prompting in simulation-based learning

Stephanie Moser, Jörg Zumbach & Ines Deibl

University of Salzburg

Simulations as an educational method have become more and more attractive within different fields. Also in Physics didactics, simulations are used for introducing and deepening physical concepts. Within this research, we examined to what extent a metacognitive training can contribute to simulation-based learning within the domain of physics. In our study, 99 Austrian 8th graders (60 female / 39 male) had to learn about the conservation of energy, using a simulation about a skateboarder within a half-pipe (University of Colorado Boulder, 2015). Within a 2x2 factorial design, the role of metacognitive training prior to experimenting with the simulation (with or without) and the role of metacognitive prompting (with or without) was examined. A pre- and a post-test were applied to assess knowledge acquisition, metacognitive behavior, cognitive load and mental effort. All participants were randomly assigned to one of the four conditions. Results of a MANCOVA revealed that there was no significant main effect for metacognitive prompting and training on the post knowledge test at a first glance. A significant main effect for metacognitive prompting was found after recoding the independent

variable "Prompting" according to the extent it was actually used. Participants using the prompting extensively scored higher results on the post knowledge test (p = 0.01). A step-wise regression analyses using performance in the knowledge post-test as dependent variable and use of metacognitive strategies (on a trait level), prior knowledge, use of prompting and cognitive load as predictors only revealed prior knowledge and use of prompting as significant predictors. As a conclusion, this experiment supports findings that learning with simulations does not automatically occur. Learners might benefit from instructional support like scaffolds but have to use these prompts in- and extensively.

A formal model of self-serving response biases

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The validity of self-reports of sensitive attitudes, attributes, and behaviors suffers from the tendency of individuals to provide overly positive self-descriptions. One approach is to assess such biases on the level of individuals ultimately applying such measures to control for the distorting effect of response biases. The overclaiming paradigm aims to assess this tendencies by considering the discrepancy between a self-report and an external criterion. To this end, participants receive a list made up of both factually existent and invented words (allegedly referring to general knowledge) and are asked to state whether they are familiar with each of the items. Overclaiming is defined as the tendency to claim knowledge about factually non-existent items, and can thus be used as a criterion discrepancy measure of self-serving response biases. Existing measures of the extent of overclaiming suffer from a confound of response tendencies and memory processes, however, rendering their interpretation ambiguous. To overcome this limitation, rooted in the multinomial processing tree framework, a formal measurement model was developed using a novel variant of the overclaiming paradigm. The model allows for the decomposition of memory processes and response tendencies. We report on several experiments validating the parameters of the model. We additionally show that – unlike traditional approaches - the response bias parameter of the model moderates the association of implicitly and explicitly assessed attitudes towards homosexuality, thus supporting the validity and utility of the proposed model in assessing self-serving response biases.

Dissociating short- from long term calibration of interval timing

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Human interval timing plays a crucial role in many everyday activities, such as task coordination during car driving or detection of temporal violations, for instance realizing that a website loads for too long. It has recently been shown that the underlying temporal distribution of a task

affects response behavior. In particular, when asked to reproduce a just presented standard-interval (SI), reproduced intervals (RIs) are systematically shorter or longer depending on the duration of other SIs presented in the experiment. This suggests that humans build up an internal representation of the underlying temporal distribution from which the SIs are sampled, and that reproduction is influenced by this internal representation. In the literature, it is often assumed that the buildup of this context takes a significant number of trials. We replicated the general context-related findings, showing that RIs of the same SI (e.g., 800ms) are shorter when the objective distribution of SIs is short (400-900ms) and longer when the distribution is longer (700-1100ms). Crucially, a mixed-effects model shows that this prior distribution is not static per context, but also affected by recency-effects of the immediately preceding (N-1) SI. The effect of a context with a longer distribution on a particular trial can, for instance, be alleviated if the N-1 trial has been shorter in duration. Furthermore, context-driven influences on RI duration appear quickly after task-onset. The usually applied extensive distribution training might hence not be necessary.

Spatial reference frame(s) when reaching to proprioceptive targets

Stefanie Mueller & Katja Fiehler

Justus-Liebig-Universität Gießen

While previous research consistently showed that visual stimuli are coded in a gaze-dependent reference frame, the coding scheme of proprioceptive stimuli is less clear. Some studies suggest that proprioceptive reach targets are coded with respect to gaze, similar to visual targets, while others found that proprioceptive reach targets are coded gaze-independent, in a body-centered reference frame. In study 1, we examined if a movement before reaching determines whether a proprioceptive target is coded in a gaze-dependent reference frame. Subjects reached to the location where they had felt a touch on their finger either when their (left) target hand was fixed at the target location (stationary condition) or after they moved their hand to the target location (moved condition). Gaze direction was varied relative to the target. We found that reach errors varied as a function of gaze relative to target but only when the target hand had been moved. This indicates that the movement caused gaze-dependent coding of the proprioceptive target. However, we did not know whether the gaze-dependent representation replaced the gaze-independent one or whether a gaze-dependent representation was employed in addition to a gaze-independent, presumably body-centered representation .In study 2, we used a similar paradigm as in study 1 but we varied the location of the movement vector (start to target location) relative to the gaze direction and to the body midline. We correlated the reach errors of trials where the movement vector was at the same location in one reference frame, but at a different location in another. Assuming that 2 movements that are represented in the same reference frame also produce similar errors, significant correlations indicate the use of the respective reference frame. We found evidence for body- and gaze-centered coding in the moved condition, indicating that a gaze-dependent representation was used in addition to a body-centered one.

Neural correlates of intentional and non-intentional voice learning

Denise Müller, Romi Zäske & Stefan R. Schweinberger

Friedrich-Schiller-University Jena

The neural processes underlying voice memory are still poorly understood. Recent electrophysiological evidence suggests a rapid acquisition of speaker representations during learning with differential voice processing during study (from ~250 ms) and retrieval (from ~290 ms) based on recognition performance at test (Zäske et al., 2014, J. Neuroscience). As voice recognition depends on intention of learning, we explore event-related potential (ERP) effects of intentional vs. non-intentional learning by using a variant of the directed forgetting paradigm. At study, participants were cued to either remember or forget voices while detecting an occasional target voice. The target voice was introduced to sustain attention across 12 study blocks. Furthermore, the location of voices (left/right channel) was varied between speakers. On a subsequent test, participants performed an old/new recognition task on both to-be-remembered (TBR) and to-be-forgotten (TBF) study voices. Recognition performance was above-chance for both memory conditions, but higher for TBR than for TBF voices. During study, TBR voices elicited more positive ERPs (~200–1400 ms) than TBF voices over widespread frontal, central, and parietal areas, confirming differential voice processing during intentional vs. non-intentional learning. At test, voices correctly classified as “old” compared to “new” elicited a more positive left parietal LPC (500–1500 ms). This OLD/NEW effect was polarity-reversed at a left frontal recording site, and independent of memory condition. It may thus reflect familiarity with studied voices independent of intentions to remember voices. Incidental memory for the location of correctly recognized study voices was above-chance only for TBR voices, suggesting successful recollection of context information only when voices were intentionally processed.

Assessing stereotypes using a Simon-type task

Florian Müller & Klaus Rothermund

Friedrich-Schiller-Universität Jena

We investigated whether a paradigm from research on language processing may provide a viable alternative in the assessment of individuals’ stereotypes. The original paradigm was employed to demonstrate that subjects are able to quickly judge the truth of clearly true or false sentences presented in RSVP in a Simon type paradigm as long as an evaluation mindset was implemented. However, over and above the assessment of participants’ spontaneous judgement of true and false sentences, it may also be used to infer participants’ endorsement of sentences where evaluation as true or false depends on participants’ individual attitudes. Results from an initial study testing the paradigm’s suitability for stereotype assessment as well as shortcomings and future directions are discussed.

Zum Einfluss unterschiedlicher Fußbekleidung auf die Bediensicherheit von Fahrzeugpedalen

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Auf der Suche nach Hinweisen auf mögliche Einflüsse der Fußbekleidung auf die Pedalbedienung im Fahrzeug führten in einer Pilotstudie 40 studentische Versuchspartner und -partnerinnen (Vpn) im Fahrsimulator jeweils 84 Bremsversuche mit festen, den Fuß umschließenden und bequem sitzenden Schuhen sowie mit FlipFlops als Fußbekleidung durch. Die Abfolge der Versuche wurde nach einem ABBA-Design in einer Cross-Over-Anordnung ausbalanciert. Als abhängige Variablen wurden die Vorbremszeit, das ist die Zeitspanne zwischen Onset des zum Bremsen auffordernden Signals und dem vollständigen Druck des Bremspedals, sowie der Zeitbedarf der am Bremsvorgang beteiligten Teilhandlungen (z.B. Reaktionszeit und Umsetzzeit) und die erlebte Bediensicherheit erfasst. Die Ergebnisse zeigen gegenüber beschuhten Füßen neben deutlich erlebter Bedienunsicherheit auch signifikant langsamere Umsetz- und Bremszeiten, wenn die Vpn FlipFlops trugen. Massive Bremsverzögerungen (Ausreißer) treten bevorzugt in der FlipFlop-Bedingung auf. Die Versuchsergebnisse weisen damit auf ein Sicherheitsrisiko beim Fahren mit FlipFlops hin und sie geben Hinweise für die Gestaltung zukünftiger Experimente zur Bediensicherheit von Stellteilen im Fahrzeug.

Heart-beat evoked potentials (HEPs) in patients with Borderline Personality Disorder and Post-traumatic-Stress Disorder

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The ability to perceive and regulate own emotions has been linked to the processing of afferent bodily signals (interoception). Persons, with a better interoception have a better understanding of their emotions. Altered interoception seems to be associated with psychiatric disorders and is tightly linked to symptoms like body image disturbance or emotional dysregulation. The aim of the present Electroencephalogram (EEG) study was to analyze the cortical processing of afferent bodily signals of patients with Borderline Personality Disorder (BPD), patients with Post-traumatic-Stress disorder (PTBS) and healthy volunteers. Furthermore, we analyzed the association between interoception and childhood traumatization. Heartbeat-evoked potentials (HEP), an indicator of the cortical representation of afferent signals from the cardiovascular system, were investigated in 20 medication-free female patients with current BPD, 17 medication-free female patients with current PTBS and 16 female volunteers. HEPs were assessed in a 5-minute resting state EEG and parallel electrocardiogram (ECG) measurement. Childhood traumatization was assessed by means of self-reports and structural interviews. Patients with current BPD had significantly reduced mean HEP amplitudes compared to PTBS patients ($p = .052$), while HEP amplitudes of the healthy volunteers were in-between these

groups. HEP amplitudes of BPD patients were negatively correlated with childhood traumatization (R = -.55), while HEP amplitudes of PTBS patients were positively correlated with childhood traumatization (R = .54). The results indicate deficits in the cortical processing of interoceptive bodily signals in patients with BPD, while PTBS patients seem to have an enhanced cortical processing of bodily signals. Together with a recently done EEG source analysis, we will discuss the different mechanisms of interoception in BPD and PTBS patients.

Incompatible partner reactions improve performance in the weaker task of a picture-word interference paradigm – But only if they can be ignored

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Incompatible partner reactions improve performance in the weaker task of a picture-word interference paradigm – but only if they can be ignored. Similar to anticipated action effects, contingent partner reactions (CPR) can influence action planning. Usually, compatibility benefits are found: actions are initiated faster when they get imitated. However, as most previous studies used simple choice actions, little is known about the impact of CPR on task set selection. The present study asked whether CPR compatibility improved performance in the presence of conflict when a weaker task needs to be shielded from interference by a stronger one. Using a picture-word interference paradigm, participants alternated between picture naming and word reading single task blocks, with CPR compatibility being varied between the two halves of the experiment (i.e. the partner reacted to the subject's verbal actions by performing either the same or the opposite task). Surprisingly, in Experiment 1, CPR compatibility had no impact on word reading performance but a reverse compatibility effect emerged in the weaker picture naming task. A possible explanation is that during picture naming, the partner's incompatible word reading must be ignored to prevent distraction, which leads to an overall improvement in task shielding. Consequently, ignoring irrelevant information in the stimulus material gets easier as well. To test this hypothesis, Experiment 2 prevented ignoring the CPR as in some trials subjects had to react to an anomaly in their way of being uttered. The reverse compatibility effect for picture naming disappeared, and instead there was a compatibility benefit for word reading. The results suggest that in situations of high conflict, subjects strategically ignore an incompatible partner, which facilitates task shielding in general. If such strategies are prevented and attention is directed to CPR, standard compatibility benefits emerge, at least in easy tasks.

Weighing up short- and long-term risks: The interaction of feedback and predispositions for impulsive versus reflective processing in decision making under risk

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In everyday life, people often have to weigh up conflictive short- and long-term consequences

of different decision options. Theoretical models suggest that impulsive and reflective processes are differently involved in the integration of short- and long-term consequences during the decision making process (e.g., Metcalfe & Mischel, 1999; Schiebener & Brand, 2015). We aimed to investigate which cognitive functions may affect decision making in such situations. We administered a new decision-making task, named Cards and Lottery Task (CLT), to 150 healthy participants. In order to investigate how immediate feedback about long-term prospects of decisions taken may influence subsequent decision making, we conducted a between-subject experiment with two task versions: One including feedback on short- as well as long-term prospects, and one including feedback on immediate outcomes only. Especially the latter resembles many real life decisions where there is no immediate feedback about a decision's future effect (e.g. how smoking increases the risk of getting lung cancer). The results revealed no main effect of feedback. However, we found significant interaction effects between feedback group and measures indicating predispositions towards impulsive or reflective processing. Individuals with high motor impulsivity as well as individuals with a low need for cognition tend to neglect long-term risks, especially in cases where feedback concerning short- and long-term consequences is imbalanced, and long-term effects cannot be experienced directly. In both versions, advantageous decision making correlated with reasoning and working-memory abilities. Our findings contribute to recent dual-processing models by indicating that immediate feedback about long-term risks could benefit people with predispositions to process information in a more impulsive rather than reflective way.

Shared attention and co-representation in a visual search task with two observers

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Searching together for target stimuli may play a crucial role in various professional fields, such as medicine, criminology, airport security, and (air) traffic control. Yet, studies using visual search tasks have focused primarily on how individuals search on their own. In our Experiment 1, we used a singleton detection task with two participants simultaneously observing a screen and alternately responding to trials. We investigated whether dimension-based reaction time (RT) intertrial effects, i.e. the RT benefits of responding to a target defined on the same dimension as in the preceding trial relative to the RTs to a target defined on another dimension (Found & Müller, 1996), are also found when the person's responding changes across trials. We found such cross-person intertrial effects in a sample of acquainted observers but not in a sample of unacquainted observers or in a control condition in which one observer was replaced by a computer program. In Experiment 2, using a compound search task, we examined whether in trials in which it is the co-actor´s turn to respond, acquainted observers not only spontaneously co-represent their co-actor´s stimuli but also further process response-relevant attributes of the target. Both, when the responding person repeated and when the person changed across trials, an interactive RT pattern dependent on the target-defining dimension and the response-defining attribute in the previous trial relative to the current trial was found. Overall, the results suggest that acquainted observers tend to spontaneously engage in

respective attentional and cognitive processes in trials known to be responded to by their co-actor, which in turn affects early allocation of attention and response selection when it is their own turn to respond. This set of findings supports and extends the general concepts of shared attention and co-representation.

Situationsbewusstsein und Leistung beim Segeln mit digitaler Medienunterstützung: Experimente und Blickfeldanalysen auf See

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Die effiziente Nutzung des Windes zur Fortbewegung auf dem Wasser bei gleichzeitig sicherer Navigation vom Start- zum Zielhafen verlangt von Seglern auf See ein hohes Maß an Kompetenz multimodaler Reizwahrnehmung und -selektion zur Situationsanalyse und Handlungssteuerung. Digitale Multifunktionsdisplays (MFDs), die GPS-Kartenplotter, Windanzeiger, Logge, Lot u.v.m. auf einem Display am Steuerstand vereinen, werden in der Sportschifffahrt immer beliebter. Sie reduzieren die komplexe Wahrnehmungssituation, indem sie alle handlungsrelevanten Informationen visuell und räumlich konzentriert darbieten. Inwieweit unterstützen oder beeinträchtigen MFDs die effiziente und sichere Schiffsführung? In der populären Fachpresse wird die Frage kontrovers diskutiert. Wissenschaftliche Arbeiten fehlen bislang. Unsere Arbeit stellt einen ersten Versuch dar, die Mensch-Technik-Interaktion in dieser kleinen, aber theoretisch hochinteressanten Domäne empirisch zu untersuchen. Die Hypothesenbildung ist nicht trivial. Die Leistung beim Segeln könnte durch MFDs zunehmen, da handlungsrelevante Reize schnell, präzise und in einem einheitlichen Code dargeboten werden. Anderseits sollte gemäß Wickens‘ Theorie multipler Ressourcen (1984) die Bündelung aller Informationen auf dem visuellen Display kontraproduktiv sein; zudem dürfte die Kompetenz zur handlungsgeleiteten multimodalen Wahrnehmung bei mangelnder Übung zurückgehen. Das Situationsbewusstsein beim Navigieren könnte durch MFDs zunehmen, da Routenplanung und Positionsbestimmung GPS-gestützt vereinfacht werden. Andererseits könnte die verkürzte Beschäftigungsdauer mit der Seekarte und das kleine visuelle Display Raumvorstellung und Orientierungsleistungen beeinträchtigen (z.B. Burnett & Lee, 2005). Basierend auf Untersuchungen in der Luftfahrt haben wir einige Pilotexperimente auf See konzipiert und durchgeführt. Wir stellen Machbarkeit und Grenzen vor, sowie die sich daraus ergebenden differentiellen Hypothesen.

Unbiased truth: Symmetrical interference effects on memory for truth and falsity

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There are two opposing views on the mental representation of truth and falsity in the literature: According to the Spinozan model, new information is initially represented as true. Given that a

person has enough cognitive capacity, the information is then evaluated and possibly tagged as "false". In contrast, the Cartesian model proposes that new information is initially stored without any reference to its validity. Given that a person has enough capacity to evaluate the information, the memory representation is then possibly tagged as either "true" or "false". Hence, the two models make different predictions in case of limited processing capacity during information encoding. According to the Spinozan model, people will show a bias to recall false information as "true". In contrast, the Cartesian model does not predict any memory asymmetries for truth and falsity. A memory experiment was conducted to test these conflicting predictions. Participants studied trivia statements and subsequently received feedback regarding the validity of each statement ("true", "unknown validity", "false"). One group of participants had to perform a secondary task during feedback encoding. In contrast, feedback encoding was not disrupted in a control group. As expected, feedback memory was impaired by the secondary task. Importantly however, memory for truth and memory for falsity were impaired to a similar degree. This finding contradicts the Spinozan model but is in line with the Cartesian model.

Why free choices take longer than forced choices

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Free-choice tasks, in which participants can choose between two (or more) equally correct responses, are often used to investigate so-called self-initiated voluntary actions. A standard finding is that RTs in free-choice tasks are longer than in forced-choice tasks, where each stimulus is mapped to one particular, correct response. Ever since Berlyne's early work the question remains: what is the reason for the RT difference? One common assumption is that more (complex) operations in free-choices slow down the decision process. Alternatively, though, the free-choice disadvantage may also result from a temporal delay of the actual decision process. We examined these possibilities in a color discrimination study with intermixed free- and forced-choice trials. For both tasks, our rationale was based on sequential sampling accounts, which pose that a response is initiated when evidence accumulation surpasses a certain decision threshold (Ratcliff, 1978). Critically, we manipulated the height of the decision thresholds by varying the amount of catch-trials (i.e., no response required) between experimental blocks: more catch-trials supposedly increase decision thresholds. We derived the following predictions: (1) If free-choice tasks slow down the decision process, a correspondingly lower rate of evidence accumulation should yield an interaction of catch-trial ratio and task type. (2) In contrast, if the RT disadvantage of free choices is due to a temporal delay of the decision process rather than to a lower rate, we should observe additive effects of catch-trial ratio and task type. Our results supported the second explanation. This suggests, that both tasks require the anticipation of a goal-state for which evidence is then accumulated. While in forced-choice tasks, this goal is externally determined by the stimulus, in free-choice tasks it needs to be generated internally, which requires additional time. Further possible interpretations are discussed as well.

The ad-hoc construction of moral relevance judgments

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Many current theories of moral judgment assume that humans possess some form of stable intuitive moral knowledge and that moral judgment results from the direct application of this knowledge to a particular judgment problem. The literature on domain-general judgment and decision making, however, shows that people usually do not enter a given judgment task with a complete set of pre-established values, but rather engage in a flexible ad-hoc search for reasons to justify their decision to themselves and others. Observed judgments are therefore strongly affected when different elicitation procedures direct subjects' attention to different aspects of the choice task. In a series of experiments, we demonstrate a new phenomenon of reason-based cognition in moral relevance judgments. We show that a number of basic factors (distance, age, sex) is indicated to be morally relevant on even-numbered rating scales, but not on odd-numbered scales. We explain these effects with the hypothesis that the different scales evoke different implicit contrast spaces against which the expressed judgment needs to be defensible, and that the available reasons to make a moral difference seem compelling in one contrast space but not in the other. Several alternative explanations in terms of trivial measurement distortion are tested and refuted (e.g., different rounding of a stable underlying true value, attraction to a salient midpoint, decision avoidance, or content-independent differences in scale sensitivity). Implications of these findings for theories and methodology in moral psychology are discussed. In particular, inferences from observed patterns of expressed moral judgments to the structure and content of a stable underlying moral knowledge base seem fallacious as long as systematic influences of different elicitation procedures in the respective domain are not yet fully understood.

The jigsaw principle in educational videogames

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Educational videogames consist of manifold multimedia elements that might impact playing and learning. Thus, multimedia design principles should be reconsidered when they are implemented within this medium. For example, it should be validated how to implement methods like the jigsaw principle with mechanics provided by videogames. Such principle is characterized by the distribution of crucial task elements among a group of learners to foster collaborative behavior. To address this issue, we conducted an experiment with 60 participants to compare conditions with or without increased task interdependence through the jigsaw method. The participants had to rebuild a house from the novel Effi Briest collaboratively within an adjusted version of the game Minecraft. The results show increased social interactions, play performance, and learning outcomes with increased task interdependence. Our analysis

revealed that the impacts of our group variation on recall knowledge was fully mediated through play performance. A moderator analysis showed a significant negative moderation of play performance on the impacts of our manipulation on orientation knowledge. These results connect play performance and learning, thus we provide detailed insights into the comparably strong effects (e.g., learning outcomes η_p^2=.23). Furthermore, we found increased mental effort within the groups with increased task interdependence. Addressing efficiency values, we could show that our manipulation resulted in a more efficient usage of cognitive load within the increased interdependence groups. Although the overall cognitive load was not reduced, the increased task interdependency lead to a more efficient learning process. Additionally, we demonstrated that an increased mental effort does not necessarily harm learning within an educational videogame. The results will be discussed regarding educational videogame design, enrich cooperative learning principles and collaborative working memory research.

Attentional mechanisms of simultanagnosia in patients with posterior cortical atrophy

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A significant minority of Alzheimer's disease patients suffer from atypical focal syndromes such as posterior cortical atrophy (PCA). PCA is dominated by initially isolated progressive higher visual and visuo-spatial impairments. One of the major clinical manifestations is simultanagnosia which is the inability to perceive multiple visual objects at the same time. Although widely studied in stroke patients, little is known about the precise neuro-cognitive mechanisms contributing to simultanagnosia in neurodegenerative diseases. This study aimed to (i) specify changes in basic attention parameters underlying symptoms of simultanagnosia, (ii) assess the link to grey and white matter damage, and (iii) integrate those findings into a neuro-cognitive model of simultanagnosia following PCA. To this end, simultaneous perception of multiple visual objects was tested in 10 PCA patients with verified AD pathology (measured by Pittsburgh compound B positron emission tomography) and 10 healthy aged-matched controls. The critical outcome measure was the percentage of incorrect object identifications. Using whole and partial report of briefly presented letters based on the 'Theory of Visual Attention', we furthermore quantified and compared visual attention parameters across study groups. Patients demonstrated a specific slowing of visual processing speed, while visual short-term memory capacity was preserved. Among PCA patients, those with slower processing speed showed more severe symptoms of simultanagnosia. Furthermore, voxel-based morphometry yielded extensive reductions of grey and white matter in parieto-occipital and thalamic brain areas. Interestingly, the degree of individual atrophy of white but not of grey matter regions was associated with processing speed. Based on these findings, we propose that atrophied white matter commonly observed in PCA leads to slowing of visual processing speed which underlies the overt clinical symptoms of simultanagnosia.

Reading capabilities influence spatial belief revision

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In daily life, humans construct all kinds of beliefs about different types of information. Living in a dynamic world, these beliefs frequently undergo revisions, especially in cases where pieces of new information are true but inconsistent with what is currently believed. Belief revision is construable as variation of mental models, with the models initially constructed based on initial beliefs. The present study is concerned with the revision of spatial beliefs, particularly with beliefs about the arrangement of objects in space. In adult reasoners, variation processes are strongly guided by the linguistic asymmetries inherent in facts in cases where facts are presented as relational statements. The preference to relocate the located objects (LO) as over the reference objects (RO) has been termed the "LO-principle". With the present study, we investigated how varied levels of reading capability affect model variation. Primary school children of 2nd, 3rd and 4th grade performed in tasks where they mentally constructed and revised beliefs about object arrangements. The results show that children with better reading skills (in grade 4) revise models more often in accord with the LO-principle compared to children with low-level reading skills (in grade 2). In contrast, the process of model construction was not affected by reading skills.

Moderate money, more binding: Attended distractors are not equally bound into event file

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An explanation of the distractor-response binding (DRB) effect (Frings, Rothermund & Wentura, 2007) is that distractors are integrated with the target response into an event file. If the distractor is encountered again, the whole event file including the saved target and response is retrieved. A partial mismatch of event file and current encounter leads to slower responses and more errors than a full match. We investigated if the strength of a distractor influences the DRB effect. Participants had to manually respond to the screen position of a bank note (5, 10 or 20€) which indicated potential extra payment. Participants knew that for a randomly selected trial, they would receive the payment indicated – if the response was correct and faster than 500 ms. This variation was used as a manipulation of the distractor strength. We assumed that the DRB effect would be stronger with the higher value. Instead, we found an overall DRB effect which was mainly driven by the 10€ bank note. We chart ways to clarify the basis of this modulation and discuss why and under which conditions an inverted-U-shaped vs. a monotonous relationship between distractor strength and DRB effect can be expected.

Modelling the influence of stereotypes in decision making

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Previous studies could show an influence of stereotypes on decisions. For example, when female product testers recommended soccer balls – an object category mainly associated with men – participants were less likely to choose the recommended object than if the same object was recommended by men. Even if the participants were explicitly told to ignore stereotypes, a large number failed to do so. However, with prior notice that stereotypes were to be ignored, some of the participants tended to overcorrect for the presented gender information. It is not yet clear, in which way stereotypes are incorporated in the decision making process. We present a set of novel models, which treat stereotypes as part of a compound cue. In these models, the cue validity of the tester can be boosted or diminished, depending on whether the gender of the tester fits to the given object category. In one model, only the validities of matching testers are modified, in the second one only the validities of the testers whose gender does not match, and in the final model, both are modified. The modified validities are then used to calculate a subjective Bayes posterior for each option based on the formula from Lee and Cummins (2004). We compared the performance of these models to a model based on the unmodified Bayes posterior to predict participants' decisions. Our results suggest that most participants incorporate stereotypes by modifying the validities of cues which do not match in terms of stereotype.

Using parameters obtained in intensive longitudinal designs to predict experimental effects: Exploring reliability and power

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Prior research has shown that within-person process parameters (operationalized as random slope parameters in intensive longitudinal designs) can predict a variety of outcomes. For example, inter-individual differences in the intra-individual coupling of stress and affect (coined stress reactivity) predict various mental health outcomes and even mortality. As we will show, such parameters can also be used to predict experimental effects: Using data from an empirical study, we demonstrate that the intra-individual coupling of daily competence and daily well-being moderates the effect of a subsequent experimental frustration of the need for competence in a laboratory setting. We will further present results from simulation studies exploring design characteristics that are necessary to (a) reliably assess inter-individual differences in such within-person processes and (b) obtain sufficient statistical power to detect this moderation effect. Specifically, we will show that – given certain conditions – 25 measurement occasions in the intensive longitudinal design phase can be sufficient to obtain satisfactory reliability in the within-person process estimates. However, as expected, the most important factor in determining the statistical power for the moderation effect is the number of participants. We will conclude with recommendations regarding design characteristics for the

analysis of inter-individual differences in within-person process parameters as predictors of experimental effects.

The multiple faces of complex problems: A model of complex problem solving competency and its assessment

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Recent discussions in the realm of Complex Problem Solving (CPS) research have highlighted the potential and need for a broader view on handling complex problem situations (e.g., Funke, Fischer & Holt, in press, Schoppek & Fischer, 2015). Following this line of argumentation, we present a competency model for complex problem solving (CPS) building on a differentiation from the domain of industrial and organizational psychology, namely Knowledge, Skills, Abilities and Other components (KSAO). Due to its roots in the analysis of job requirements and work tasks, the differentiation of KSAO offers a way for systematic theoretical and empirical investigation by building on established empirical approaches and an integration of insights beyond current narrow operationalizations of CPS. The KSAO model of CPS competency can serve as a point of integration for systematic research, targeting assessment and theoretical development of CPS competency, and as a theoretical framework, allowing for a translation and connection of findings from the domains of CPS research and industrial and organizational psychology. In our presentation, we introduce the model, its features and conceptual background, highlight specific aspects for the case of CPS via exemplary domain-general and domain-specific components and empirical findings in each of the categories, and review established conceptualizations of CPS in light of the model. Implications for various strands of research and future directions of empirical investigations are discussed.

Neural correlates of maternal sensitivity and emotion regulation in mothers with a history of childhood abuse

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Maternal childhood abuse poses a strong risk for the development of children. Parenting has been identified as one mechanism of risk transmission, as mothers with childhood abuse often show reduced levels of maternal sensitivity. One possible neurobiological factor of this pathway might be fronto-limbic brain activity, comprising structures of the emotion regulation, the salience and the empathy network. Alterations in activity in these brain regions could be associated with maladaptive parenting. In the present study, mothers with (N=22) and without (N=25) experiences of physical and sexual abuse during their own childhood and their children

(6-12 years) were drawn from a community sample. Maternal sensitivity was assessed in a real-life, standardized mother-child-interaction. Mothers took part in an fMRI-experiment in which they were asked to vividly imagine conflict and pleasant interactions with their own and with an unknown child (script-driven imagery). Brain activity (BOLD response) when imagining conflict and when imagining pleasant interactions with their own child was compared between the two groups: Mothers with a history of childhood abuse show higher responsivity to conflict interactions, while controls show higher responsivity to pleasant interactions in structures of the salience and the empathy network. Mothers with childhood abuse also show decreased functional connectivity in regions important for emotional and self-referential processing during imagination of conflict situations compared to controls. Correlation analysis revealed associations between brain response and maternal sensitivity. The results highlight potential neural underpinnings of reduced maternal sensitivity in mothers with a history of childhood abuse and contribute to a better understanding of the intergenerational transmission of abuse.

Intervention in dangerous situations: The role of perceived intervention risk when injustice sensitivity toward others does not predict moral courage

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There is a well-documented link between a person's injustice sensitivity and his/her likelihood to act morally courageous. Herein, we present four studies in which we show that the predictive character of injustice sensitivity is only present in situations which do not involve physical violence such as (1) situations involving norm violations at the work place or (2) situations involving discriminating paroles toward minorities. Moreover, we find that the anticipated intervention risk moderates this differentiated relationship between injustice sensitivity and moral courage. Study 4 aims at disentangling whether the missing link between injustice sensitivity and moral courage in potentially harmful situations is due to the violence content or, more generally, due to the anticipated costs per se.

Visual-tactile calibration conforms tactile dominant adaption

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We dynamically adapt our sensory perception to the environment (supervised) or to another sensory cue (unsupervised) during the life. Previous studies suggest that vision is calibrated by touch to obtain more accurate size perception. However, to the best of our knowledge, no one has studied the effect of touch on vision in spatial position perception. A novel vibrotactile belt, which consists of fourteen minatory vibration motor, was used in our multisensory visual-tactile

calibration study. We have presented visual-tactile stimuli with a cue-conflict to the subjects and asked them to make a decision about their own perceived position. We also asked them to report their confidence in each decision. The results illustrated that although the relative reliability of the visual cue was more than tactile, the visual PSE moves significantly towards the tactile PSE and reached close to the tactile PSE during the calibration. However, no changes were observed for tactile PSE. Subject were significantly more confident in high reliability visual stimuli in comparison to high reliability tactile stimuli. The results are in agreement with previous findings about size perception and also suggest that tactile dominant adaption model is the best explanation for visual-tactile spatial calibration.

The off-center effect in soccer penalty kicking as an approach to distinguish different thresholds of perception in a natural task environment

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Dehaene et al. (2006) proposed a testable taxonomy that distinguishes different processing types: subliminal, preconscious, and conscious processing. We focus on a more applied finding, the off-center effect in soccer penalty kicking (e.g. Masters et al., 2007), to analyze predictions of the Dehaene model in a naturalistic task environment. The off-center effect describes the fact that goalkeepers can influence the penalty taker's decision-making by positioning themselves marginally away from the goal's center. Importantly, in this cases penalty takers report to be not aware of any displacement, but still kick more often to the bigger goal side. This points to an unconscious effect of the goalkeeper's position on the penalty taker's decision making. However, we did not manipulate stimulus strength, an important factor in the model, that, together with the allocation of attention, determines the processing mode, as is usually done in cognitive sciences (i.e. by reducing the presentation duration), but varied the physical distance of the goalkeeper to the goal's center. Bigger displacements are considered stronger stimuli, whereas smaller displacements are considered weaker stimuli. Here, advantages and disadvantages of the off-center paradigm in analyzing unconscious processing of visual information in natural task environments are discussed.

Cognitive control of auditory selective attention: Preparation enhances distractor suppression, not target selection

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The goal of the present study was to investigate preparatory mechanisms of auditory selective attention. Participants performed a magnitude-judgment task on one of two dichotically presented spoken number words, one spoken by a female, one spoken by a male. A cue indicated which gender participants had to attend to in the upcoming trial, so that attention

switches and repetitions occurred randomly. The cue-target interval (CTI) was either 400 ms or 1200 ms. Stimulus onset asynchrony (SOA) between target and distractor word was -200 ms, 0 ms, or 200 ms, hence, the distractor could be presented before or after the target, or simultaneously. Previous studies revealed only small effects of CTI on attention switches, or no effect at all (e.g., Koch et al., 2011, JEP:HPP). The results of the present study confirmed that increasing the CTI did not reduce switch costs in reaction times (RTs). However, when the distractor was presented before the target, participants responded faster when the CTI was 1200 ms than when the CTI was 400 ms. CTI did not influence RTs when the target was presented first or when target and distractor were presented simultaneously. Increased time to prepare for the attentional focus of the upcoming trials thus seems to improve distractor suppression without improving target selection. This occurs independently from the attentional focus of the previous trial.

Need for Interpersonal Touch: How briefly touches make us feel confident

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Touch can be considered the earliest form of communication in social interaction (Reite, 1990). It plays a crucial role in intellectual, emotional, and social growth (Field, 2002). Researchers investigating in research of touch demonstrated the importance of touch in multiple settings (e.g., Crusco & Wetzel, 1984; Guéguen & Jacob, 2005; Hornik, 1992). The best-known effect is the Midas Touch, which described the effect that tipping rates were significantly higher when waitresses touched a customer on the hand or shoulder compared to no physical contact (Crusco & Wetzel, 1984). A widely accepted explanation is that touch as a nonverbal signal is a more genuine form of communication and able to increase compliance. Which mechanisms underlie the relationship between touch and recipients' response, however, is not yet entirely understood (cf. Gallace & Spence, 2010). Even if there are several explanations for the consequences, individual differences in interpersonal touch had not been the focus, but proved as origin of need for haptic information (e.g., Nuszbaum, Voss, Klauer, & Betsch, 2010). The present study investigates individual differences in the automatic use of haptic information from interpersonal touch. A questionnaire assessing individual differences in the Need for Interpersonal Touch (NFIPT) was developed and validated within an unrelated product-evaluation task. Before entering the laboratory, participants were briefly touched on the shoulder or received no touch. Moderating effects of NFIPT on confidence and frustration were measured by the following product-evaluation task. Results showed that higher NFIPT participants were more confident in judgment when they were briefly touched. Effects on frustration were not evident for NFIPT. Research on NFIPT is in its infancy. Research on culture, age, gender, and the interaction with other facets of personality like social anxiety is pending. Implications for different contexts like social media are discussed.

The effect of phonological similarity and articulatory suppression on serial recall: A test of the SOB-CS model

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Immediate serial recall of verbal lists is impaired when list items are phonologically similar to each other. This phonological-similarity effect is abolished under articulatory suppression. These two findings constitute a central piece of support for the phonological-loop model (Baddeley, 1986). Both findings can also be explained by an alternative model, SOB-CS (Oberauer, Lewandowsky, Farrell, Jarrold, & Greaves, 2012). The SOB-CS model makes additional predictions that differ from those of the phonological-loop model: Phonological similarity has a detrimental effect on order memory but a beneficial effect on item memory. Both effects occur also under articulatory suppression. Articulatory suppression adds interference from irrelevant material, which impairs item memory more than order memory. As a consequence, the beneficial effect of similarity contributes more strongly to correct list recall under articulatory suppression, thereby abolishing the similarity effect on list-recall accuracy. Two experiments confirm the predictions of SOB-CS and contradict those of the phonological-loop model.

Users' handedness and performance when controlling integrated input devices - Implications for automotive HMI

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In modern technical environments, we are confronted with tools transforming body movements into tool movements to extend our own capacities (e.g., controlling the centrally integrated input device of an in-car HMI while driving), and to enlarge or strengthen single parts of our body (e.g., using advanced driver assistance systems). However, tool use often challenges the human information processing system. Especially, when spatial and/or spatial-temporal trajectories of body and tool movements do not correspond, human movements become slow and inaccurate. This study investigated the impact of handedness on simple and complex tool actions. In pointing and point-drag-drop tasks, right- and left-handed users controlled the cursor with a movement- or force-controlled input device (touchpad vs. trackpoint). In both tasks, response times, but not errors increased for trackpoint compared with touchpad use. Any performance differences between left- and right-handed users in general were not observed, but an interaction with the dominant and non-dominant hand in action. Right-handed users' response times were higher for their non-dominant hand, especially in point-drag-drop tasks. Surprisingly, for left-handed users we did not observe any performance difference between their dominant and non-dominant hand. Additionally, more pronounced practice effects were observed for right-handed users than for left-handed users. Results showed that right-handed users, but not left-handed users were less skilled with their non-dominant hand. This became very apparent in complex tool actions. We assume that most tools and tool environments are designed for right-handed usage, so that left-handed users are often forced to use their

non-dominant (right hand) for proper usage. Consequently, fine psychomotor abilities of their non-dominant hand must be better developed. Recent results confirm this. Implications for applied issues, e.g., automotive HMI, and for further research will be discussed.

What's that smell? – Training-based olfactory plasticity in young adults

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There is considerable evidence that olfaction is, in many ways, a "learned" sense, showing experience-induced plasticity in both central circuits and peripheral receptors even in adulthood. Although this has been demonstrated in humans, the focus has been on single chemicals to which some individuals are initially insensitive. We sought to explore the behavioral and neuronal mechanisms of learning induced olfactory plasticity. Specifically, we tested (1) the possibility of enhancing sensitivity to complex odors through exposure, (2) the role of cognitive engagement, and (3) the extent of transfer of learning to unexposed odors. For this, thresholds and olfactory event-related potentials (OERPs) for exposed and unexposed odorants were obtained before and after a training involving either active odor identification or mere odor exposure. Behavioral results suggest that intermittent odor exposure enhances threshold sensitivity and that cognitive engagement may further enhance generalization to previously unexposed odorants. Cognitive engagement from odor discrimination compared to passive smelling resulted in enhanced activity of amodal attention networks possibly reflecting attentional engagement for previously task-relevant odors. Retesting (pre versus post) yielded a suppression of the OERPs for unexposed odors (not presented during training) but not for exposed odors (presented during training); these effects were localized to left superior temporal areas during periods encompassing the N1 (340-640 ms) and the late positive component (750-1845 ms). Taken together, the results provide support for the notion that repeated exposure augments olfactory sensitivity and suggest that these effects are mediated by increased attention counteracting repetition suppression.

The effect of scene semantics on eye movement control during development or what the milk in the bathroom can tell us.

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Where would you look for the milk? Probably neither in the bathroom, nor in the bedroom, because adults are effective scene searchers. In order to study this every-day observation in the laboratory, adults are presented with scenes containing an object that semantically either fits or does not fit into the scene context (e.g., shampoo vs. milk in the bathroom). As a regular finding, the observers' gaze dwells longer on objects that are incongruent, reflecting their prior knowledge about which objects belong into a particular context. When does this congruency

effect conveyed by the semantics of a scene emerge during development? To answer this question we recorded eye movements of three-year old children and adults (n = 8 each) during a visual search of photographs of daily-life scenes in an entirely gaze-contingent paradigm. The search target was present in 29% of the trials. These served as filler trials. In the remaining trials, the scene did not contain the search target, but an object that was either semantically congruent or incongruent with the scene. We found a trend for an increase of the semantic congruency effect in dwell time with age, when comparing three-year olds to adults, but also when considering age within the group of three-year olds alone. This effect was driven by a larger number of fixations on the critical object rather than a longer duration of fixations. These preliminary findings imply that children by the age of three are not as sensitive as adults to semantic incongruency in scenes, but that this age might mark an important step in the development of scene knowledge. We are now aiming at replicating and extending these findings, using different tasks, a broader age range, and other measures of scene knowledge for further validation.

Do they fear less? - Potentiale und Grenzen psychologischer Begleitforschung in technisch orientierten Verbundprojekten am Beispiel des AAL-Projekts FEARLESS

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Universität Bamberg

Wie kann ein intelligentes Hausnotrufsystem das Sicherheitsempfinden von alleinlebenden älteren Menschen verbessern und dadurch zu einem selbstbestimmten Leben in ihrer gewohnten Umgebung beitragen? Das europäische Verbundprojekt FEARLESS suchte nach Antworten auf diese Frage. Ziel der interdisziplinären Projektarbeit war es, im Dialog mit potentiellen Nutzerinnen und Nutzern ein Hausnotrufsystem zu entwickeln, das Stürze und andere Gefahrensituationen im häuslichen Umfeld automatisch erkennt und selbsttätig einen Notruf auslöst. Das Projekt wurde von Psychologinnen und Psychologen der Universität Bamberg wissenschaftlich begleitet. Ausgehend von einer nutzerorientierten Sicht wurden zwei kulturvergleichende Bedürfnisanalysen durchgeführt. Neben älteren Menschen (N=259) wurden auch Angehörige (N=215) und Angestellte von ambulanten Pflegediensten (N=22) befragt. Auf der Basis dieser Studien wurden technische Anforderungen formuliert und ein Modell zur Technikfolgenabschätzung entwickelt. Das Technological Impact Assessment Model (TIAMo) beschreibt das Zusammenspiel von technischen, betriebswirtschaftlichen und psychosozialen Aspekten und stellt Hypothesen darüber auf, wie ein intelligentes Hausnotrufsystem zum Wohlbefinden von alleinlebenden älteren Menschen beitragen kann. Im weiteren Verlauf des Projekts diente das Modell als theoretisches Bezugssystem für die interne Kommunikation sowie die Projektevaluation. Mit unserem Beitrag wollen wir demonstrieren, wie sich die Ausrichtung des Projekts durch psychologische Theorien und Methoden verändert hat und auf psychologische Probleme hinweisen, die durch den Betrieb eines solchen Systems entstehen können. Außerdem geben wir einen Ausblick auf zukünftige Forschungsvorhaben zur Förderung von Wohlbefinden, Selbstbestimmung und sozialer Teilhabe im Alter, bei denen wir uns verstärkt der Suche nach Alternativen zum Einsatz von High-Tech-Lösungen widmen wollen.

The role of working memory in dual-task performance

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The present study aims to explore the role of executive functions in multitasking. Research has shown that usually severe performance decrements arise in dual-task performance as compared to single task performance. This reflects a limitation in processing temporally overlapping information. Interference between tasks arises due to a bottleneck process limited to processing only one task at a time. It has been proposed that this interference is resolved by executive functions. To test this proposition, a working memory task and a dual-task paradigm are combined. Because working memory involves executive functions, an interaction between the dual-task and the working memory task would indicate that the dual-task paradigm also involves executive functions. To test this question, we merged the psychological refractory period (PRP) paradigm with a working memory complex span task. Participants were presented with a sequence of letters to remember, followed by a task block in which they had to perform either a single task or a dual-task, and finally were asked to recall the letters. Results showed that working memory performance, i.e. the amount of letters recalled in the correct order, decreases when performing a dual-task as compared to performing a single task. This supports the assumption that PRP dual-tasks demand executive functions in working memory.

Measuring response times using three response alternatives in a decision task

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Response time measures are widely used in psychology to draw inferences about cognitive processing costs in controlled experimental tasks. Since response times also depend on response implementation, such as hand dominance and how easy it is to register a response motorically, experimental tasks are typically designed to measure response times for binary contrasts at most (e.g., yes/no, same/different), where each response option is registered by a unimanual response (left hand or right hand). Allowing for the collection of three response alternatives eliminates the need for a decomposition of the task into pairwise binary contrasts across experimental blocks, which would require participants to reassign hand/response associations throughout an experiment. To measure response times for a task involving three response alternatives, we have developed a task set-up where unilateral responses used to register two response alternatives are supplemented by an additional bimanual response (left and right hand simultaneously) to register a third response alternative. In addition to the implementation of three response alternatives, we included a motoric baseline task, where response time asymmetries based on differences in handedness, but also in motoric differences between unimanual and bimanual responses, can be assessed independently from the experimental task at hand. Task set-up will be discussed based on a recent experiment where

three response alternatives were available when performing a simple decision task involving three categories. In this experiment, participants had to determine whether a visually presented face pair represented two male faces, two female faces or one male and one female face. Unimanual responses were used for the presumably binary distinction (male or female), and a bimanual response for the mixed response. In addition to response times, eye tracking data will be discussed.

Values system for athletes and non-athletes students: Comparative study

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The subject of values is important topics in psychology because it was determinants of the behavior of the human, and therefore got the attention of many scientists and researchers. So this research interested in studying the patterns of value for student athletes in Soran University in Kurdistan region and their peers from non-athletes. This research aims to identify the values system of the students and the significance of the differences in that depending on the variables of gender, grade, age and specialization. The research use the descriptive approach which depends on application of Allport , Vernon and Lindsey scale on a sample of students were selected among Soran University students. The Sample consist (154) students majoring in sports and (154) students in other disciplines .The researcher used the Statistical package for Social Sciences (SPSS) in data analysis. In light of the results it was presented a set of recommendations and proposals.

A Bayesian hierarchical mixture approach to strategy classification in multiple-cue judgment

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To make decisions about objects described on multiple cue dimensions, people can rely on several, qualitatively different strategies. A common distinction is between cue-abstraction strategies, which make a decision based on rules abstracted from previous experiences; and exemplar-based strategies, which make a decision based on a comparison with previously experienced exemplars stored in memory. Several studies have shown that people select among these two classes of strategies depending on various characteristics of the judgment task, such as the statistical structure of the environment (e.g., linear vs. non-linear), type of learning environment, and the cognitive resources available (e.g., time pressure). To classify decision makers as users of cue-abstraction vs. exemplar-based strategies, previous analyses have mainly relied on maximum-likelihood estimation with subsequent comparison of model fit. Here, we propose a latent-mixture approach based on Bayesian hierarchical parameter estimation. The mixture component allows to identify latent groups of individuals relying on the different strategies, while the hierarchical distributions capture individual differences within each group.

We illustrate our approach by analyzing differences in selection of cue-abstraction and exemplar-based strategies between different training conditions (learning-by-comparison vs. direct criterion learning). For this context, we elaborate how the conclusions regarding strategy selection and individual differences within each strategy class differ from classification based traditional, non-hierarchical techniques.

The analysis of computer mouse movements can reveal the temporal dynamics of decision evolvement in the Ratio Bias task

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Eotvos Lorand University

People can experience conflict between competing responses on several reasoning tasks, as reflected by response latency and post-decision confidence measures. However, these regular metrics don't allow us a complete understanding of the underlying processes, since they give us information only about the result of the decision, not about their development. In this research, we attempted to apply the response dynamics paradigm by recording and analyzing the computer mouse movements of participants in the Ratio Bias task. The analysis of aggregated trajectories revealed that people tend to prefer the non-chosen option in the early phase of the decision process in the incongruent trials. Furthermore, the trial by trial categorization of the trajectories (applying Freeman's Maximum Deviation threshold) showed that people were not biased towards the heuristic answer in numerous incongruent trials.

Temporary negative compatibility effects in RT and accuracy distributions in the Egly paradigm

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To study the within-trial time course of attentional selection, we analysed RT and accuracy in the Egly paradigm (Egly, Driver, & Rafal, 1994). We focus on the conditional probability (or hazard) functions of response occurrence and on the conditional accuracy functions. In 89% of trials, a cue appeared shortly at one of the four ends of two vertical or horizontal rectangles. In 75% of cued trials, this cue was valid and the 100 ms target arrow appeared with a cue-target SOA of 150 ms. In the invalid cue conditions, the target either appeared at the other end of the cued rectangle (invalid same) or at one end of the uncued rectangle (invalid different). Participants had to discriminate the target orientation (left/right). In the uncued trials, we observe the expected positive compatibility effect (PCE) between target location (left/right from fixation) and target arrow orientation (left/right): faster and more accurate responses when the target location is consistent with the target orientation. In the invalidly cued trials, we observe a temporary negative compatibility effect (NCE; faster and more accurate responses in inconsistent trials), but only in the invalid same condition when the rectangles are oriented

horizontally, and only in the invalid different condition when the rectangles are oriented vertically. This suggests that the second covert attentional shift from the invalid cue to the target can also cause interference temporarily. In the validly cued trials, we observe the expected PCE for vertically oriented rectangles. For horizontally oriented rectangles, however, and for most subjects, we first observe a PCE around 80 ms after target onset, followed by an unexpected NCE around 160 ms after target onset: Perhaps there is a quick spread of visual attention across the rectangle which temporarily generates a response in the direction of the spread, or perhaps the NCE is caused by the direction of microsaccades (Kliegl, Rolfs, Laubrock, & Engbert, 2009).

The influence of deception on memory and metamemory: A multinomial processing tree analysis

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When confronted with a question, the truthful response usually receives the highest activation in long-term memory and has to be suppressed in order to generate a lie. Thus, the generation of a lie is more effortful and takes longer than telling the truth; consequently, it is cognitively less fluent than the latter. Fluency manipulations have been found to typically increase metamemory predictions (e.g., Judgments of Learning [JOLs]) but to actually decrease memory performance (Besken & Mulligan, 2014). We employed lie generation as a fluency manipulation to replicate those findings and extended our paradigm to further examine source guessing conditional on item memory, which has been shown to occur when participants hold beliefs about the different memorability of item classes. In two experiments, participants (N = 56) were instructed to generate a lie or respond truthfully to general knowledge questions, followed by item-by-item JOLs after each response. A recognition test (Experiment 1) or a source memory test for the type of answer (whether an item produced at encoding was a lie or truthful answer to a question; Experiment 2) followed. Results were generally in line with previous research. Lies produced longer response latencies and lower JOLs than truthful responses. Contrary to our predictions, lies and truthful responses produced equivalent recognition and source memory performance, likely due to a ceiling effect. Additional analyses with Bayen, Murnane, and Erdfelder's (1996) two-high-threshold multinomial model of source monitoring showed a guessing bias towards guessing such that a response had been a lie only for items that were not recognized, but guessed to be old. Therefore, generating lies produced a single dissociation between JOLs and memory performance. We conclude that lie generation could be considered as a manipulation of fluency, as it produces comparable results as some other fluency manipulations.

An experimental validation of sequential multiple-choice tests

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Presenting answer options sequentially one after another has been proposed as an alternative to the traditional, simultaneous presentation of multiple-choice response alternatives. When options are presented sequentially, test-takers can no longer compare all available answer options with regard to their plausibility, and have to assess the correctness of each answer option separately in sequential yes/no decisions. A potential advantage of this method is that it may be less vulnerable to the use of testwiseness cues than traditional multiple-choice tests. However, responses to sequentially presented answer options may be influenced by response biases, as for example the tendency to prefer early over later options. Recent correlational analysis found no differences in reliability and criterion-related validity for the two test formats. In the present experimental investigation, we induced various degrees of knowledge in a domain of which participants had no knowledge. Using this improved external validation criterion, we found that test scores in both test formats reflected experimentally induced knowledge levels equally well. Presenting answer options sequentially was thus found to be a viable alternative to the standard simultaneous presentation mode for multiple-choice items.

Upside-down: Static reference frames influence multiple object tracking

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Observers can spread their visual attention across multiple moving objects simultaneously. This ability is often studied with the multiple-object-tracking (MOT) paradigm. Participants' task is to keep track of multiple moving target objects among indistinguishable distractor objects. While MOT displays are often flat (two-dimensional), a number of recent studies used virtual three-dimensional MOT displays, such as spheres moving on a virtual floor-plane. With the present set of experiments, we explored the influence of static reference frames on MOT. Participants tracked two target spheres among ten distractor spheres moving on a virtual three-dimensional floor-plane. Across trials, we presented the tracking scenes either upright or upside-down. In the upside-down condition, the spheres appeared to move on the ceiling. This allowed us to manipulate the reference frame while keeping all other factors known to influence tracking performance constant, such as inter-object spacing or speed. Tracking performance was impaired in the upside-down as compared with the upright condition. We further examined this effect by manipulating the congruence between tracking-display orientation and head orientation. The tracking display appeared on either the top or the bottom of a large vertical screen. Thus, participants' head was either oriented downwards seeing an upright (congruent) or upside-down (incongruent) tracking display or their head was oriented upwards seeing an upright (incongruent) or upside-down (congruent) tracking display. The upside-down orientation impaired tracking performance regardless of head orientation. Summarizing, static reference frames influenced tracking performance demonstrating that

tracking is influenced by factors beyond the distribution of visual attention across object positions in the two-dimensional projection plane.

Retrieval practice fails to insulate episodic memories against interference after stroke

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Regensburg University

Recent work in cognitive psychology has shown that retrieval practice of previously studied information can insulate the tested information against retroactive interference from subsequently studied other information in healthy individuals. The present study examined whether this beneficial effect of retrieval practice generalizes to persons with stroke. Twenty-four patients with stroke, 5 months post stroke, and 24 healthy controls participated in the study. In each of two experimental sessions, participants studied a list of items and underwent a practice phase in which items were either retrieval practiced or restudied. After that, participants either studied a second list of items or fulfilled an unrelated distractor task. At the end of each session, participants' memory for the first list was tested in a final criterion test. Results in the final test showed a retroactive interference effect for the restudied items in both patients with stroke and healthy controls, with similar effect sizes in the two subject groups. In healthy controls, the retrieval-practiced items showed a reduced interference effect compared to the restudied items. In contrast, in patients with stroke, no such effect of interference reduction after retrieval practice was observed. The findings indicate that retrieval practice of previously studied information fails to insulate the tested material against retroactive interference from subsequently studied information in patients with stroke. Such failure may substantially contribute to patients' memory impairment in real life.

It depends: Approach and avoidance reactions to emotional expressions are influenced by the contrast emotions presented in the task

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In the last years, several studies examining approach and avoidance reactions to emotional expressions have been published. These studies often yielded conflicting results. For example, expressions of anger have been reported to elicit approach reactions in some studies but avoidance reactions in others. Nonetheless, the results were often explained by the same general underlying process, namely the influence that the social message signaled by the expression has on motivational responses. It is therefore unclear which reaction is triggered by which emotional expression and which underlying process is responsible for the reactions. In order to shed some light on the mixed results, we examined the role of a potential moderator on approach and avoidance reactions to emotional expressions, namely the contrast emotion. We believe that different approach and avoidance reactions occur depending on the

congruency or incongruency of the evaluation of the two emotions presented in the task. Depending on this congruency, different features of the expression (e.g., valence, social message) should become salient and trigger the response. This might result in an approach related reaction to specific negative expressions. The results from a series of experiments supported these assumptions: Negative emotional expressions (anger, fear, sadness) elicited avoidance reactions if contrasted with expressions of happiness. However, if contrasted with a different negative emotional expression, anger and sadness triggered approach reactions and fear activated avoidance reactions. Importantly, this result also emerged if the emotional expression was not task-relevant. We propose that approach and avoidance reactions to emotional expressions are triggered by their evaluation if the two emotions presented in a task differ in evaluative connotation. If they have the same evaluative connotation, however, reactions are determined by their social message.

Accounting for others' taste effect of desired and undesired social groups' ratings on the appreciation of art

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This study assesses impact of social contextual information on the liking of art. Context has a powerful impact on our art evaluations. Despite some outstanding arguments in its philosophy of a highly personal or universal context-free basis for judgments, there is overwhelming evidence that when we do approach art, our perception and appraisal are made under the influence of a wide range of socio-cultural, environmental, and psychological elements. In fact, according to Gartus and Leder (2014, p. 311), art, due to its deep ties to human personality and culture, is "particularly sensitive to the context in which it is experienced". Surprisingly however, one factor that may have one of the most powerful impacts on how we judge art - social context or social "distinction," whereby we use our engagement as a means of joining or distancing ourselves from other social groups (e.g., Bourdieu, 1968) - has been largely ignored in empirical research. To test social impact, a group of art-naïve university students (N=187) was asked to rate a set of 90 paintings for liking, using a 7-point Likert-type scale. Before painting presentation, participants were primed with information that one of three social groups - fellow students (peers), art museum curators (experts/socially desirable group), or long-term unemployed (undesirable) - had rated the painting positively or negatively on the same scale. These were compared against a control condition in which paintings were rated without information. Paintings with high ratings by peers and art experts led to higher participant liking ratings. In contrast, paintings with low rating by the unemployed group led to higher liking ratings. Social priming was also modulated by level of identification with the social groups. These results provide first empirical evidence of social "distinction" impact on art rating, and form an important area for future research in museum/consumer/aesthetic decisions or preference judgments.

Alertness training improves visual processing speed in healthy elderly adults

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Perceptual processing speed is heavily affected by aging, with manifold consequences for daily life and independence. Thus, reports of significant processing speed training benefits in seniors are highly promising. However, the underlying mediators of these benefits are underspecified and could include diverse attentional and motor functions. Because the potential influences of these functions could not be disentangled, it is not clear whether such trainings really improve their targeted function, i.e. attentional processing speed. We used an approach based on the Theory of Visual Attention (TVA) to test whether a training of fast motor responses (the CogniPlus Alertness training) i) transfers to perceptual, i.e. attentional parameters and ii) specifically improves the targeted mechanism, i.e. TVA parameter visual processing speed C. To control for unspecific and simple retest effects, the specific training group (n = 25 elderly participants) was compared to demographically matched groups, a passive control group (n = 25) and an active control group receiving unspecific working memory training (n = 25). Training consisted of 16 sessions lasting 45 minutes each. We found a significant training x group interaction: visual processing speed was significantly enhanced from pre- to post-test in the alertness training, and not in the two control groups. On the basis of the theory-driven approach, we demonstrated that a training of fast motor responses designed to enhance alertness accelerates perceptual processing speed in healthy seniors. The identification of such a specific transfer to the targeted attention parameter is decisive as it allows precise conclusions about the neuro-cognitive changes underlying the training benefits. Finally, the finding of a processing speed benefit indicates that alertness trainings in the elderly might indeed lead to a significant increase of neuro-cognitive reserve.

Error and feedback processing in social anxiety

Jutta Peterburs

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Fear of (social) performance situations and negative evaluation is a core symptom of social anxiety disorder (SAD). Even though evidence for altered performance monitoring in SAD has been accumulating, little is known about the impact of contextual factors on error and feedback processing in SAD. Using neuroimaging techniques such as EEG (i.e. event-related potentials, ERPs) and fMRI alongside computerized tasks, we investigate to what extent performance monitoring in SAD is modulated by social context. In this talk, I am going to present studies aimed to determine if error-related negativity (ERN), an ERP component associated with error processing, and feedback-related negativity, and ERP component linked to processing of performance feedback, are modulated by presence of an observer in SAD patients as compared to healthy controls. Moreover, I am going to present fMRI data showing that source of feedback, that is, if feedback is provided by a person or the computer, differentially affects activation patterns in prefrontal cortex in individuals with high or low social anxiety.

Object-based shifting of attention in working memory

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Working memory (WM) enables the retention of a limited number of items and the prioritization of a subset of items for processing by focusing attention on them. Current models of WM suggest that the same attentional mechanisms that are known from perception also operate in WM. In perception, shifts of attention between spatial positions within one object are performed faster than shifts between positions located on different objects. This within-object benefit can be explained by an automatic spread of attention within perceived object boundaries in visual cortex. Hypothesizing the same attentional mechanisms in WM as in perception, we tested whether the within-object benefit can be observed, both on the behavioral and neural level, when subjects focus attention on spatial positions in WM. Subjects were presented two objects, each containing two highlighted spatial positions, and memorized all four spatial positions. Attentional shifts in WM were faster for spatial positions located on the same object compared with equidistant positions on separate objects as observed in a perceptual version of the same task. Analysis of fMRI activity in visual und parietal cortex using pattern classifiers (MVPA) revealed that the automatic spread of attention within object boundaries was also present for information held in WM. Specifically, when attention was shifted to a memorized position, activity in early visual areas was enhanced at the retinotopic location corresponding to the second position co-located on the same object. These results extend the hypothesized shared mechanisms of spatial attention in perception and WM by demonstrating this notion for object-based attention. This suggests that when object-like representations are held in WM, attentional selection includes activation of the complete object, thus accounting for the within-object benefit.

The effect of motivation on evaluating creative ideas

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Although the evaluation of creative ideas influences cultural trends, the career prospects of creators, the development of new companies and the manufacturing of novel products among others, we barely know anything about how to do it efficiently. Since there is no clear-cut criterion for distinguishing creative from non-creative products, their recognition depends on the judgment of appropriate decision boards. Here, we studied what features act as cues for perceiving the extent of creativity in products, as well as what conditions supported the recognition process. Four creativity-related features were manipulated with regard to the content of project descriptions. Subsequently, participants had to judge the creativity of the proposals by either rating them or investing into them. We found that increased motivation in the evaluation performance, influenced by internal and external incentives, was associated with

more successful evaluations as compared to the baseline group. Furthermore, the stimuli were judged more consistently if the vast individual differences in creativity definitions were unified in the task instructions. We discuss what enabled people to make successful evaluations, i.e. which factors intensified the agreement among the raters and led to a more solid recognition of creativity.

Pedestrians' observation time of approaching vehicles and its consequence for gap size estimation

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Technische Universität Chemnitz

One of the causes of crashes between pedestrians and motorised road users is the pedestrians' selection of improper gaps for crossing. This is somewhat surprising, as studies on the perception of object approach imply that although road users' judgment is far from perfect, they usually tend to err on the conservative side, i.e. they judge gaps much smaller than they actually are. However, one shortcoming of studies on gap size estimation is that participants are usually presented with scenarios for a duration that is preselected by the experimenter, and probably not representative of their subjective information need. The goal of our experiment was to assess for how long participants would choose to observe an approaching vehicle before coming to a crossing decision, and whether that observation time would be sufficient to estimate gap size on the same performance level usually found in controlled studies. The results imply that with gaps that are clearly too small or large enough, observers come to rather fast decisions. Gap sizes in between go with a somewhat longer observation duration. However, variations in observation duration had only minimal influence on the quality of gap size estimation. Still, certain individual extreme values might be considered indicative for instances in which the potential for misjudgments is increased.

Perception at a glance: The development of high-level categorization

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Adults and infants have been shown to discriminate abstract categories of natural objects (Quinn & Johnson, 2000, Macé et al., 2009), but it is unclear whether this performance is based on high-level visual representations or low-level perceptual cues (e.g., power-spectrum). Prior studies (Grossmann et al., 2009; Jeschonek et al., 2010) found category discrimination in 7-11 month-olds on post-perceptual ERP components (Nc, PSW). In the present study, we use a Fast Periodic Visual Stimulation Task while recording EEG to compare perceptual categorization of canonical and phase-scrambled pictures of animals and furniture items in infants and adults. This paradigm provides an implicit, objective, and robust measure of visual categorization (Rossion, 2015). Participants were tested with short sequences in which 4 items of the same

category were presented consecutively (standard category) at 6.03 Hz (6 images/s). Every 5th image belonged to the other (oddball) category. The oddball response and harmonics (1.21 Hz; F/5; nF/5) were used as indicators of discrimination. In adults (N=13; 4m), oddball responses centered on P8 were observed in canonical (furn odd $p<.0001$, anim odd $p<.0001$) and scrambled conditions (furn odd $p<.0001$, anim odd $p<.001$). Categorization of canonical images remained significant after controlling for responses to scrambled images (all $ps<.0001$); thus, low-level visual cues did not explain high-level categorization. In 7-month-olds (N=51; 28m), oddball responses were observed in all but the furniture oddball condition (anim odd $p<.01$, furn scram odd $p<.05$, anim scram odd $p<.01$). The response to animal oddballs was only small and confined to single harmonics (3rd and 4th). It did not survive correction for scrambled images. In 4-month-olds (N=52; 23m), no oddball response was observed in any condition. Taken together, these findings suggest that fast abstract categorization at a glance can only be performed by adults, not by infants.

Fostering bystander norm interventions as a measure for the prevention of bullying: Results from a peer-based intervention program

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Although the majority of students disapprove bullying behavior in school, only a part of them intervene when witnessing bullying between their classmates. Bullying behavior constitutes a norm violation, especially when it is repeated and unprovoked. Following the participant role approach for bullying, defenders of the victim show interventions against such norm violations to stop the bully. Other group members, as outsiders, reinforcers and assistants of the bully, support the bully either actively or by omission to intervene and therefore constitute targets for a training to enhance active bystander behavior against peer aggression. To this aim, a bystander intervention training for students was developed which focuses on individual level (competences to intervene effectively) and class level variables (group processes, norms and participant roles). The classroom-based training was implemented through teachers who themselves had received in-service training before ("multiplicator approach"). The current study presents the evaluation of the Bystander Intervention Training for students. Data from 22 training and 26 control classes (N = 638 students) were collected at three occasions and analyzed using multilevel models. The central outcomes were the frequency of bullying and victimization, active vs. passive bystander intentions and empathy as a potential mediator. Results showed that the training reduced passive bystander intentions and bullying victimization over time. While the training enhanced the level of empathy, training effects were stronger for classes with high implementation quality. Taken together, the study shows that a bystander intervention training can be useful to promote interventions against norm violations like bullying. Peer bystanders constitute a powerful resource against aggression in school.

The retrieval of instructed stimulus-response associations relies on working memory capacity

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Our previous studies on item-specific priming have demonstrated that both Stimulus-Action (S-A) associations and Stimulus-Classification (S-C) associations can be formed by mere instruction. Just like acting upon stimuli, merely instructing S-A and S-C mappings during a prime trial lead to item-specific reaction time increases and accuracy decreases in a later corresponding probe trial when S-A and/or S-C mapping switched rather than repeated between prime and probe instance. This finding indicates that S-A and S-C associations were formed during primes and automatically retrieved during probes. Here, we investigated whether working memory capacity is necessary for instructed S-A and S-C associations to be consolidated and/or retrieved. In two experiments, we induced high versus low working memory load in between prime and probe instance, i.e., during consolidation, or during probe instances, i.e., during retrieval. Our findings clearly show that working memory load during consolidation did not affect the retrieval of instructed associations, whereas working memory load during retrieval prevented instructed associations from taking behavioral effect, implicating that they could not be retrieved. We discuss these findings within the light of current memory models of instruction-based stimulus-response associations.

Action-effect binding meets agency

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The subjective feeling of agency is a pervasive phenomenon that accompanies intentional actions. Feelings of agency are typically explained in terms of predictive mechanisms – mostly equated with internal forward models – and in terms of postdictive mechanisms – mostly equated with retrospective judgments –, with both mechanisms supplementing each other. We present new evidence for a third mechanism that contributes to feelings of agency: the integration of action and effect in an event file. More precisely, short-term integration of action and effect (measured via the retrieval of an effect-associated response) predicted agency ratings on a trial-to-trial level. This finding opens up a new perspective on feelings of agency and represents a first step towards reconciling theories on the sense of agency with effect-based accounts of human action control.

Stimulus-response vs. category-language binding in language switching

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We explored the influence of semantic and phonologic categories on stimulus-response (S-R) binding in language switching. In the basic experiment, a variable S-R mapping (each picture had

to be named in German and English, depending on the language cue) was compared against a constant S-R mapping (each picture was associated with only one language and, thus, had to be named in German OR English). Yet, the constant S-R mapping was present in the learning blocks only and was reversed in the final test block, so that each stimulus had to be named in the other language. The performance was better and language switch costs were smaller in the constant S-R mapping group as compared to the variable S-R mapping group. Furthermore, with constant S-R mapping, we observed a substantial DEcrease of switch costs during the learning blocks and an even larger INcrease in the test block. In further experiments, we used stimuli that belonged to semantic categories (e.g. animals vs. fruits) or phonologic categories (e.g. word starting with the phonem /b/ vs. /k/). That is, in the constant S-R mapping group, one category had to be named in one language while the other category had to be named in the other language during the learning blocks. This mapping was again reversed in the test block. Additionally, we either used the same or different stimulus pictures (and thus also responses) in the learning and test blocks. The overall pattern of results was comparable to the basic experiment, replicating the remarkable influence of S-R bindings on language switch costs. Whereas the use of semantic or phonologic categories only had a minor influence on the data pattern, the increase of switch costs due to the mapping reversal was more pronounced when using the same as compared to different stimuli in learning and test blocks. Taken together, these results indicate a relatively specific effect of a binding between stimulus and response rather than between a category and a language.

The temporal organization of behavior: Mechanisms of response order control

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Temporal organization of human behavior is particularly important when several action requirements must be processed at around the same time. A crucial and elementary challenge in such multitasking situations is to control temporal response order. However, multitasking studies usually focus on temporal processing dynamics after a specific response order - which is usually triggered by stimulus sequence and instructions - has been determined, whereas a comprehensive study of response order scheduling mechanisms is still lacking. Across three psychological refractory period (PRP) experiments, we examined the impact of stimulus order and effector system characteristics on response order decisions. Crucially, we utilized a combination of effector systems (oculomotor and manual) that is known to ensure reasonable response order variability in the first place. The results suggest that - contrary to previous assumptions - bottom-up factors alone (e.g., stimulus order) are not necessarily the primary determinant of temporal action scheduling. Instead, we found a major influence of response characteristics in form of an oculomotor task prioritization. This effector-based prioritization could be attenuated by both instructions and changes of the task environment (providing temporally predictable input), the latter being especially beneficial to increase multitasking performance accuracy. Importantly, substantial effects of task compatibility suggest that a dedicated stimulus code comparison mechanism precedes and affects response order decisions.

The results emphasize the extent to which cognitive control of action scheduling is adaptive to particular task requirements and further demonstrate the deep impact of response modalities on central cognitive processes.

Is ease of processing used as a cue for metacognitive judgments?

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The aim of this study is to investigate if ease of processing is used as a cue for metacognitive judgments before and during the learning process. According to the cue utilization approach (Koriat, 1997), ease of processing is a cue for metacognitive judgments. Based on this approach, students' processing of a deleted letter text should be less automatic and consequently, students should judge the text as more difficult to learn (ease-of-learning judgment), predict lower performance (judgment of learning), and they should make lower confidence judgments in the correctness of a given answer (retrospective confidence judgments). These assumptions were tested in two experiments where ease of processing was manipulated by letter deletion. In Experiment 1, ease of processing was manipulated within-person (n = 65), and in Experiment 2, ease of processing was manipulated between-person (n = 63). Students made ease-of-learning judgments after a text presentation for 2 seconds and after reading the text once. Judgments of learning were made after the first reading phase and after a re-reading phase. After each item of the knowledge-test, students made retrospective confidence judgments. Results show that students judged the disfluent text as more difficult to learn, predicted lower performance, and made lower confidence judgments for disfluent than for fluent texts. This was especially the case when students first learned with a fluent and afterwards with a disfluent text (Experiment 1). Whereas reading time in the first reading phase was significantly longer for the disfluent than for the fluent text, there was no significant difference in the re-reading phase. Moreover, when ease of processing was varied within-person, students showed worse performance for the disfluent than for the fluent text. Further research is required to investigate if students use their judgments to regulate their study and thus, to investigate the role of metacognitive judgments for performance.

Conditioning the human pupil using brightness as UCS

Ferdinand Pittino, Katrin M. Kliegl & Anke Huckauf

Ulm University

Conditioning the human pupil using variations in brightness as unconditioned stimuli (UCS) has yielded mixed and contradictory findings. Whereas early experiments found that conditioned stimuli (CS) associated with brightness resulted in pupillary constriction, others were not able to replicate this finding (see Voigt, 1968). One study even found a dilation response to the CS associated with brightness (Kugelmass, Hakerem, & Mantgiaris, 1969). Our study took up on this

unresolved controversy. In a short-delayed conditioning procedure, Landolt Rings with different gap positions (CS) were paired with a bright respective dark monitor background (UCS). Before and after this conditioning phase, the pupillary response to the CS was recorded. The data (n=16) clearly show evidence of a conditioning effect: Before conditioning the pupillary response did not differ between the CS. After conditioning the CS associated with brightness elicited a more marked dilation response than the CS associated with darkness. Besides this paradoxical effect, we further found evidence for evaluative conditioning: Following the acquisition phase, the CS associated with brightness was evaluated as more arousing and more negative than the CS associated with darkness. As the pupil also reflects changes in arousal (e.g. Partala & Surakka, 2003), the pupillary conditioning effect is discussed in respect to a contribution of evaluative factors in the formation of the conditioned response (dilation vs. constriction).

Zusammenhang zwischen der Ambiguitätstoleranz von Konsumenten und deren Informationsverhalten beim Kauf von umweltfreundlichen Produkten

Martin Pittner & Gerald Kolar

FHWien der WKW

Je niedriger die Ungewissheitstoleranz bei Personen ausgeprägt ist, umso eher werden ungewisse Situationen beendet und nach Informationen gesucht, um die eigene Gewissheit zu erhöhen (vgl. Dalbert, 1999). Im Zusammenhang mit der Ungewissheitstoleranz differiert auch die Informationssuche von Konsumenten. Sorrentino et al. (vgl. 1988) konnten in zwei Experimenten nachweisen, dass sich ungewissheitstolerante und -intolerante Personen in ihrer Verarbeitung von Informationen unterscheiden. Ziel dieser Untersuchung ist, den Einfluss ausgewählter psychologischer Prädiktoren auf die Informationssuche der Konsumenten zu evaluieren. Im Zuge einer standardisierten Online-Erhebung (n=709) wurden Demographie, Persönlichkeitseigenschaften (Werte anhand PVQ-Kurzversion von Shalom Schwartz, 2007; Kompetenz- und Kontrollüberzeugungen (FKK) von Krampen, 1991; Ambiguitätstoleranz nach Dalbert, 1999) und die Einstellung zu Corporate Social Responsibility (CSR) bei österreichischen Lebensmitteleinzelhändlern erhoben. Je höher die Ambiguitätstoleranz der Probanden, desto höher ist die Informationssuche bei umweltfreundlichen Produkten. Bei Aufteilung der Konsumenten gemäß ihrem nachhaltigen Lebensstil zeigten sich unterschiedliche Ergebnisse in der gezielten Suche nach entsprechenden Artikeln. Des Weiteren konnte nachgewiesen werden, dass Konsumenten mit hoher Ambiguitätstoleranz sich nicht eher dem Urteil von Experten zu nachhaltigen Produkten anschließen. Diese Ergebnisse werden kritisch diskutiert. Die vorliegende Untersuchung bestätigt somit die Relevanz von psychologischen Konstrukten als Prädiktoren für ein umweltfreundliches Kaufverhalten.

Simple reaction time and size-distance integration in virtual 3D space

Thorsten Plewan & Gerhard Rinkenauer

Leibniz Research Centre for Working Environment and Human Factors

Simple reaction time to visual stimuli is based on several stimulus properties. Recently, there was converging evidence that larger stimulus size evokes faster reactions and that this effect seemingly depends on the stimulus' perceived size rather than on physical stimulus properties. Size-distance scaling usually is regarded as main functional mechanism underlying size perception. Yet, the role of stimulus depth (distance to a target) has often been neglected in previous studies. Hence, in the present series of experiments, stimuli were presented using stereo head mounted displays. This way, 3D renderings of white spheres (target) were generated which appeared either in front of, within, or behind a reference plane. The target was modulated such that either retinal size or perceived size was constant across depth planes. In the former case, perceived stimulus size increases along with depth and according to previous research, participants were expected to react faster in response to perceptually large (i.e. distant) stimuli. However, the results pattern was in disagreement with this prediction. Without prior knowledge of the target position, participants consistently reacted faster towards targets that appeared closer. This effect was no longer observable in case the depth plane's position was changed along with the target. Yet, under these conditions modulation of perceived size across depth planes (i.e. constant retinal size) seems to induce a prolongation of reaction times. Taken together, these findings reveal that simple reaction times can indeed be affected by changes in size and distance, but this effect is not solely related to differences in perceived size. At least using virtual 3D stimuli that are mainly based on binocular disparity relative depth information (in contrast to absolute depth) and perceived target position seem to have stronger impact on reaction time.

General introduction to multitasking: From basic mechanisms to optimized task scheduling

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This introductory talk aims at presenting state of the art of the research on multitasking within both cognitive and movement sciences. First, the concept of multitasking will be introduced and further explained, based on which a definition will be specified. Next, research practices within cognitive and movement sciences will be clarified by comparing similarities and differences of the approaches within the two research fields. In this part, both basic mechanisms as well as daily life applications will be addressed. Finally, being the focus of the current seminar, dual-tasking performance will be briefly introduced as a starting point for the series of talks that follow in the current seminar.

The functional significance of the left posterior parietal cortex for precise timing

Bettina Pollok, Katharina Stephan, Ariane Keitel, Vanessa Krause & Nora Schaal

Heinrich-Heine-University Düsseldorf

A specific significance of the posterior parietal cortex (PPC) for precise timing in non-musicians has been established. The study aims at investigating the effects of cathodal and anodal transcranial direct current stimulation (tDCS) in 20 professional drummers on reaction times, synchronization and continuation accuracy of the right hand. Data were analyzed with respect to baseline performance and compared with those from non-musicians. TDCS was applied for 10 minutes at 0.25 mA over the left PPC, corresponding to Brodmann area 7. Behavioral measures were determined prior to and immediately after tDCS. The overall analysis of the synchronization data revealed significantly larger tap-to-tone asynchronies following anodal tDCS, replicating the findings in non-musicians. No significant tDCS effects were found on the other tasks. The analysis for precise and less precise synchronizers according to median split revealed that synchronization accuracy was modulated in precise performers, only, while in non-musicians the reversed pattern was found. The data support the hypothesis that the left PPC is critically involved in precise timing, but its significance varies with musical expertise. While in drummers the PPC might be involved in keeping the beat, in non-musicians the PPC could be stronger related to prevention from losing the beat.

Does stimulus-hand proximity affect multitasking performance?

Jennifer Pomp[a], Rico Fischer[b] & Roman Liepelt[a]

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Recent research in humans and monkeys has provided significant evidence for altered processing of visual items when hands are located close to the stimuli (hands close) compared to processing of items when hands are located far from the stimuli (hands far) (Abrams et al., 2008; Graziano & Gross, 1995). The presence of hands close to a visual stimulus biases the allocation of attention to the area near the hand and enhances the engagement of cognitive control for stimuli in near hand space (Liepelt & Fischer, in press; Weidler & Abrams, 2014). In the present study, we investigated the consequences of this privileged stimulus processing near the hands when multiple stimuli have to be attended to and acted upon in a psychological refractory period (PRP) paradigm. Participants performed an odd-even categorization task (Task 1) and a color categorization task (Task 2) with a Task 1 priority instruction and varying stimulus onset asynchronies (SOAs). Both tasks were given in hands close and hands far conditions and hand position was counterbalanced across participants. We hypothesized that altered vision near the hands affects the disengagement from central stage processing in Task 1 in order to engage in Task 2 processing (i.e., task set shifts at the bottleneck), which is represented by an increased PRP effect in hands close conditions in Task 2. We discuss our findings in the context of recent dual-task models showing how action-perception interactions affect task-set shifting when two tasks have to be performed in parallel.

Modality-specific representation of action and sound verbs in the motor and auditory systems

Margot Popp, Natalie Trumpp, Eun-Jin Sim & Markus Kiefer

University of Ulm

Modality-specific theories assume a close link between conceptual knowledge and the sensorimotor brain systems. In support of these theories, previous neuroimaging studies provided evidence for a feature-specific representation of object concepts in corresponding modal-specific brain regions: Action-related object information activated frontal and parietal motor areas whereas sound-related information specifically activated auditory areas in temporal cortex. The present functional magnetic resonance imaging (fMRI) study tested whether such a feature-specific representation of concepts generalizes to action and sound related verbs. Carefully matched action (to throw) and sound related verbs (to crack) were presented to participants along with pseudo words while performing a lexical decision task. Action verbs specifically elicited higher activity in frontal and parietal motor areas whereas sound verbs specifically activated auditory association areas in temporal cortex. This differential activity pattern observed during processing of action and sound verbs partially overlapped with brain activation observed during actual manual movements and listening to real sounds, respectively. The present results therefore suggest that, similar to object concepts, conceptual features of action and sound verbs are grounded in the corresponding modal brain systems typically engaged in action and perception.

Pointing out mechanisms underlying Joint Action

Emanuele Porcu, Luke Bölling, Markus Lappe & Roman Liepelt

University of Münster

Recent studies have shown how spatial and feature based attention can contribute to induce a spatial compatibility effect in both the standard Simon task and the joint Simon task. Less work has been generally devoted to investigate how attention modulates the spatial compatibility effects. In the present study, we aimed to explore whether indirectly manipulating the degree of attention necessary to respond to a compatible and an incompatible stimulus can modulate the spatial compatibility in a joint Simon task and elicit a compatibility effect in the individual go-nogo Simon task. To this end, we biased spatial attention to the compatible stimulus by asking participants to perform a pointing response always toward the compatible side, regardless of the stimulus location. Crucially, reaction times – recorded at the gesture onset – showed a compatibility effect pattern in the Individual condition and an additionally modulation in the Joint condition. These results show that spatial attention intrinsic in the action planning can affect both individual and joint Simon task.

Agency in the Joint Simon task

Emanuele Porcu & Roman Liepelt

University of Münster

When we interact with other people, distinguishing ourselves from others constitutes an essential process to optimize our actions. In order to make this distinction, we rely both on the a-priori knowledge that specific actions will most likely produce predictable outcomes and on online cues that allow us to infer a causal relation between our actions and the following events. In other words, we use a compound of high and low cognitive and perceptual processes that contribute to create our own sense of "agency". But does agency have a direct influence on Joint action behaviour? In this talk, I will present results pertaining the potential influence of agency on a Joint Simon task. We manipulated the degree of control (high and low agency) that a participant could experience over a confederate's actions. Subsequently, we tested whether the degree of agency had any impact on the participant's performance in a Joint Simon task. Although participants were able to subjectively experience agency over the confederate's actions, our results do not point toward an influence of agency on the Joint Simon task. Such outcomes will be discussed within the framework of the referential coding account (Dolk et al., 2014).

Material effects in recognition memory: Fractals but not words elicit the list strength effect

Johannes Prager & Martin Brandt

Universität Mannheim

The list length effect in recognition memory has been found for lists of fractals, but not for lists of words (Kinnell & Dennis, 2012). Kinnell and Dennis (2012) argue, that this result is due to stimulus homogeneity: word lists are commonly heterogeneous whereas lists of fractals tend to be homogenous. According to global memory models such as MINERVA 2 (Hintzman, 1986, 1988), the list length effect and the list strength effect are based on identical theoretical mechanisms. However, the list strength effect has almost exclusively been investigated with word lists (e.g. Ratcliff, Clark, & Shiffrin, 1990). This might be one reason, why the list strength effect usually has not been found empirically. We conducted two experiments on the list strength effect varying the stimulus material. In line with the results of Kinnell and Dennis (2012) for the list length effect, the list strength effect only showed up using fractals as stimulus material but not for words.

Differential effects of power on social distance

Dirkje Pril & Joris Lammers

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Earlier research has found that power increases social distance (Lammers, Galinsky, Gordijn, & Otten, 2012; Magee & Smith, 2013), meaning that the powerful are more inclined to keep distance to others and engage alone in their activities. In the present line of three studies, we show that power can also decrease distance. Specifically, we test whether the relation between power and social distance is moderated by the power-relevance of the other person. In the first two studies (N = 98 and N = 100), we find that within a power dyad, high power persons feel less distant to their low power opponent than low power persons feel to their high power opponent. In a third study (N = 157), we use a full 2 (power) x 2 (relation-relevance) within-subjects design and find the predicted cross-over interaction. Specifically, where elevated power is related to increased distance to persons outside the power-dyad (compared to decreased power), this effect reverses for the person within the power dyad: high power persons perceived less distance to their power-opponents than low power persons. Future studies are planned to further substantiate this relation using game-theoretical approaches and investigate possible moderators and consequences of this perceived social distance.

Extending the Social Simon paradigm to a four person setting

Lydia Puffe, Kerstin Dittrich & Karl Christoph Klauer

University of Freiburg

One of the most prominent paradigms to examine joint action is the Social Simon task: Two participants are encouraged to respond to a non-spatial stimulus feature with one response key, whereby the stimulus position varies randomly in the horizontal domain. Although the spatial position is task-irrelevant, participants perform faster and more accurate, if there is a match between spatial stimulus position and spatial response location. This compatibility effect diminishes when a participant fulfils the same task by his or her own, still reacting to one stimulus feature. Automatic co-representation of the co-actor's action is considered to account for this finding, inducing a response interference in a joint action setting (Sebanz, Knoblich, & Prinz, 2003). Recent research questions this co-representation account, and suggests instead that the presence of a co-actor or a salient non-social event serves as a spatial reference point, allowing for spatial response coding (Dittrich, Dolk, Rothe-Wulf, Klauer, & Prinz, 2013; Dittrich, Rothe, & Klauer, 2012; Dolk et al., 2011; Dolk, Hommel, Prinz, & Liepelt, 2014; Guagnano, Rusconi, & Umiltà, 2010). In consequence, the spatial response induces an interference with the spatial stimulus position. None the less, the particular process of referencing as well as its interplay with the settings' mapping and the influence of particular co-actors' characteristics still reveals some open issues within this account. In a new series of experiments, it will be examined how performance and eventually spatial representations might differ in a setting of four participants working jointly on the Social Simon task. First results will be presented at the conference. Extending the classic Social Simon setting to four persons allows to contrast and

examine specific assumptions of the existing accounts. In this sense, it is purposed to find answers for the underlying mechanisms driving the Social Simon effect.

The N400 component of the event-related brain potential reflects implicit semantic prediction error: Evidence from a connectionist model of sentence comprehension

Milena Rabovsky, Steven Hansen & James McClelland

Stanford University

The N400 component of the event-related brain potential is widely used in research on language and semantic memory, but the specific cognitive functions underlying N400 amplitudes are still unclear and actively debated (Kutas & Federmeier, 2011). Recent simulations with a connectionist model of word meaning suggest that N400 amplitudes might reflect implicit semantic prediction error (Rabovsky & McRae, 2014) in line with early discussion by McClelland (1994). Here, we extend these simulations to sentence comprehension, using a connectionist model of sentence processing (McClelland et al., 1989) to simulate a number of N400 effects obtained in empirical research. In the model, sequentially incoming words update the representation of sentence meaning and, important for present purposes, this representation not only reflects sentence meaning as apparent from the constituents presented so far, but also reflects the model's best guess interpretation of the meaning of the sentence as a whole, predicted based on the statistical regularities in the model's environment. As each new word comes in, the representation of sentence meaning is updated and this update reflects the implicit prediction error contained in the previous representation. Simulating influences of semantic congruency, cloze probability, a word's position in the sentence, semantic and associative priming, repetition, and interactions between repetition and semantic congruency, we found that this update of the predictive representation of sentence meaning consistently patterned with N400 amplitudes. These results yield further support to the idea that N400 amplitudes reflect implicit semantic prediction error (McClelland, 1994; Rabovsky & McRae, 2014).

Blind to groups: Understanding group membership consideration in visual information search in intergroup dilemmas

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In intergroup dilemmas, individuals choose between improving their own outcomes and improving the outcomes of an ingroup or an outgroup member. Some actors take group membership into consideration, and often clearly favor the ingroup. Such ingroup-love is regarded as a catalyst for intergroup conflict. Surprisingly, other actors seem to turn a blind eye to the group identifying information, and consequently avoid favoring members of one group over the other. However, it remains unclear which individual differences make actors more

prone to seek out information regarding group membership in intergroup dilemmas, or to turn a blind eye. Taking a fine-grained information processing approach, we investigate decision-makers' tendency to seek out group identifying information in money allocation tasks between members of two groups via eye-tracking. We find variance in the degree to which individuals visually attend to group identifying information, with some actors completely avoiding this information. We replicate previous research suggesting no predictive power of Social Value Orientation or the degree of identification with the group in explaining differences in seeking out group identifying information. We further investigate the influence of need to belong, inequality aversion, and group prototypicality on attendance to group identifying information. Implications for intergroup research are discussed.

The influence of sequential reward expectancies on cognitive flexibility and stability

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Sequential changes in reward prospects moderate cognitive flexibility and stability in terms of increased flexibility when reward increases and increased stability when reward remains high. Evidence for these sequential reward effects comes from a recent study, using the voluntary task switching paradigm with 20% free choices and 80% forced choices. There, we could show that the voluntary switch rate (VSR) is increased in trials where reward prospect changes (increase or decrease as compared to trial N-1) compared to trials where reward prospect remained high (Fröber & Dreisbach, 2015). Building on these findings, we will present three experiments, investigating boundary conditions for these sequential reward effects. In the first two experiments we increased the ratio of free to forced choice trials (Experiment 1: 50% free, 50% forced; Experiment 2: 80% free, 20% forced). In both experiments, former results could be replicated. That is, VSR was significantly increased in reward increase and decrease trials compared to remain low and remain high trials. However, in contrast to Fröber and Dreisbach's results, the VSR in remain high trials was only descriptively lower than VSR in remain low trials. Therefore, Experiment 3 was conducted where we exclusively focused on the effects of unchanged low vs. high reward on VSR. Results showed a significantly smaller VSR on remain high trials as compared to remain low trials. Taken together, these new findings further confirm the idea that the prospect of unchanged high reward selectively fosters cognitive stability whereas changes in reward prospect increase cognitive flexibility.

Experimental evaluation of fact boxes for informed decision-making

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Patients' informed decision-making requires transparent, comprehensible, and balanced communication of the potential risks and benefits of medical procedures. For that purpose,

simple decision tools that condense the most relevant information from the medical evidence are comparable to or even better than more detailed tools. Since detailed information leaflets are predominantly available to the general public in Germany, their effects on health knowledge, risk perception, and decision intentions have to be evaluated. Using a between-subjects design, we compared different communication formats including standard formats (e.g. by the German Cancer Aid) and systematically constructed simple formats that allow the reader to integrate risks across the medical options and across potential harms and benefits (transparently presented e.g. with absolute numbers). Additional research questions about the influence of the denominator (100 vs. 1000 persons reference class) and about tabular versus graphical displays were examined. People who received the simple formats (across different displays and denominators) acquired more health knowledge, had more realistic risk perceptions, and had lower treatment intentions than participants who received the standard information format. A catalogue of essential guidelines for health professionals, who want to communicate health risks, was derived from the results.

Implicit factors dominate visuomotor binding

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The visual consequences of our motor commands are quickly conveyed to the corresponding motor control structures in the brain, which enables efficient visual feedback control of voluntary movements. These processes work remarkably well even in the face of complex visual input or discrepancies between physical actuator and visually perceived effect, e.g. when working with a tool or moving a computer mouse. Here, we use an ambiguous situation in which a single cursor could be either controlled by the left or the right hand to determine the visual and cognitive factors that determine the assignment of a visual stimulus to the corresponding motor command. Our results demonstrate that the visuomotor system is exquisitely sensitive to the spatio-temporal correlation between cursor and hands, learning the appropriate mapping implicitly within several minutes. In contrast, spatial proximity between physical locations of end effector and visual consequence has a moderate but immediate influence on the assignment process. Finally, an explicit instruction about which hand controls the cursor only has a small and transient influence. These findings provide a first insight into the factors that determine the binding of visual information to the corresponding motor structures to enable fast feedback control. In our modern technical world, the situations in which the consequences of our actions are disconnected from their visual consequences are on the rise. This elevates the significance of visuomotor binding from a biological mechanism to a human factor that needs to be taken into account in the design of any technical system that requires quick and intuitive operation despite the handling movements being physically detached from their visual consequences, such as tele-operation systems or some complex vehicles.

One model fits all: Explaining many aspects of number comparison within a single coherent model - A random walk account

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The time required to determine the larger of two digits decreases with their numerical distance, and (for a given distance) increases with the digit's numerical magnitude. One detailed quantitative framework to account for these effects are random walk models. These chronometric models describe how noisy partial number-related evidence is accumulated over time, and assume that the drift rate of this stochastic process increases monotonically with the size of the digits presented. In a complete paired digit comparison design (digits 1 to 9) we obtained saccadic choice responses of 43 participants, and analyzed (i) mean saccadic latency, (ii) error rate, (iii) the standard deviation of saccadic latency for each of the 72 digit pairs; we also obtained (iv) mean error latency for each numerical distance from 1 to 8. To test different variants of random walks models, we evaluated their ability to account, in quantitative detail, for all of these aspects simultaneously, using the same small set of parameters. Random walk models accounted in considerable detail for several aspects of our data, including previously untested aspects of latency standard deviation and error latencies. However, different from standard assumptions often made in the context of random walk models, this account required that the distributions of step sizes of the induced random walks are asymmetric. We also describe a novel effect in number comparison, the decrease of saccadic response amplitude with numerical distance, and suggest an interpretation of this finding using the framework of random walk models.

Evidence on concurrent processing of visual attention in speeded and accurate visual searches and difficult response selection

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Both visual attention and response selection are limited in capacity. In conjunction search, visual attention is required to bind item features (e.g. color, form), resulting in a serial search process. Accordingly, search times increase with a larger number of items. Here, we investigated whether speeded and accurate conjunction searches were subject to the response selection bottleneck. This bottleneck induces sequential performance of the response selection processes of two tasks in a dual-task situation. In both dual-task experiments, participants completed two tasks presented with an experimentally modulated temporal interval between them (Stimulus Onset Asynchrony, SOA). Task 1 was an auditory four-choice discrimination task and Task 2 was a conjunction search task in which the target had to be detected among a small or a large number of distractors. In Experiments 1 and 2, the search display was presented until response (speeded search) or masked (accurate search), respectively. In Experiment 1, we analyzed conjunction search times according to the locus-of-slack method, and a large part of the feature binding processes could operate concurrently to the response selection processes of the

auditory Task 1. In accurate conjunction search in Experiment 2, d' indicating target detection performance was not reduced at short compared to long SOA. Interestingly, analyzing d' conditional on the speed of Task 1 responses (RT1) revealed that target detection was better for fast compared to slow RT1. The finding suggested that difficult response selection processes could influence feature binding processes. We conclude that in general, visual attention and response selection rely on different capacity limitations.

Adaptation aftereffects in biological representations reflect the level of expertise

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In order to recognize familiar objects, it is commonly assumed that incoming perceptual object information must be matched against representations of these objects stored in memory. While earlier memory theories implicitly claimed that these representations are stable and accurate, recent demonstrations showed that representations are flexible and subject to immediate adaptation following exposure to new information (e.g., Carbon et al., 2007; Strobach & Carbon, 2013). Moreover, learning and expertise reshape the representations and their structure in a way that they show lower changeability in the presence of different individual exemplars (see Gauthier & Tarr, 2002; Daelli, 2011; Tanaka et al., 2012). However, so far, the demonstration of flexible representations is largely limited to representations of faces and evidence of adaptation effects in alternative categories as well as in experts is lacking. The present study tests adaptation aftereffects in representations of animal categories in groups at different levels of biological expertise. Our data demonstrate the influence of expertise on these effects of these categories following the exposure to new information. Thus, these data illustrate the role of expertise in adaptation of biological object representations, and extend the phenomenon of expertise and flexible memory representations beyond human faces.

Der Einfluss der Area of Interestgestaltung auf Blickzuwendungskennwerte: Ableitung eines Kriterienkatalogs zur Gestaltung von Area of Interest

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Eye-Tracking Studien liefern seit geraumer Zeit wertvolle und objektive Einblicke in das subjektive Blickverhalten von Fahrern. Die Auswertung der Daten ist allerdings nach wie vor mit Ungenauigkeit, vor allem in der Analyse der Aufmerksamkeitsbereiche verbunden. So fehlt es zum Beispiel an Kriterien und Richtlinien zur Gestaltung von Areas of Interest (AOI). Dieser Umstand erschwert die Reproduzierbarkeit und die Vergleichbarkeit von Blickverhaltensstudien im Forschungsfeld der Verkehrspsychologie. In der vorliegenden Studie werden in eigens dafür aufgenommenen realen Fahrszenarien AOI von Novizen und Experten in die jeweiligen Fahrszenarien eingezeichnet. Alle Teilnehmer erhalten vorab Information über das

interessierende Blickverhalten des Fahrers und werden funktional in die AOI-Gestaltung eingeführt. Erwartete Ergebnisse umfassen Unterschiede in der Größe der gezeichneten AOI, der Anzahl der gezeichneten AOI, sowie in den Fixationszeiten und Fixationshäufigkeiten der für die Szenerie relevanten AOI. Erste Vorabuntersuchungen zeigen, dass die Ergebnisse in den analysierten Parametern sehr stark variieren. Die Ergebnisse dienen der Gestaltung eines Kriterienkatalogs zum Zeichnen von AOI für das Forschungsfeld „Verkehrspsychologie“. Die Ergebnisse der Studie sowie Vor- und Nachteile des Kriterienkatalogs werden diskutiert.

How do users relearn uncertain concepts? - Insights into the learning process via eye movements

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If users deal with system updates, they have to adapt to the modified system functioning and relearn new concepts. This relearning process is often time-consuming and accompanied by a higher cognitive load, so that the acceptance of system modifications is mostly low. The current study investigates how eye movement patterns may inform about the stage of learning during relearning uncertain concepts. Participants learned a spatial probability concept while predicting at which of three locations distinct target objects will appear. After four blocks the probability concept changed without any notification and was used for another four blocks. By analyzing the number of correct predictions, results show better learning effects for the first learned probability concept than for the relearned one. Eye movement patterns systematically change with the learning progress. However, the parameters possess specific distinctiveness, e.g. fixation duration decreases over blocks and reflects the learning progress in an accurate manner, but it responds to the relearning phase with a time delay. This time delay might be due to the adaptation of the mental representation: When presenting the second probability concept, incoming information first interferes with the mental representation of the first probability concept. Finally, the mental representation is overwritten and adapts to the new concept during the relearning phase. On the other hand, the number of fixations signalizes directly the beginning of the relearning phase, but reaches a stable level almost immediately. It might reflect the disturbance of performing the visual search task due to the changed spatial probability task. Thus, eye movement patterns provide different information with regard to the stage of the learning process and may be used to improve the interaction design of technical systems.

A comparative evaluation of methods to detect publication bias and p-hacking

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The current replicability crisis demonstrates that the published evidence supporting

psychological hypotheses is too often unreliable and biased. This situation calls for a re-evaluation of the available evidence with regard to many psychological findings. Among the reasons for deficient replicability are publication biases and questionable research practices (QRPs) like p-hacking. Thus, a re-evaluation of published evidence requires methods that are able to detect these problems. The inventory of such methods has grown quickly recently. Some of the traditional techniques (like regressing effect sizes on their standard errors) have been refined (e.g. PET-PEESE) and completely new methods have been suggested (e.g. p-curve). There are, however, only very few comparative investigations of the relative performance of these methods. Important boundary conditions under which publication biases can be identified are unknown. Furthermore, it remains an open question for some of these methods whether and to what degree they are also capable of detecting QRPs. We pursued these research questions using extensive Monte Carlo simulations. Five methods of bias detection were investigated: Trim and Fill, PET-PEESE, TES, p-curve and p-uniform. Experimental data were simulated using a fixed effects model and selected for publication based on their p-values. We assessed the sensitivity and specificity of the tests for publication bias, evaluated corrected estimates of true effect sizes with regard to their unbiasedness and efficiency and determined coverage probabilities of confidence intervals around these estimates. Our results show that Trim and Fill is generally unsuitable to detect biases that are due to the selection of significant results. One of the additional central findings is that p-curve and p-uniform react sensitively to different biases and often provide reasonable effect size estimates, but may be outperformed by PET-PEESE under specific conditions.

Feeling the context: The role of context-evoked conflict experience in unconscious context-specific conflict adaptation

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Humans are able to flexibly adapt to changing contexts that have been associated with a high or low probability of conflict, under particular conditions even when both the conflicting stimuli and the context are presented unconsciously. However, the underlying mechanisms that lead to (or prevent) unconsciously triggered context-specific conflict adaptation remain vague. Here we investigated how subjective conflict experience – an important factor for adaptation to recent conflict – plays a role in unconscious context-specific adaptation. We hypothesized that conflict experience gets associated with the context, and that the actual adaptation process is elicited by the context evoking this conflict experience. In a masked priming paradigm, participants responded to a target arrow that was preceded by a masked prime arrow. The form/type of the target arrow represented a context of either low interference (20% incongruent trials) or high interference (80% incongruent trials). Importantly, after each trial, participants indicated whether they experienced conflict or not. The results show that the high-interference context increased the probability to experience conflict, even when no conflict was actually present, indicating an association between conflict experience and context. Yet, we found no adaptation effect: congruency effects did not differ between the two contexts. This initially surprising

observation supports the assumption of Reuss et al. (2014) that when context information is presented late in the trial, it still can be associated with unconscious conflict, but the context information is available too late to be able to impact on quickly decaying unconscious conflict information.

Stop thinking about inhibition!

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Inhibition is typically divided into the inhibition of pre-potent response (i.e., the ability to stop ongoing responses) and the resistance to distracter interference (i.e., the ability to ignore distracting information). However, evidence for these inhibitory processes is mixed at best. To shed more light on the different forms of inhibition, we conducted a study in which the inhibition of prepotent responses was assessed with the antisaccade task, the stop-signal task, the color and number Stroop tasks, the Simon task, as well as the negative compatibility task. The resistance to distracter interference was assessed with the arrow and letter flanker tasks, the global-local task, the positive compatibility task and n-2 repetition costs in task switching. The sample consisted of 110 young adults (18-28) and 110 older adults (65-75). In both age groups, the tasks had good reliabilities, but did not correlate among each other. Structure equation modeling suggested a model with the inhibition of prepotent response and the resistance to distracter interference. However, this model had low explanatory power. Together, these findings call into question the concept of inhibition.

Inhibitory mechanisms in motor imagery: A novel action mode switching paradigm

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Motor imagery requires that actual movements are prevented (i.e., inhibited) from execution. To investigate whether and how inhibition takes place in motor imagery, we developed a novel action-mode switching paradigm. Participants imagined (indicating only start and end) and executed movements from start buttons to target buttons. Trials were presented in pure and mixed blocks. We analyzed trial sequence effects. Trial sequences depended on current action mode (imagination or execution), previous action mode (pure blocks/same mode, mixed blocks/same mode, or mixed blocks/other mode), and movement (target and hand repetition, hand repetition only, or hand alternation). Results provided evidence for three inhibitory processes. First, effector specific inhibition was indicated by hand repetition costs when the previous trial was an imagination trial. Second, global inhibition was indicated by the relative difficulty of different action mode sequences (e.g. switch benefits in execution-imagination-sequences compared to imagination-imagination-sequences may result from reduced global inhibition after an execution trial). And third, inhibition as part of motor

imagery was indicated by target repetition benefits in imagination-imagination sequences. Thus, several inhibitory mechanisms contribute to motor imagery. Motor imagery is not simply a weaker form of execution. Rather, active inhibition (global and effector specific) takes place. An applied conclusion is that in sports competitions motor imagery shortly before actual performance may have detrimental effects.

Skin conductance responses in anticipation of gains and losses

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Anticipating future outcomes is fundamental for decision-making. Traditionally, it has been proposed that the anticipation of a loss looms larger than the anticipation of a gain of equal size. This phenomenon has been referred to as loss aversion. Recent evidence, however, indicates that individuals often give similar weight to gains and losses, and thereby challenges the validity of the loss aversion hypothesis. We examine skin conductance responses – a psychophysiological marker for emotional arousal – during the anticipation of gains and losses in a roulette task. This approach is supposed to give insights into the emotional states that participants experience while they anticipate a gain or loss. In contrast to most previous research, gains and losses were separated from each other and symmetric in magnitude. We found that integrated skin conductance responses during the anticipation phase increased with the magnitude of both gains and losses. Contrary to the predictions of the loss aversion hypothesis, the anticipation of a loss did not elicit stronger reactions than the anticipation of a gain of equal size. By an ex-post restriction of the loss domain, we found that participants were more aroused per Euro to losses relative to gains. This finding has previously been interpreted as an indicator of loss aversion. We show that it results from a smaller range of losses compared to gains rather than from a general aversion to losses.

Auditory stimulation training in preschool children with language impairments – A longitudinal study

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The current study was designed to investigate the development of working memory, phoneme discrimination skills and perception of high frequencies (4000 Hz and 2000 Hz) in N = 101 preschool children (62 male; 39 female; mean age: 4.52 years; SD = .59) with deficits in speech comprehension and a poor capacity of working memory. Children in the experimental group (EG; n=40) listened to acoustically modified pieces of classical instrumental music three times per day for 30 minutes over a period of 12 weeks. Children in the first control group (CG1; n=24) received individual pedagogic assistance for a similar amount of time instead. A second control group (CG2; n=37) served as waiting controls. EG children showed significantly improved

working memory capacities and perception skills of high frequencies (> 4000 Hz) in comparison to both control group children. Furthermore, EG children significantly increased their phoneme discrimination skills and their perception of high frequencies (>2000 Hz) when compared to the CG2 group children. Results suggest that auditory stimulation training with music can enhance auditory cognitive performances in preschool children with language impairments. Further research is needed to ascertain the role of music-centered auditory stimulation training on working memory and language development in preschoolers with language impairments.

Solving Stock Flow problems either in a conventional way or using a general problem solving strategy

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We all have to deal with complex dynamic systems in our everyday lives. Nevertheless, past research has shown that even the simplest forms (Stock Flow Tasks) are poorly understood even among highly educated college students (Booth Sweeney & Sterman, 2000; Cronin, Gonzalez & Sterman, 2009). Approaches to increase the Stock Flow understanding through a different representation format or embedding the tasks in different contexts have not yet yielded a resounding success. However, a recent study that was inspired by cognitive load theory examined the impact of using a general problem solving strategy instead of a conventional problem solving strategy on mathematic and economic problems (Youssef-Shallala, Ayres, Schubert & Sweller, 2014). The general problem solving strategy yielded better results in subsequent transfer tasks. Based upon these findings, the present study adapted the general problem solving method and applied it to Stock Flow problems. College students had to solve Stock Flow tasks either conventional or starting with a general problem solving strategy. Results were compared to previous findings and practical implications are discussed.

Implicit memory for irrelevant speech

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The processing of auditory information is coercive in the way that the processing of visual information is not. Unlike in the visual system, ears cannot be closed to block off unwanted input. On the one hand, this perceptual awareness guarantees the detection of stimuli that are of importance for the organism (e.g., the crying of a baby, a ringing phone), on the other hand, it comes at the cost of enhanced disruptability by task-irrelevant information. A classic example for such a disruption is the irrelevant speech effect on serial recall. While we usually are interested in the recall of relevant information, in the present study we asked ourselves how much of the irrelevant information comes through. Working memory theories make opposing predictions on whether semantic features of the to-be-ignored speech should be activated, or

not. To test these predictions, we presented auditory distractor words drawn from different semantic categories. For each category, two sets were created with the same mean production frequency. Shortly afterwards we asked our participants to take part in a separate study (which was actually the second part of the experiment) where they had to spontaneously produce exemplars from the semantic categories that the auditory distractors were drawn from. We found that previously ignored exemplars were produced with a higher probability than exemplars from the other set, which is evidence for semantic priming by irrelevant speech. Hence, semantic features of the to-be-ignored speech must have been activated and, apparently, this activation can have behavioral effects, too.

The involvement of facial muscle responses in the masked emotion misattribution procedure

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Recently, we adapted the misattribution procedure to investigate automatic processing of specific emotion categories (Rohr, Degner, & Wentura, 2015). The results of this study suggested (a) that misattribution can be emotion-specific under unmasked presentation conditions, (b) that misattribution under masked presentation conditions is limited to the processing of specific emotion aspects, presumably valence and arousal. Thus, it seems likely that different (i.e., cognitive semantic, and affective) processes are involved in the procedure, given that otherwise the same pattern of results should be expected under both masked and unmasked conditions. In the present study, we examined this question directly by recording facial electromyography and behavioral responses in a masked misattribution and an unmasked categorization task employing happy, angry, fearful, and neutral faces. As expected, emotion-specific facial muscle responses were observed during the categorization of unmasked emotional faces. By contrast, under masked presentation conditions, behavioral and facial muscle responses were more limited. The implications of these results for the processes underlying emotion misattribution will be discussed.

Can visual spatial attention be influenced by aesthetic stimuli?

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We used a probe dot task to investigate the question whether aesthetic stimuli attract visual spatial attention. Two pictures of chairs were presented to the left and the right of fixation, followed by a dot at one of the chair's position. Participants decided at which side the dot was presented. To estimate the impact of the aesthetic value of the chairs on spatial attention, we paired either highly aesthetic or less aesthetic pictures with neutral ones. Participants reacted faster when the dot was presented at the position of the aesthetic chair than at the position of the neutral one. This "congruency" effect was absent for less aesthetic chairs, i.e., reaction

times to dots presented at the less aesthetic chair's side did not differ from those of the neutral chair's side. This pattern of results suggests that aesthetic stimuli capture attention. In a subsequent memory recognition task, in which participants were asked to decide whether a chair had been presented before or not, highly aesthetic chairs were more accurately recognized than neutral or less aesthetic ones. Together, the results are in line with the "fluency theory of aesthetic experience" (e.g., Reber, Winkielman, & Schwarz, 1998), which proposes a cognitive processing benefit for aesthetic stimuli. Furthermore, our results indicate that attention plays an important role in processing the aesthetic value of a stimulus.

Cultural influences on structural landmark salience: Right-hand traffic vs. left-hand traffic

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Previous experiments showed that in an allocentric perspective, landmarks located before the intersection and in the direction of turn are the preferred ones when giving route directions (for a right turn this means that the landmark on the right-hand side before you cross the intersection is the optimal one). In an egocentric perspective, people prefer both landmarks located in the direction of turn (for a left turn people prefer landmarks located on the left-hand side; equally often before and behind the intersection). However, so far we only examined people living in a right-hand traffic environment, i.e. Germany. This leads to the actual research question: could the same landmark preferences be found in a left-hand traffic environment? Therefore, we analyzed the landmark preferences of 260 participants in Germany and Great Britain. Results revealed significant differences in the preferences. For people in a right-hand environment, previous findings were replicated. For a turn to the right, they equally often prefer landmarks located before and behind the intersection on the right-hand side, and for a left turn the same on the left-hand side. However, for people in the left hand environment the preferences are different. There, surprisingly, a significant difference between a left turn and right turn was found. For a left turn, landmarks before the intersection were preferred more often whereas for a right turn landmarks located behind the intersection were preferred more often (both in the direction of turn). In none of our previous experiments (i.e. right-hand environment), we found differences in the landmark position preferences with respect to the turning directions. These results demonstrate that "traffic socialization" should be considered for determining the ideal position of a landmark for giving route directions. These findings will be discussed within the current literature and theories on wayfinding and intercultural differences.

Acoustic features triggering "irrelevant speech effects": The role of spectral and loudness changes

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The "irrelevant speech effect" describes the phenomenon that irrelevant background speech substantially disrupts memory performance in serial-recall tasks, when compared to silence or noise. The psychoacoustic features that cause this effect are not sufficiently understood yet. The present experiment explored to what extent changes in loudness or the third-octave spectrum influence the magnitude of irrelevant speech effect. To that effect, the temporal resolution of natural speech was systematically manipulated by either 'freezing' the spectrum or equivalent A-weighted level for periods of 50, 100, 200, 500 ms or for the entire 14-s duration. Doing so yielded time-dependent target levels for third-octave wide noises, which subsequently were added to result in the desired stimulus. 40 normal hearing subjects memorized the order of visually presented digits while they heard the thus manipulated sounds or control conditions of unprocessed speech and noise. The observed irrelevant speech effects monotonically increased with temporal resolution, i.e. became larger the shorter the frozen intervals were. This occurred for spectral changes and – to a slightly greater extent – for combinations of spectral and loudness changes, while loudness changes alone did not have any significant effects on performance. Thus, spectral changes appear to be the dominant factor in accounting for irrelevant speech effects.

"Being ahead of time" in different languages: Spatial concepts in temporal cognition across tasks and speech communities

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Spatial concepts have been regarded as fundamental structures that support and shape cognition of more abstract domains. Temporal cognition in particular seems to draw upon a range of spatial representational features. However, the open question still remains of how closely temporal concepts map onto spatial entities and to what extent linguistic or cultural preferences might moderate space-time mappings. To scrutinize the relation of spatial and temporal concepts, two major groups of tasks were administered across different sets of studies and languages: First, we looked at the spatial underpinnings of temporal concepts more broadly when analyzing participants' pointing gestures or their alignment of temporal sequences. Second, we specifically looked at the correspondence between spatial and temporal frames of references (FoR) that were preferred in different languages and across various tasks. Results indicated that temporal concepts might be generally dominated by the preferred writing direction. However, with regard to the representational frameworks of spatial and temporal FoR, correspondence between space and time was rather low but language specific. Implications of the results for theories of temporal cognition and for accounts of metaphoric structuring are discussed.

The influence of scene preview on the central fixation bias in a free viewing experiment

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Processes controlling gaze behavior in humans while looking at pictures can be divided into bottom-up and top-down control. In addition to these principles of gaze guidance, systematic tendencies described in most scene viewing experiments play an important role. One of the strongest systematic tendencies is the central fixation bias: observers show a strong tendency to fixate the center of a scene during initial fixations, regardless of image content. While the central fixation bias does not inform us about how certain image parts attract the attention of observers, there is a lack of experimental studies that investigate conditions to reduce the central fixation tendency in a laboratory setting. Here, we report a scene viewing experiment with varying initial fixation time that induced a strong variation of the central fixation bias. We presented 120 images that had been used in one of the most influential experiments investigating the central fixation bias (Tatler, 2007). Before free exploration of a scene, 4 in 5 participants were forced to keep their eyes on a pretrial fixation marker while the image was already displayed. This pretrial fixation time ranged from 125 ms to 1000 ms. Compared to a viewing condition with sudden onset of the image, we found that the central fixation bias was reduced during initial fixations in all conditions with a non-zero pretrial fixation time. We conclude that future experiments aiming to investigate the attentional distribution over an image might thus benefit from a non-zero pretrial fixation time to increase the relative weight of bottom-up and top-down processes of attention allocation.

Across-task binding impairs implicit sequence learning in dual-task situations

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One often replicated finding is that implicit sequence learning is impaired in dual-task conditions. Keele et al. (2003) proposed that these decrements might result from the secondary task disturbing the coherence of the to-be-learned sequence. With overlapping features, stimulus activation can lead to response activation in either of the tasks - and, thus, to dysfunctional across-task binding. Schumacher and Schwarb (2009) recently found that dual-task implicit sequence learning was preserved whenever the task context enabled participants to keep the representations of the two tasks (temporally) separate. They suggested that simultaneous occupation of the response selection stage impedes learning (without specifying the mechanism). In line with cognitive-control models of dual-task performance (e.g., Hazeltine et al., 2006; Logan & Gordon, 2001; Meyer & Kieras, 1997; Tombu & Jolicoeur, 2003), we assume as well that parallel processing is generally possible - but that it bears the risk of across-task binding. Sequence learning should be impaired whenever the two tasks share the same feature codes - but one task is random. To test this hypothesis, we combined a

visual-manual serial response selection (SRT) task (Nissen & Bullemer, 1987) with an auditory-vocal tone identification task. Crucially, in two conditions we manipulated the extent to which the feature codes in both tasks overlapped. With simultaneous stimulus presentation and "equal priority" instructions, we found preserved learning effects when the feature codes of the two tasks did not overlap. By contrast, learning was impaired when the codes of both tasks did overlap. Thus, our findings suggest that the impairment of implicit sequence learning in dual-task situations is due to across-task binding rather than due to the simultaneous occupation of the response selection stage.

Caught in the net: Investigating self-control and mindfulness in daily life using a novel network approach

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Background: Self-control and its limitations have been investigated mainly with short and standardized tasks in laboratory settings. Recent years have seen an ever increasing number of studies that explore self-control in daily life via ambulatory assessment. Due to reduced controllability of field settings, there are many factors that are not fully explored, yet. However, by using a novel network approach (Bringmann et al., 2013), it is possible to investigate the complex, interdependent network of self-control and its influences in everyday life. Furthermore, it is possible to explore how an intervention, such as mindfulness training, changes the network structure. Method: For six weeks an ambulatory assessment and additional seven weekly laboratory sessions are conducted with 100 participants who are randomized to a control or intervention group. Pre and post measurement sessions take place and the experimental group participates on weekly computer based mindfulness trainings. During ambulatory assessment, participants complete questionnaires six times a day via smartphones. Results: Multilevel vector-autoregressive models are used to construct a self-control network. Network differences between the experimental and control group and also intra-individual networks in the course of time are analyzed. Furthermore, the influence of interventions (mindfulness) on the constructed network is investigated.

Visual speaker information and sentence processing: Evidence for rapid integration

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In language processing, it is still a matter of debate whether sentence processing takes place in one step or in two steps. Supporters of the two-step model argue that in a first step, the semantic content of a sentence is processed, and that pragmatic information is only taken into account in a second step. One-step models, on the other hand, postulate that all accessible information – including general world knowledge or extralinguistic information such as gestures

or age and gender of the speaker – is integrated immediately when processing language. Recently, studies have provided evidence for a rapid integration of extralinguistic information such as age and gender implied by the speaker´s voice (van Berkum et al., 2008), as predicted by the one-step model. In the present study, we investigated whether visually presented information about the speaker is also integrated rapidly. In a self-paced reading study, participants read sentences which were either typical for a man vs. a woman, or for an adult vs. a child. The typicality of each sentence was determined by a critical phrase (e.g., "an elegant cocktail dress" in "Last week, I bought an elegant cocktail dress for my sister´s wedding"). A picture of a man vs. a woman, or of an adult vs. a child – and therefore either matching or mismatching the critical phrase – was shown to the left of the sentence. Results showed longer reading times for mismatching pictures on the critical phrase, on the phrase after that, and on the final phrase (sentence wrap-up). The results therefore point towards a rapid integration of visual speaker information when processing a sentence, thus supporting the one-step model.

Automatic imitation of rules in choice decisions

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Prior studies have shown that people unconsciously imitate object choices they have observed in another person, especially when their own preferences regarding the objects are not well formed. The aim of this study was to investigate, whether people also imitate the rules according to which these products are chosen. In a first experiment, participants watched a model person choose between two Asian food products. One was labelled as being a new flavour, the other as the market leader. Afterwards, participants were asked to choose between two other products. Again, one was labelled as being a new flavour, the other as the market leader. Results showed that participants were significantly more likely to pick the product with the same label as the one the model had chosen. In the second experiment, participants were shown two objects on a display, one with a red label (meaning the object was inexpensive) and one with a green label (meaning the object was biological). In addition to the objects, a rule cue in the centre of the display indicated whether participants were to choose the ‘inexpensive’ or the ‘biological’ object. Participants responded by pressing a button next to the object. Before each trial, participants were shown a video of a model person participating in the same experiment. The relationship between the choice in the video and the choice the participant himself had to perform was systematically varied. The observed rule could either be the same or different, the chosen object could either be the same or different, and the position of the chosen object could either be the same or different. Results showed that participants’ reaction times were faster when model and participant were to choose according to the same rule and/or chose the same object, whereas the position of the object did not have an effect. These results suggest that automatic imitation effects can also occur for the rules according to which choices are made.

Sensorimotor semantics: How perceptual experience relates to on-line language processing

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Embodied theories of language suggest that word meaning is stored in traces of real-world perceptual experiences across the neocortex. Numerous behavioural and neuroimaging studies over the past decade have demonstrated the role of multiple perceptual systems in the representation of word meaning, e.g., the neural motor system is activated by words denoting actions, while the visual pathways respond to words referring to visual properties (e.g., van Dam et al., 2010). In this talk I will highlight two important features of embodied word meaning: first, the patterns of activation that are elicited by words within sensorimotor areas are actually distinct from patterns of activation elicited by real-world experience. This suggests that although word meaning is derived from perceptual experience, it cannot be equated with traces of experience. Secondly, relevant perceptual cues are combined on-line during language processing: this on-line creation of meaning is flexible and is supported by areas within the anterior temporal lobe. Taken together, the studies presented in this talk show how far the comparison between experience and word meaning can be taken, and provide some information about the neural mechanisms supporting the on-line construction of meaning during language comprehension.

The influence of short action-effect interval durations on intentional binding

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Environmental stimuli that are caused by actions (i.e., effects) are perceived as being earlier compared to stimuli that are not caused by actions. This phenomenon is commonly referred to as intentional binding (IB). Previous studies have investigated the influence of action-effect interval duration on IB-magnitude. The common finding has been that IB decreases with increasing duration. However, previous studies applied relatively long duration ranges, rather atypical for real life effect-delays. We tested how IB magnitude behaves in a range of short action-effect intervals, more comparable to real life effect delays. Additionally, action-effect intervals varied predictably between blocks or randomly within blocks. While participants watched a fast moving clock, a sound stimulus was presented. They had to report at which position the clock hand was when they perceived the sound. In one condition, the sound was presented alone (baseline), while in another condition, participants caused the sound by a key press (experiment). We measured IB as the difference between the baseline and experimental condition. Within subjects we manipulated whether the three intervals (200, 250, 300 ms) varied between blocks (predictable) or randomly within blocks (unpredictable). For both, predictable and unpredictable intervals, we observed consistently larger IB magnitudes with increasing action-effect intervals. Thus, variations of action-effect intervals seem to address postdictive IB processes. Moreover, the influence of interval duration on IB is more complex than previous research suggested. For ranges of short intervals, IB increases with interval

duration, while it decreases for long ranges. These results will be discussed in the context of IB.

Changed functional connectivity at rest in functional illiterates after extensive literacy training

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Resting-state fMRI (R-fMRI) can be used to study intrinsic functional connectivity (iFC) and has recently been used to study the neural networks involved in reading and reading disorders. About 7.5 million adults in Germany cannot read and write properly despite attending school for several years. They are considered to be functional illiterates (FI). We investigated training-related changes in intrinsic functional connectivity (iFC) at rest. A group of 20 FI participating in a literacy training course and 20 adult normal readers participated in the study. We used independent component analysis (ICA) to elucidate different networks existing at rest. Before training, the between group analysis showed increased iFC in FI in a left-fronto-parietal network (LFPN; anterior insula, medial frontal cortex, lateral and frontal parietal regions) and in the Basal Ganglia (BG)-network (thalamus, caudate, putamen, pallidum, amygdala, supplementary motor cortex and cingulate gyrus). Furthermore, Visual Network-I (encompassing temporal occipital fusiform gyrus, lateral occipital cortex, occipital pole, lingual gyrus, thalamus) showed decreased iFC in FI. Training-related changes of functional connectivity in the FI group comprised of reversal of the "hyperconnectivity" in middle frontal gyrus and in the frontal orbital cortex and between supramarginal gyrus and the BG network. Furthermore, functional connectivity increased in FI in the Visual network-I (lateral occipital cortex, insular cortex). These changes in connectivity correlated with gains in reading speed and spelling accuracy. These findings show that poor reading and writing abilities are associated with abnormalities in iFC in several brain areas subserving cognitive processes important for reading. Intensive literacy training induces changes in the functional connectivity between and within neural networks important for literacy skills.

Grasping feelings: Proximity of hands to positive pictures boosts mood recovery

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The regulation of dysphorical mood states plays an important role in the onset and maintenance of depression (Hervás & Vázquez, 2013). Depressed individuals show mood-congruent memory, interpretation and attention biases (Joormann & D'Avanzato, 2010). Studies show, however, that focusing attention to positive information helps to regulate dysphorical mood (Sánchez, Vázquez, Gómez, & Joorman, 2014). Consequently, methods that help to focus and maintain attention towards positive information could contribute to regulate mood. Recent findings from cognitive psychology show that stimuli presented in hand proximity (near hand) receive more attention than those presented in distal places (far hand; e.g., Abrams, Davoli, Du, Knapp, &

Paull, 2008). The present study examined participant's mood recovery after the presentation of positive images near or far from hands. After a sad mood induction, participants were assigned to one of two experimental conditions. In the near hand condition, participants positioned their hands on the left and right side of the computer screen while pictures were presented (i.e. near to the presented pictures). In the far hand condition, participants positioned their hands on the left and right side of their chairs during picture presentation (i.e., far from the presented pictures). Mood state was measured immediately after participant's arrival, after sad mood induction and after the presentation of the pictures. According to our results, participants in the near hand condition showed a better mood recovery than participants in the far hand condition. These results support the notion that attention plays an important role in mood regulation processes and are in line with the embodiment validation hypothesis (Brinol, Petty, & Wagner, 2011) suggesting that bodily states moderate the influence that positive contents can have on mood.

Metacognitive awareness and prospective memory: Understanding the cue-focality effect

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Event-based prospective memory (PM) is the ability to remember to perform an intended action in response to an environmental cue while performing some other ongoing task. PM performance strongly depends on a cue's focality to the ongoing task (Einstein & McDaniel, 2005) – that is, the overlap between the processes engaged for performing the ongoing task and for cue detection. When a cue is focal (i.e., the cue is automatically detected as part of the ongoing-task processing), PM performance is better than when the cue is nonfocal (i.e., cue detection requires processing different from the ongoing-task processing). Usually, these PM improvements are also accompanied by faster ongoing-task responding during focal compared to nonfocal PM tasks, implying that detection of focal cues requires less attentional resources. It is an open question whether this latter aspect of the focality effect is a consequence of an explicit attention-allocation process that lies under metacognitive control or of a processing adjustment based on task experience. In two experiments, we manipulated cue focality (focal, nonfocal) within participants and asked participants to predict and postdict their PM performance in both focality conditions. In Experiment 1, we found that only few participants predicted the focality effect but the focality effect in task performance occurred independent of whether it was predicted or not. All participants accurately postdicted the focality effect. In Experiment 2, one group of participants was led to belief that nonfocal cues were just as easy to detect as focal cues. These participants still showed a focality effect, which was comparable in size to a standard group, even though they did not predict it. We conclude that the focality effect does not rely on metacognitive awareness but rather reflects a calibration to task-demand experiences.

The non-arbitrary relation between vowels and emotion

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The vowel /i:/ (as in “cheese”) is assumed to be particularly frequent in words with positive emotional valence. In contrast, /o:/ is expected to be particularly frequent in words with negative emotional valence. We will report four experiments which investigate this hypothesis in detail: In Experiment 1, participants had to invent pseudo-words in positive or negative mood (Rummer et al., 2014, Exp. 1) and in Experiments 2 and 3, they had to name faces with different emotional expressions. Words invented in positive mood and denoting positive referents included more /i:/s and fewer /o:/s than words in negative conditions. In Experiment 4, participants were instructed to invent novel names (in a language unknown to the participants) for real objects which differed with respect to their emotional valence. This experiment started with an auditory presentation of a Swahili text followed by a presentation of 10 pictures each with a positive, neutral, and negative emotional valence. Participants were instructed to invent pseudo Swahili names for these objects and read them aloud. The names for positive objects included more /i:/s and the names for negative objects included more /o:/s . In sum, we interpret our findings as evidence for the hypothesis that /i:/ is related to positive emotional valence and /o:/ is related to negative emotional valence. We discuss two possible explanations for this non-arbitrary relation between words and their meaning, the frequency code hypothesis (Ohala, 1994) and the articulatory feedback hypothesis (Rummer et al., 2014).

Webpages and personalized banner ads: Effects on visual attention, recognition memory, and task performance

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Internet companies capture and analyze data related to user interests and activity to personalize internet content. Thereby, banner ads have come in the focus of interest not only on e-commerce portals but also on social networks and news portals. However, our knowledge about the effects of personalized advertisement on attention, task performance, and memory is very limited. In this study, 48 female participants performed a search task on webpages of a news portal containing personalized or non-personalized ads, respectively. We investigated whether personalized content actually increases attention and memory for ads and whether the performance of the information search task is negatively influenced at the same time. We measured eye movement behavior by means of an eye-tracker as well as recognition of task-relevant information and ad content. The spatial distribution of fixations quantified by a progressive entropy measure indicated the overall exploration of webpages. Our results support the hypothesis that ad personalization enhances attention and recognition for the ad content, whereby the effect on attention was weaker. This smaller effect on attention may be due to learned banner blindness. Nonetheless, the effect comprises practical significance with respect to large-scaled populations of webpage recipients, because small effects on the level of

attention can elicit substantial effects on the level of memory performance. In contrast, the overall exploration of webpages and the recognition of task-relevant information was not affected. An in-depth analysis of eye movements on banner ads revealed a relatively stable spatiotemporal course of gaze behavior from ad pictures to the logo and finally to the slogan. We conclude that ad personalization is effective but that it does not necessarily hamper the performance of the primary task. Also, we discuss a prototypical scan path of succeeding eye movements on particular elements of the banner ad.

An ACT-R model of age-related cognitive decline in the digit span task

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Cognitive decline is a natural process that all aging humans experience over time. In particular, age-related changes in working memory are associated with performance differences in a variety of cognitive tasks. Here, we demonstrate how age-related decline in the digit span task can be modeled using the ACT-R cognitive architecture. We implemented an ACT-R model of the digit span working memory task adapted from the Wechsler Adult Intelligence Scale (WAIS) including a simple articulatory rehearsal mechanism. We then applied numeric simulation to identify which cognitive parameters of the architecture are central for modeling the performance distributions of different age-groups as provided in the WAIS manual. In line with the literature, we found that the source activation parameter (attentional capacity) is critical for working memory performance. Beyond modeling mean performance, adjusting source activation leads to an accurate reproduction of performance distributions for different age groups. In contrast, varying the memory retrieval threshold or activation noise does not yield adequate model fits. Our simulation shows that age-related performance patterns in the digit span task can be parsimoniously modeled using the source activation parameter of ACT-R. In future research, we will extend this approach to include other working memory tasks and furthermore investigate age-related changes in rehearsal strategies.

Emotion induction in a driving simulation task

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Emotions have a strong impact on human performance. To investigate this relationship, it is necessary to experimentally manipulate affective states in laboratory settings. Although numerous methods of affect induction have been developed, it is unclear whether these methods are also applicable in complex environments like a driving simulation task. The aim of our study was the evaluation of a standard emotion induction method in the lane change task, a standard driving simulation task. The emotion induction method consisted of a combination of music and autobiographical imagination. The experimental manipulation focused on the

induction of the two basic emotions anger and happiness together with a baseline condition. To investigate the effectiveness of the induction method, we used different measurements for the assessment of emotions during driving. We assessed the participants' self-perception of emotional valence and arousal using the self-assessment manikin scales (SAM, Lang, 1980). Additionally, we collected heart rate data and analysed heart rate variability (HRV). SAM ratings revealed expected patterns of affective self-perception. Analysis of HRV during driving further support the effectiveness of the method. Our results indicate that emotion induction by means of a combination of music and imagination can be successfully applied in paradigms involving complex real live simulation.

Functional neuroanatomy of multitasking in the dual n-back paradigm

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Performing two tasks at the same time causes interference that is reflected as performance impairments. Comparing neural activation during dual tasks with the summed activation from single task performance, previous studies have detected an over additive activation of a distributed cortical network during dual tasks with a specific dual task processing centre in the dorsolateral prefrontal cortex. This activation pattern has specifically been shown during the performance of overlapping dual tasks of the psychological refractory period (PRP) type, in which two stimuli are presented in rapid succession. In the present study, we investigated whether a similar activation pattern is observed during dual n-back performance. The dual n-back includes two simultaneously performed n-back tasks (auditory-verbal and visuospatial), and therefore is a dual task with a working memory processing component. We found that the dual task specific neural activation during dual n-back performance can be dissociated from the neural activation during the performance of the dual n-back subtasks as single tasks. Importantly, the dual task specific activation pattern during dual n-back performance was similar to the activation pattern observed in previous studies with dual tasks of the PRP type. These findings are discussed in reference to the functional neuroanatomy of executive processing of competing tasks under working memory load.

Full modeling of neural dynamics during naturalistic language processing: Predictive coding on multiple levels

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Language comprehension is usually investigated with carefully constructed, artificial stimuli to isolate specific linguistic processing levels – such as studying semantic processing by presenting semantic violations. Understanding real-world, congruent language depends, at every moment, on multiple parallel and overlapping processes. We present a novel approach to analyze these

processes: continuous-time multivariate linear estimation of EEG data. Participants (n = 40) listened to 144 variable, naturalistic sentences. Going beyond the classical approach of focusing on specific, critical time points such as syntactically or semantically incongruent words, we model the entire time course of the experiment, and simultaneously the full spectrum from low- (e.g. perceptual) up to high-level (e.g. semantic) phenomena. We specifically focus on neural signatures of surprisal within congruent speech, e.g. positions at which input is perceived that is of low predictability at different linguistic levels. Compatible with the assumption of models of language processing via parallel overlapping predictions, we observe the attenuation of multiple surprisal signals proportional to the degree to which stronger predictions become available at each processing level. For example, where few expectations about the specific acoustic dynamics (e.g. amplitude envelope of upcoming speech) are available - such as at the beginning of sentences - this response is strong. Over the course of sentences, as neural entrainment to the temporal characteristics of the speech stream becomes possible and allows predictions about the acoustics of upcoming words, surprisal responses are increasingly attenuated. We observe similar effects at other levels, e.g. an attenuation of semantic surprisal effects by predictability. We conclude that predictive coding is an appropriate model for natural language processing. Our methodological framework opens venues for further naturalistic investigations.

Improving pitch memory in congenital amusia with transcranial alternating current stimulation

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Congenital amusia is a life-long impairment of music perception which is associated with pitch perception and memory deficits. Brain imaging studies have highlighted structural differences in congenital amusia, predominantly in frontal and temporal areas. Additionally, a functional anomaly of decreased low gamma oscillations (30-40 Hz range) in the right dorsolateral prefrontal cortex (DLPFC) during pitch memory in amusics has been revealed. The present study aimed to investigate whether applying transcranial alternating current stimulation (tACS) at 35 Hz to the right DLPFC would improve pitch memory abilities in individuals with congenital amusia. Nine amusics took part in two tACS sessions and completed a pitch memory and visual memory task before and during tACS with a target frequency of 35 Hz or a control frequency of 90 Hz. Matched controls also completed the pitch and visual memory task without stimulation in order to compare performances. The results reveal that 35 Hz stimulation significantly improved pitch memory in amusics. No modulation effects were found with 90 Hz stimulation or on the visual control task. Furthermore, the analysis revealed that before stimulation, amusics showed a selective impairment of pitch memory compared to controls, whereas the visual memory performances were comparable. Interestingly, the amusics' pitch memory performance during 35 Hz stimulation was not significantly different to pitch memory in healthy controls. In sum, the study shows that modulating the right DLPFC with 35 Hz tACS in congenital amusia leads to an improvement of pitch memory performance supporting the hypothesis that alterations of gamma oscillations within the DLPFC are causally involved in disturbed pitch

memory. In addition, the study adds to the growing literature that non-invasive brain stimulation is a useful tool for therapeutic interventions.

The bimodal advantage in language switching

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Findings from recent experiments suggest modality-specific effects during language switching in terms of a bimodal advantage. Typically, switching from one language to another leads to switch costs (i.e., higher reaction times and increased error rates in language switch trials compared to repetition trials). These switch costs were reduced for bimodal (i.e., switching between a spoken and a sign language) compared to unimodal language switching (i.e., switching between two spoken languages). However, in previous experiments the possibility could not be ruled out that this bimodal advantage was due to differences between unimodal and bimodal language switching with regard to the proficiency level of the different languages. To examine this issue, we conducted a language switching experiment with comparable proficiency level for unimodal and bimodal language switching. 24 participants switched between German and an invented spoken language (no-proficiency group; unimodal blocks) as well as between German and an invented sign language (bimodal blocks) during picture naming. Another group of 24 participants (high-proficiency group) had to name numbers and switched between German and English number words (unimodal blocks) as well as between German and well-known manual number signs (bimodal blocks). The results revealed improved performance for bimodal compared to unimodal language switching in both experimental groups. There were shorter reaction times, lower error rates and - most importantly - lower language switch costs in bimodal compared to unimodal blocks. Thus, our results further confirm findings about a bimodal advantage in language switching, ruling out that these findings were solely evoked by different proficiency levels of the languages. Together, these findings suggest different inhibitory mechanisms in unimodal compared to bimodal language switching resulting in reduced switch costs in bimodal language switching.

Reading `me´ and reading `death´: Distinguishing effects of self-relatedness from valence effects

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Sensory input is organized and selected by physical as well as non-physical features. Until today, it is an open question which non-physical features influence attention allocation (Wentura, Müller, & Rothermund, 2014; see Yiend, 2010, for a review). In the field of attentional capture research, several studies failed to find an attention allocating effect of positive stimuli while finding an effect of negative stimuli (see e.g., Bertels, Kolinsky, Pietrons, & Morais, 2011; Mogg,

& Bradley, 1999). Those results are typically interpreted as evidence for a threat-detector hypothesis, implying that attention is dominantly allocated by threat-related, negative stimuli. In contrast, other studies yielded evidence for a general relevance hypothesis, as the attention allocating effect of valent (even positive) stimuli can be found when explicitly forced (Brosch, Sander, Pourtois, & Scherer, 2008). Considering the attention grabbing power of self-related content (see e.g., Alexopoulos, Muller, Ric, & Marendaz, 2012), we argue that relevance is not limited to positive and negative content but includes self-related content as well. Hence, we hypothesize that the attention allocating effect of relevant stimuli is due to two different dimensions, namely valence on the one hand and self-relatedness on the other hand. In order to differentiate between the two dimensions, we compared effects of positive, negative and self-related stimuli in paradigms typically used to measure effects of valence or self-relatedness.

The effect of social feedback on music preference

Thomas Schäfer

TU Chemnitz

Although much is known about musical preferences,F they are still hard to explain and predict. Over the last two decades, scholars have suggested that the functions served through music should be considered when interpreting musical preferences. It is known that the degree of functionality and the strength of musical preferences are correlated. However, since correlation does not yet equal causation, we sought to clarify experimentally if the degree of functionality really determines the strength of musical preferences. We selected “social relatedness” as one of the most basic functions of music and manipulated it in an experimental study. Participants indicated their favorite musical style and a favorite piece of music that they deemed capable of creating a strong social bond among devotees of that style. They were told that other devotees of the same style would subsequently be asked to rate – based on that piece – how much they would like to get to know the person who had named that piece and their degree of affinity for that person. False feedback was manipulated in two randomized groups, one receiving very positive feedback from the other fans (suggesting high functionality of the piece) and the other receiving rather negative feedback (suggesting low functionality). At the end of the study, participants indicated how much they liked the piece they had named. As expected, participants in the high-functionality group gave higher preference ratings for their selected piece than participants in the low-functionality group. The results suggest that the degree of music’s functionality in everyday life is a determinant of musical preferences.

Is schema-consistent source guessing compensatory?

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Schemata are known to influence both source memory and source guessing. While several

studies found a memory advantage for schema-inconsistent sources, guessing is typically biased in favor of the schema-consistent source (e.g., Küppers & Bayen, 2014). We investigated whether this bias is primarily influenced by schematic expectations or reflects a conscious compensatory guessing strategy based on metacognitive awareness of the inconsistency effect in source memory. Participants studied object word items that were presented with scene labels as sources. Items were either presented with their schematically expected scene (e.g., oven in the kitchen) or with their schematically unexpected scene (e.g., toothpaste in the kitchen). After each trial, some participants were asked to make a Judgment of Source (i.e., to predict their likelihood of remembering the scene of an object). Participants incorrectly predicted their source memory to be better for schema-consistent trials. A compensatory strategy would, in this case, bias source guessing in favor of the (believed-to-be less well remembered) schema-inconsistent source (Meiser, Sattler, & von Hecker, 2007). In contrast, our participants showed a schema-consistent guessing bias. We conclude that source guessing was primarily based on schematic expectations. Participants showed a metamemory illusion concerning influences of schemata on source memory, possibly due to higher encoding fluency for schema-consistent trials (e.g. Undorf & Erdfelder, 2015).

Pupil dilation and EEG alpha frequency band power reveal increased cognitive load for link-selection processes during hypertext-like reading

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In the present research, we were interested in a direct comparison of pupil dilation and electroencephalographic (EEG) alpha frequency band power as measures for increased cognitive load when hyperlink-like words have to be selected during computer-based text reading. For obtaining process measures, we used a methodology of concurrent EEG and eye-tracking data recording that allowed us to compare epochs of pure text reading with epochs of hyperlink-like selection processes in an online reading situation. Furthermore, this methodology allowed us to directly compare the two physiological load-measures EEG alpha frequency band power and pupil dilation. Results of a first experiment revealed increased cognitive load during hyperlink-like selection processes on both measures in terms of decreased alpha frequency band power and increased pupil dilation. Surprisingly however, the two measures did not correlate. Two additional experiments were conducted that excluded potential perceptual, motor, or structural confounds.

Parietal cortex structure and function modulate conscious content

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When visual input has conflicting interpretations, conscious awareness can alternate

spontaneously between these: bistable perception. This phenomenon is detrimental in the neuroscientific study of awareness, since unchanging stimuli induce changes in consciousness. Neuroimaging studies have indicated two right superior parietal areas in the resolution of this perceptual ambiguity (ant-SPLr and post-SPLr). Specifically, while structure of the post-SPLr predicts individual differences in ambiguous perception, activity in the ant-SPLr is time-locked to perceptual switches under functional magnetic resonance imaging. Transcranial magnetic stimulation (TMS) studies that interfered with the normal function of these regions have come to contradictory results on the causal role of parietal cortex in bistable perception, by showing differential effects of TMS on bistable dominance durations, depending on the TMS protocol, parietal stimulation site and visual stimulus. In an effort to resolve these contractions, we demonstrated a previously unreported stimulus-dependence for the effect of TMS in bistability, suggesting that TMS may alter interactions between stimulus-specific regions and a parietal selection mechanism for awareness. We also investigated the fractionation between ant-SPLr and post-SPLr by use of combined TMS with electroencephalography (EEG) and found differences in TMS evoked potentials based on stimulation site and functional state of the brain. Lastly, we explored the relationship between bistability and attention-related functions, which may also be realised by fractionated parietal regions. Again using TMS, we were able to show that the previously observed parietal fractionation between ant-SPLr and post-SPLr is not due to TMS-induced modification of spatial or sustained attention, but specific to conscious awareness. An attempt is made to bring these findings together in a unified account of parietal function in determining the content of awareness.

The psychophysics of price perception: Evidence from the lab and from the field

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The subjective perception and integration of discrete numerical information is an elementary cognitive process that is highly relevant for research in psychology and that provides the basis for other measures such as means or expected values. Number integration also occurs in many everyday situations, for example in a consumer context where people keep track of their spending. Given the relevance of this ability, it is important to gain a better understanding of how people perceive and aggregate numbers that they encounter sequentially and what factors influence their accuracy. Towards this goal, participants in a laboratory experiment (n = 40) repeatedly estimated the sum of a number sequence briefly presented on a computer screen. Results indicate a systematic bias towards underestimation that could be captured with a compressive power function. The observed underestimation depended on the sequential order in which the numbers were presented but not the shape of the underlying frequency distribution. Similar results were obtained in a field study where customers in a grocery store (n = 966) systematically underestimated the total value of their shopping basket prior to checkout. A model comparison approach revealed that the observed underestimation in the lab study was best captured by a compressed mental number line when evaluating single items. In difference to this, in the field study the results rather point to a systematic error when integrating the

information. The field study further indicated that underestimation increased with age but was not due to a simple rounding strategy or the systematic forgetting of unhealthy items such as sweet or fatty snacks. The results yield novel insights into how people perceive and process numbers in an economic context.

A bird in the hand isn't good for long: Short-termed choice impulses in intertemporal decisions

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In intertemporal decision making, individuals prefer smaller rewards delivered sooner over larger rewards delivered later, often to an extent that seems irrational from an economical perspective. This behavior has been attributed to impulsivity, but what exactly underlies these impulsive decisions is still unclear: Does a constant bias in perceiving the time information lead to a dominance of time over value? Or does the time information lead to an immediate and short-termed impulse of taking the sooner reward? To distinguish between the two alternative explanations of impulsive decisions, we studied the process dynamics underlying intertemporal decisions. In an intertemporal choice task, we used mouse tracking to study participants' responses to the sequential presentation of the value and the time information. We found that the information about options' delays leads indeed to a short-termed bias that, in turn, leads to impulsive choices. Hence, the increased preference for sooner smaller rewards can be attributed to an immediate and short-termed impulse of taking the sooner alternative.

Effects of evaluative congruency in working memory

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Evaluative congruency plays an important role in evaluative priming; moreover, it seems also to affect working memory performance. In previous studies applying a change detection task with four emotional faces per trial, we observed a slightly better performance for trials containing only evaluatively congruent items (e.g. four happy faces) compared to an incongruent condition (e.g. two happy and two angry faces). However, we obtained only a small effect. Several characteristics of the procedure might have led to a reduction of the congruency effect. For example, the presence of an emotionally congruent face in the incongruent condition might have reduced the difference between congruent and incongruent trials. Thus, in the present study we presented only two faces to overcome this shortcoming and added two to-be-remembered abstract shapes to maintain task difficulty. Furthermore, we inserted trials which induced a focus on the emotional content. With these procedural changes, we did not find an evaluative congruency effect on accuracy; however, we obtained faster reaction times in congruent trials. Furthermore, in congruent trials participants had a stronger tendency to

indicate that the test faces were old; they showed a more liberal bias in congruent trials. These findings are in accordance with the idea that congruent concepts activated in working memory mutually maintain or facilitate their activation.

Language cues in the formation of hierarchical representation of space: How to build a linguistic landmark

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Background: The formation of a hierarchical representation of space can be induced by the spatial adjacency of landmark objects belonging to the same semantic category (Wiener & Mallot, 2003), and can affect route choice in favor of the alternative transgressing fewer regions. Aims: Using the same paradigm, we tested linguistic cues with various hierarchical categorization principles in regional structuring. Method: In a virtual environment, subjects performed 18 navigation tasks, 12 of which allowed for equidistant, but region-sensitive alternatives. The experimental environment was parceled (i) with landmarks of different semantic categories ("Landmarks"), (ii) with superordinate fictive proper names ("Arbitrary"), (iii) with superordinate prototypical names ("Prototypes"), (iv) with elements from different linguistic semantic categories ("Semantic"), and (v) with members from multi-component institutions ("Whole-Parts"). Results: The results of the "Landmarks" condition confirmed the findings by Wiener & Mallot. For the linguistic conditions, higher error rates as well as strong differences in the prevalence of region-consistent route choices were found. A significant preference was found only for the "Whole-Parts" condition. Conclusions: In the "Arbitrary", "Prototypes" and "Semantic" conditions, language-mediated hierarchies are non-spatial, and do not seem to be associated with the proximity of the places or sign-boards present in all experimental conditions. Only in the Whole-Parts-Condition was a dense semantic network established through prototypical parts of a whole complex. We suggest that language-based induction of hierarchies must not only contain more affiliations between regional and place cues, but also include a spatial association to induce a hierarchical subdivision in the perception of space.

Social priming and the classical Stroop task: A process dissociation approach

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Recent research has shown that the classical Stroop effect can be eliminated or decreased by social priming of dyslexia (Augustinova & Ferrand, 2014; Goldfarb, Aisenberg, & Henik, 2011). It is still being discussed which underlying cognitive process is affected by the social priming procedure. With the help of the process dissociation model, we aim to scrutinize whether the early process of word reading or the late process of color naming is affected (Lindsay & Jacoby,

1994). Instead of reaction times, it is necessary to examine the proportion of correct answers per trial type in order to apply the process dissociation procedure. In a first experiment, subjects completed an initial Stroop task and were subsequently primed with the social concept of a dyslectic person. Afterwards, they completed a second session of the Stroop task. The effect of the social priming procedure on the Stroop interference could tendentially be observed in the amount of correct answers. In a following experiment, participants received either a social priming of dyslexia or dyscalculia. Solely, the dyslexia priming is expected to have an impact on Stroop interference. Results will be presented to answer which process is affected by the social priming procedure.

Selective visual attention to emotional words

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Love is just a word. Although it is a simple array of letters, it is emotional. We learn to relate certain meanings to words. Words therefore differ in their emotional quality. Electroencephalographic (EEG) studies show that our brain can differentiate between emotional and neutral words, reflected in a larger early posterior negativity (EPN) and a larger late positive potential (LPP) for emotional words. Motivated Attention describes that emotional content itself attracts visual attention. In this study, effects of attention, emotion and their interaction are investigated using word stimuli. Twenty-five participants either viewed passively or actively counted negative, neutral or positive nouns while high-density EEG was recorded. There were no significant differences in accuracy or response speed. On ERPs, we found increased EPN and LPP amplitudes for emotional as well as for attended words. Crucially, at the LPP we also found an interaction: Explicit attention to emotional nouns led to a substantial increase of the LPP amplitudes. In source space, enhanced visual processing was found in the EPN and LPP time windows for both main effects. For attention, in addition larger activity was found in broad paracentral, parietal and frontal areas. The interaction at the LPP was mirrored in source space, where enhanced visual activity was found only for counted emotional nouns. Results confirms findings of Motivated Attention, namely that attention and emotion processes act separately at early but interact at late processing stages, which we located to visual areas.

Less lying as a matter of dying: The effect of existential threat and norm salience on deceptive behavior

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When faced with the opportunity to increase benefits through deceptive behavior, people trade the incentives for moral costs: the higher the moral costs, the less likely people will engage in deceptive behavior. In the present work, we investigated existential threat (i.e., mortality

salience) as a motivational factor that might influence the likelihood of deceptive behavior. Terror management theory assumes that reminding people on their own death increases the motivation to fulfill salient cultural norms and values, such as pacifism, helpfulness or reciprocity. A further basic and strong internalized norm in human societies is the norm of honesty. Thus, we hypothesized that mortality salience reduces deceptive behavior when the norm of honesty is salient. In this case, mortality salience is assumed to increase the moral costs when violating the norm of honesty through deception. In two experiments, we assessed deception (under full anonymity) by applying a die-under-the-cup paradigm with the expected value serving as a stochastic baseline for honest behavior. Both experiments provided evidence for our hypothesis. Participants acted honestly only when mortality was salient and when the dice-game was called "Honest game about 100 Euro" (Study 1) or when honesty was cognitively activated by a crossword puzzle (Study 2). In all other conditions, results revealed deceptive behavior. Furthermore, results of Study 1 indicated increased deception under MS (vs. control group) when the game was called "Game about 100 Euro". In Study 2, we additionally manipulated the incentive to deceit. As expected, we only found support for our hypothesis when there was some incentive; no effects of MS and norm salience occurred when there was no incentive. Practical implications are discussed.

Testing the SERS theory and the influence of social value orientation on cooperation in repeated Prisoner´s Dilemmas.

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SERS theory (Fischer, 2009) posits that higher levels of perceived similarity between two players in a Prisoner´s Dilemma lead to cooperative behaviour. It also states that the payoff matrix of a PD can be transformed to a game threshold, indicating the level of perceived similarity needed to obtain higher expected payoffs from cooperation than from defection. The influence of threshold changes as well as similarity perceptions on cooperation rates each was previously found significant in experiments using one shot binary and continuous PD´s. In the three present experiments, we extended the SERS theory on iterated PD´s, in which participants repeatedly played up to 200 rounds with the same partner, and with changing payoffs in different experimental conditions (four threshold levels). We tested the following hypotheses: (1) the higher the share of similar actions (measured via the dyad choice history), the more likely is a cooperative choice in the subsequent round, and (2) the higher the similarity threshold, the lower the general tendency to cooperate. We tested hypotheses (1) and (2), as well as influences from individuals´ social value orientation (SVO slider, Murphy & Ackermann, 2011), also controlling for direct reciprocity, previous overall cooperation and other common measures. We found that (1) the history of similar actions significantly predicted changes in cooperation rates, and that (2) changing the similarity thresholds led to significant changes in overall cooperation rates. Furthermore, perceived similarity was explored under changing assumptions about choice history length, which is discussed from a cognitive perspective.

Drivers' gap acceptance in front of different types of two wheelers

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Previous studies on gap acceptance have shown that the size of an approaching vehicle influences the size of accepted gaps. For example, drivers are less likely to turn in front of a truck compared to a compact car at the same gap size. Up to now, this effect has not been studied for smaller vehicles. The goal of this experiment was to investigate road users' gap acceptance behaviour in relation to approaching two-wheelers. We examined differences in drivers' decisions to turn left in front of a conventional bicycle, an e-bike and a scooter approaching at different speeds (25-35 km/h). In a video based experiment, 44 participants were required to observe an approaching bicycle, e-bike or scooter in a video, from a driver's perspective. Their task was to indicate the smallest gap for a left turn in front of the cyclist they were willing to accept. The results show that participants accepted smaller gaps for the two bicycles than for the scooter, whereas there was no difference between the bicycle and the e-bike. Additionally, a higher approach speed of the two wheelers lead to smaller accepted gaps in comparison to a lower approach speed. The results demonstrate that the effect of the vehicle size also exists for vehicles smaller than cars.

Justice sensitivity predicts reactions to injustice elicited by other's moral hypocrisy

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This research examines whether individual differences in justice sensitivity affect cognitive, emotional and behavioral reactions to injustice caused by observation of hypocritical behavior. In Study 1, participants (n=190) read a scenario describing some Person A confronted with the dilemma of deciding whom – herself or another Person B – to assign to a monetarily rewarded task, leaving the other to an unpaid task. Participants learned that Person A used a coin flip to decide about the task allocation and either decided in line with the coin flip or lied about its outcome to her own advantage. Our participants then had the chance to either punish Person A or compensate Person B (2(Person A is honest vs. lies) x 2 (compensation vs. punishment) between-subjects design). The results showed that participants were more likely to compensate Person B than to punish Person A. This effect was particularly strong for beneficiary-sensitive participants who were also more likely to feel annoyed by an unfair allocation and to correctly memorize whether Person A decided in line with the coin flip or not. In Study 2, (n=93), again beneficiary-sensitive individuals were more likely to compensate Person B than to punish Person A, especially if the latter behaved dishonestly. This effect was mediated by individuals' fairness-related judgment of the situation. Both studies suggest that JS shapes cognitive, emotional and behavioral reactions to the situations where justice is at stake.

No implicit perception of voices in patients with hemineglect

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In patients with hemineglect, who are typically unable to consciously perceive stimuli from left extrapersonal space, preserved implicit perception of neglected visual stimuli has been demonstrated repeatedly (e.g. Ladavas et al., 1993). To test implicit perception of neglected auditory stimuli, we utilized an established high-level auditory aftereffect (Schweinberger et al., 2008): Following adaptation to male voices, androgynous voices are perceived as clearly female - and vice versa. Importantly, Zäske, Fritz, and Schweinberger (2013) showed that in healthy listeners, the voice gender adaptation effect (VGAE) is abolished when subjects do not spatially attend to the clearly gendered adaptor voices in a dichotic listening paradigm. In the present study, 14 neglect patients and 14 healthy controls underwent a series of three short experiments. Participants were tested for both, allocation errors in a tone localization task and visual neglect symptoms. The third part involved a voice adaptation experiment: In each trial a clearly gendered adaptor voice was presented to one ear while an androgynous voice (50% female/male morph) was presented to the other. This combination was repeated twice before a morphed target voice (30%, 50%, or 70% female) was presented to both ears. Participants indicated the target voice gender by button press. We observed a significant three-way interaction between group, ear and adaptor gender. In healthy controls, a VGAE occurred after presentation of the gender-specific adaptor voices to either ear. In the neglect group, a similar trend towards a VGAE after adaptation to the right ear was visible ($p = .10$), whereas no VGAE occurred after adaptation to the left ear. These results suggest that explicit perception of the adaptor stimuli is needed for a VGAE to occur. The absence of a left VGAE in neglect patients reflects their inability to direct spatial attention intentionally to the left side of extrapersonal space.

Investigating the role of the mirror neuron system for imitation by means of functional magnetic resonance imaging

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Current theories propose the mirror neuron system (MNS) to be the neuronal basis of interpersonal understanding. It is assumed that we understand others by a mapping of the perceived motor state in our own cortical motor system. For imitation, a process that is supposed to be fundamental to learning and empathy, however, the mapped motor state of another person is additionally used to generate an own motor expression. The present study aims on disentangling the neural basis of imitation. 17 healthy participants were included in a functional magnetic resonance imaging study with four conditions. For the ‘imitation’ condition,

participants had to imitate an emotional facial expression; In the 'observation' condition, participants were instructed to passively view an emotional facial expression; In the 'expression' condition, participants saw a word describing an emotion and had to express the emotion with their face; In the 'control' condition participants were instructed to pronounce letters presented on the screen. For the imitation task, we found significant activation in the inferior prefrontal gyrus, the inferior parietal cortex and the superior temporal sulcus, areas associated with the human MNS. Analysis of the expression condition revealed activation in the MNS associated areas, too. In contrast, for observation no activation was found in areas of the MNS, but in the visual cortex and the amygdala. Activation in the MNS areas was stronger during imitation than during observation, expression and control. Although mirror neurons are not directly assessable by means of functional magnetic resonance imaging, our results support the assumption that the MNS is involved in imitation. The stronger activation for imitation than for expression might represent a mirroring in addition to the execution of a facial expression.

Does consciousness research need psychophysics?

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In the field of consciousness research, many attempts are recently made to establish simple, unitary measures of "consciousness". Here, I focus on a set of elementary psychophysical concepts that could remove some major sources of confusion when we try to measure aspects of visual awareness. 1) It is misleading to think of "consciousness" as a unitary phenomenon that can be captured in a single measure. Instead, we should think of "visual awareness" (VA) as a structure of measures comprising aspects of detectability, discriminability, subjective appearance, and possibly more. 2) Any measure of VA is the outcome of a psychophysical task. To understand the measure, we need to understand the underlying decision space and be aware that different measures may require different and unrelated decision criteria. 3) To understand a measure of VA, we have to know the particular criterion content that the observer is actually using, which might be different from the one the researcher had in mind. From these concepts, I will try to resolve the apparent conflict between subjective and objective measures of VA as simply reflecting different criterion contents and different decision problems, and discuss how a multifaceted view of visual awareness conflicts with core concepts of consciousness research.

Conflict adaptation as affect regulation

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Interference between ongoing processes enhances cognitive control which aims to reduce subsequent interference. Interference is experienced as aversive. Consequently, control

processes may be reinterpreted as instances of affect regulation which aim to reduce negative states. Negative affect induced by conflict may motivate enhanced allocation of control to avoid this negative affect hereinafter. Conflict adaptation, hence reduced interference effects after previously encountered interference, could be just one of many possibilities to regulate the affective impact of conflict. Another affect regulation strategy is situation modification. Given the aversive nature of conflict, we assumed that it is easier to change a conflict situation to a non-conflict situation, rather than, inversely, changing a non-conflict situation to a conflicting one. We confirmed this prediction in a modified Color-Word-Stroop task, in which participants produced congruent or incongruent stimulation with their response. Moreover, we examined if conflict adaptation disappears when participants are given the possibility to attribute subtle affective changes to external sources. The current experiments investigated the involvement of affect in conflict adaptation and suggest that instances of "cold" control processes can in part be explained by affect regulation.

Experimental manipulation "in the wild": Proposing a within-person encouragement design

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DIPF

Experimentally manipulating treatment variables within persons across time allows investigating individual differences in the effects of behavioral interventions in everyday life contexts. When these interventions use behaviors as treatment that people can choose whether or not to show in their daily lives (like physical exercise), it would be desirable to randomly distribute treatment and control behaviors across occasions and prompt the according behavior using, for example, smartphone-based applications. Strict adherence to such prompts will often be unrealistic in real-life contexts, however. Therefore, I propose an encouragement design, in which participants agree to try to show the requested behavior when prompted – but can do otherwise if, for example, the behavior would not be appropriate in a given situation. If the prompt conditions are randomized and show a substantial correlation with the actual behavior, an instrumental variable approach can be used to estimate the causal effect of the behavior on outcome variables. If the design is implemented for a sample of participants, these models can be set up as two-level structural equation models, which allow investigating, for example, individual differences in treatment adherence and effectiveness of the intervention. Using simulations, the applicability of the approach under different conditions is explored. Potential applications and extensions as well as statistical assumptions and practical limitations of the approach are discussed.

Still letters in the forest: Global precedence effect for non-letters keeps robust even after phonological association training

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University of Kaiserslautern

On the basis of previous studies, we argue that in normally skilled readers an abstract letter code leads to the preferred usage of analytic strategies for the processing of letters, while non-letters are preferably processed via holistic strategies. The well-known global precedence effect (GPE) seems to contradict this assumption, since, with compound, hierarchical figures, including letter items, faster responses are observed in the global than in the local level of the figure, as well as an asymmetrical interference effect from the global to the local level. We argue that with letters, these effects depend on presentation conditions: only when they elicit the processing strategies automatized for reading, an analytic strategy for letters in contrast to non-letters is to be expected. We compared the GPE for letters and non-letters in central viewing, with the global stimulus size close to the functional visual field in whole word reading, and local stimuli close to the critical size for fluent reading of individual letters. Under these conditions, GPE remained robust for non-letters, whereas it disappeared for letters: no overall response time advantage for the global level and symmetric congruence effects (local-to-global as well as global-to-local interference). We interpret these results according to the view that reading is based on resident analytical visual processing strategies for letters. In a training study, we tested if the letter - non-letter distinction in GPE disappears when the non-letters become systematically associated with phonemes in various training sessions. Against our hypothesis, results before and after training were found to be the same. Conclusion: GPE disappears for letters but not for non-letters under reading-like conditions and this distinction cannot be vanished by a short-term training of non-letters associated with phonemes.

When the first language is a regional dialect: An fMRI study of story comprehension in different language varieties

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Listening to people who speak regional dialects may pose major communication problems. Above all, these speakers are often stigmatized as common or less intelligent even though they speak the standard variety as well. In contrast, research on bilingualism emphasizes positive aspects of mastering several languages. Neuroimaging studies on language comprehension show similar activation patterns for the first and second language, modulated by age of acquisition and language competence (Gómez-Ruiz, 2010). Only a few neurolinguistic studies focused on dialect speakers, most of them on perception of phonetic dialect features. In the present study, we used fMRI to map brain activation during auditory text comprehension in different regional language varieties. Forty people were selected based on a specifically developed dialect questionnaire. 20 participants spoke Standard German and South Alemannic, a dialect spoken south of Freiburg. The other half spoke only Standard German. 24 German fairy

tales were selected, translated and recorded in South Alemannic. Recordings of Standard German and another German variety, Central Bavarian, served as control conditions. For replication of previous bilingualism studies, English was also included. Whole brain analyses revealed activations in the extended language network for all participants (Ferstl et al., 2008). Rather than prefrontal areas, temporal areas played an important role in discriminating the conditions: Overall, the superior temporal gyri (STG) were less active in Standard German. Reflecting differences in comprehensibility, the anterior temporal lobe (aTL) was more active for Standard vs. English. Activation for Standard vs. Alemannic varied with participant group: Speakers without dialect exposure showed more activation in aTL, Alemannic speakers did not. Region of interest analyses linked with individual data on verbal fluency and executive functions shall further differentiate these results.

Rime sensitivity in German preliterates, early literates and adults

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Early readers and experienced adult readers are sensitive to rime overlap (e.g. /f·ɪ·ʃ/ - /d·ɪ·ʃ/), when asked whether two words rhyme (Wagensveld et al., 2012; Wagensveld et al., 2013). In contrast, preschoolers judge any type of phonological overlap as rime (e.g. /f·ɪ·ʃ/ - /f·ɪ·t/; Carroll & Snowling, 2001). In the present study, we investigated if and when German preschoolers develop rime sensitivity in the transition to first grade. We administered a computerized rime judgment task overall three times to 63 German speaking children, in preschool and first grade. The same task was additionally given to 23 German speaking adults. In 32 trials, participants had to judge whether a monosyllabic reference and target word rimed. Target words were matched for phonological measures and frequency across four conditions (rime overlap, vowel overlap, body overlap, control) and across four experimental versions. Preliminary results from latency measures showed that preschoolers like adults were rime sensitive, but regressed in rime sensitivity at the beginning of first grade. We concluded that at the beginning of reading acquisition, children overgeneralize phonological overlap but in general literates and preliterates are sensitive to rime.

Efficient versus flexible mentalizing in complex social settings: Exploring signature limits

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Wu, Sheppard and Mitchell (2016; WSM) found that adults can detect especially extreme (i.e., high/low), compared to average, empathic traits in unfamiliar people after only briefly watching or listening to that person. Authors suggest that it may be advantageous for humans to track extreme empathy traits to anticipate others' non-normative behaviours. WSM provide exciting data, but do not illuminate the cognitive mechanisms underpinning such intriguing cognitive

abilities. We propose that the operation of a relatively efficient, implicit but inflexible mentalizing system (Apperly & Butterfill, 2009; Low & Watts, 2013; Schneider et al., 2012) supports human empathy tracking from brief samples of behaviour. We highlight signature limits – over time-, attribute-, and protagonist-restrictions – that can determine when trait inferences reflect computations of an efficient-implicit mentalizing system, and when those inferences might tap operations of a flexible-explicit mentalizing system.

The time course of retro-cue induced working memory updating: Behavioral and electrophysiological evidence

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By means of a visual retro-cueing paradigm, we investigated the fate of working memory representations that are no longer required for an ongoing task. A retro-cue indicated if items on the left or right side of a previous memory array remained relevant. Subsequently, a central probe item was presented with a varying stimulus onset asynchrony (SOA: 300, 400, 600, 1000, 1800 ms). Participants had to state whether this stimulus was shown on the cued side of the memory array. The probe was either a cued, non-cued or new item. Non-cued probes were associated with delayed response times and an increased frontal negativity starting at 400 ms after probe onset (i.e. N450) that indicated a higher processing conflict compared to new probes. These effects were strongest for the 300 ms and 400 ms SOAs and decreased in the longer SOA conditions, revealing the critical time interval of visuo-spatial working memory updating. Furthermore, contralateral negativities at posterior (PCN) and anterior sites (ADAN) reflected the attentional orienting toward cued information while selective retention was associated with a sustained suppression of posterior induced alpha power contralateral to retro-cue direction. Results suggest that it takes about 500 ms to focus attention on a subset of information in visuo-spatial working memory. This updating process leaves the non-cued contents in a passive and fragile short-term memory state with less impact on ongoing information processing.

Food for your mind? The effect of tyrosine on the performance in a Stroop task and an Attention Network Test

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Tyrosine is the precursor of the neurotransmitter dopamine. Recent reports suggest that tyrosine might enhance cognitive processing in several domains, including working memory (Colzato, Jongkees, Sellaro, & Hommel, 2013), response inhibition (Colzato et al., 2014) and cognitive flexibility (Steenbergen, Sellaro, Hommel, & Colzato, 2015). In a double-blind, randomized, and counterbalanced study of n = 30, we examined whether the oral intake of

tyrosine facilitated the behavioral performance in a binary Stroop task and in an Attention Network Test. We found slight positive modulations within the Stroop task (insofar as women made fewer mistakes within the incongruent condition), but no equivalent effects within the Attention Network Test. We conclude that tyrosine supplementation does not seem to generate a large or robust increase in performance; moreover, the effects of tyrosine might partly depend on interindividual factors.

Politeness in multimedia instructions as facilitator of learning and motivation

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One crucial mechanism in transporting culturally suitable messages to other people is politeness. Even in presumable social-distant areas like learning with computers, politeness plays a crucial role. The politeness effect in multimedia research states that face threats induced by impolite on-screen instructions are supposed to decrease learning performances. However, this effect has only been proven for displayed pedagogical agents. This poster will reveal the role of politeness in instructions during learning with a multimedia web page. By incorporating former studies of learning-enhancing politeness effects and an analyzation of different politeness concepts, an experimental research design was developed in order to examine politeness effects for instructions. One hundred twenty German upper secondary school students were randomly assigned to one cell of a fractional one-factorial (direct vs. polite) between-subjects design. In this experiment, students learned all about attribution theories while clicking through a learning web page where only instructional pages differed. Results confirm the politeness effect for retention and transfer performances, showing large effect sizes. Students reported significantly higher scores on interest, probability of success, and learning assistance in the polite treatment group while scores on directness, restriction of freedom, extraneous cognitive load, and mental effort are significantly lower. Results do not only prove the postulated learning and motivation enhancing effects but also question former theories on politeness within the area of multimedia learning. Additionally, polite variations were not assessed as social cues like research on personalization effects would describe politeness variations. For this, a new term of cultural cues in multimedia learning is proposed.

On the generation and retrieval of facial representations

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A most widely unexplored field of research is how exactly facial representations and prototypes are generated and on which experiences they are established and later on retrieved. Some sparse theoretical frameworks postulate a so-called “face space” as the respective prototype provides the centroid and the unique exemplars of a face are encoded as a point in this

n-dimensional space along several dimensions. It is suggested that this face space corresponds to one's facial representation of a certain person. However, there is no knowledge about the genesis of such a face space and the dynamics of changes over time due to visual update and memory and retrieval effects. Moreover, it is not clear, whether these representations actually can be seen as averages of a given face, or as a combination of multiple prototypes. Accordingly, we let participants rate the similarity along 20 facial presentations of four unfamiliar individuals spanning a period of >60 years. Analyses by k-means of cluster analysis and multidimensional scaling revealed clear sub-prototypical clusters of the facial outward appearance of the persons, providing first hints that each development period of a person reflects genuine clustered prototypes, clearly opposing the idea of an exhaustive prototype spanning an entire life of a person. Consequently, to investigate the possibility of multiple-prototype-model relatives of the individuals who provided the stimuli were asked to rate the prototypicality of by-morphing-generated episodic prototypes which provided a cluster in Experiment 1. Interestingly, participants rather rated episodic prototypes of actual decades significantly as more prototypical than the exhaustive prototypes, suggesting an adaptation of mental representations towards recent experience with the respective individual. Here we show that it is even more economical and more precise to propose episodic prototypes which represent a characteristic time span of a human life.

Quality of mother-child-interaction modulates electrophysiological correlates of an executive function task in preschool children

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Executive functions - a set of cognitive control abilities - mediate resilience to stress and are associated with academic achievement and health throughout life. They are crucially linked to prefrontal cortex function as well as to parietal and occipital brain functions that are maturing throughout childhood at different rates. Recent behavioral research suggested that children`s executive functions were related to parenting quality and child attachment security, but the neural correlates of these associations are unknown. With this study we tested in 4-to-5-year old healthy children (N=27) how maternal emotional availability (EA) was associated with behavioral and electrophysiological correlates for response inhibition (a core executive function) in a Go/Nogo task, using event-related potential recordings (ERPs). Our data showed that the Go/Nogo task modulated children`s ERP components resembling adult electrophysiological indices of response inhibition - the N2 and P3 ERPs- , but the children`s N2 and P3 ERPs showed longer latencies. Higher maternal autonomy-fostering behavior was significantly associated with smaller children`s N2 Go/Nogo effects at fronto-central and parietal sites and with greater N2 Go/Nogo effects at occipital sites. However, no significant associations were found between maternal EA and the behavioral response inhibition measures. Our results suggest that parenting qualities are related to neural activities in children`s prefrontal, parietal and occipital cortex during a task that requires executive functions. These data support the

proposition that parent-child interactions shape neurocognitive development underlying executive function.

Measurement of heart rate by mobile wrist bands

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A physiological parameter like heart rate (HR) is frequently used in a wide range of psychophysiological studies. However, setting up of ambulatory sensors and instruments and the application of analysis software often require a certain level of expertise. Devices such as smart bands for measuring heart rate have been developed and proposed as systems for monitoring and evaluating health related behavior for user groups without any specific expertise. Monitoring the changes in physiological parameters enables anticipation and intervention to reduce health and mental issues related to lack of physical activity. The goal of this study is to examine the accuracy of a photoplethysmography based smart band against a conventional holter electrocardiogram (ECG).

Schläfrigkeit in Funkverkehr-gestützter Kommunikation: Sprachsignal-basierte Mustererkennungsanalyse

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Aus der Perspektive von Unfallprävention und Optimierung von Arbeitsleistung, sowohl im betrieblichen als auch privaten Umfeld, stellt die Detektion von kritischen Schläfrigkeitszuständen eine wertvolle Bereicherung dar. Ziel der Untersuchung ist die Identifikation schläfrigkeitsinduzierter phonetisch-linguistischer Veränderungen der Sprache und die Entwicklung eines darauf aufbauenden, automatisierten Schläfrigkeitsmessverfahrens. Zu diesem Zweck wird ein schlafdeprivationsbasiertes Sprachkorpus (N = 89) aufgezeichnet. Aufbauend auf Fortschritten der mustererkennungsbasierten Sprachemotionserkennung werden sowohl ein hybrides brute-force wie auch ein theoriegeleitetes Merkmalset extrahiert. Die Kernergebnisse der Untersuchung sind: (a) Aufbau eines realitätsnahen, moderate Schläfrigkeitsintensitäten berücksichtigenden Korpus, (b) zusätzliche Nutzung von Video- statt unimodalen Audio-Annotationen und (c) bessere Detektionsraten für männliche Probanden. Darüber hinaus konnte die Bedeutung von Expertise und Kontextinformation bei der Annotation von Schläfrigkeit durch naive Rater, Experten und Versuchsleiter festgehalten werden. Des Weiteren wurden eine Vielzahl von Artikulations- und Stimmqualitäts-bezogenen akustischen Korrelaten von Schläfrigkeit identifiziert. Die wesentliche forschungsstrategische Wertschöpfung

der Untersuchung liegt daher auch in der Integration von theoriegeleiteten und interpretationsorientierten phonetischen Ansätzen mit datengeleiteten und Performanz-orientierten brute-force Ansätzen.

Attentional capture by subliminal abrupt onsets: Testing the display wide contingent orienting hypothesis

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Prior studies suggested that the peripheral cueing effect by subliminal abrupt onsets is stimulus-driven. Mulckhuyse, Talsma and Theeuwes (2007) presented a cue 16 ms before a target. The cue appeared to the left or to the right of fixation, either at target position or away from it. The cue facilitated responses for targets at its position although cues were not informative regarding the target's likely position and although the very short lead time of the cue relative to two similar-looking placeholders (at screen center and on the other side of the screen) created the subjective impression of a simultaneous onset of all three placeholders and ensured that participants remained unaware of the cue as an onset-singleton at just one location. The downside of this procedure is the display-wide top-down contingent orienting towards the placeholders and, accordingly, the cue cannot be ruled out because the placeholders are presented at the time of the target. We tested this contention by taking different measures to reduce the temporal contingency between target and placeholder onsets. Presenting the cue and placeholders in the majority of trials only after target onset had no influence on the cueing effect (Experiment 1). However, when we left out the cue and placeholders in some target trials and additionally introduced cue-and- placeholder-only trials without a target, the cueing effect was no longer observed (Experiment 2). Likewise, when we additionally presented a tone prior to target onset to replace the cue as a warning signal for target onset, the cueing effect was also eliminated (Experiment 3). Together, the results suggest that subliminal cueing effects are not entirely stimulus-driven but depend on the participants' top-down search for target-announcing display-wide available cue/placeholder features.

Narcissists and their attraction to autocratic leadership

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Generally, in Western cultures (and not only) a preference for democratic leadership seems to be beyond question. This research investigated whether narcissists constitute an exception in this regard. The main difference between democratic and autocratic leadership is the degree of granted participation. A democratic leadership style lets group members participate in the decision-making process; an autocratic leadership style allocates the decisive power to the leader. Because narcissists have an excessive need for power, when they are in the leadership

position, they should evaluate autocratic leadership better and democratic leadership worse than their less narcissistic counterparts. When they are in a subordinate position, two alternative hypotheses are plausible. On the one hand, one might assume that they like democratic leadership better given that democratic leaders let them do their work the way they think best and allow a high degree of initiative. On the other hand, autocratic leaders decide what shall be done and assign group members to particular tasks, thereby making responsibilities for accomplishments clear and providing an opportunity to "shine". Moreover, based on the similarity principle, narcissistic subordinates may be attracted to leaders who show a leadership style (i.e., autocratic) that they would exhibit, if they were in a leadership position. A series of four studies showed that narcissists evaluate autocratic leadership more positively and democratic leadership more negatively than their less narcissistic counterparts, regardless of whether they occupied a leadership or a subordinate position. More fine-grained analyses revealed that particularly the maladaptive components of narcissism such as exploitativeness, entitlement, exhibitionism, and rivalry were responsible for these effects. Implications of the findings will be discussed.

Judge-advisor differences in intertemporal financial decisions

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Individuals are often confronted with decision situations that require tradeoffs of benefits at different points in time. For example, imagine that Stefanie has won money in the lottery and wonders whether to spend the money on a luxury holiday or to invest it in her private retirement provision, from which she will not benefit until the distant future. - Now, imagine that Stefanie asks you for your advice. Would you recommend her to invest the money in the luxury holiday or in the investment? - And would you act in line with your recommendation when facing a similar decision situation? In line with Construal Level Theory (Trope & Liberman, 2003, 2010), it is proposed that individuals give advice from a greater distance than when forming personal decisions, resulting in differences in the construal level of mental representations of the decision situation. Making decisions for oneself (low social distance) is associated with low construal levels and relatively more weight of the low-level attribute waiting time, whereas giving advice (high social distance) is associated with high construal levels and relatively more weight of the high-level attribute value of outcomes. Hence, judges should prefer sooner but smaller options over delayed but larger options and advisors should recommend delayed but larger options more often. Hypotheses were addressed in a series of experiments by asking individuals to form personal judgments or to give advice and by assessing differences in intertemporal judgments and in construal levels. In line with hypotheses, judges preferred sooner smaller options over delayed larger options and advisors recommended larger delayed options more often. These judge-advisor differences were mediated by individuals' construal level. Implications of judge-advisor differences for intertemporal judgments and for judgments in general will be discussed.

The temporal dynamics of eye movements to blank spaces during memory retrieval of verbal information

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When retrieving information from memory, people gaze at blank spaces if visual stimuli previously occupied these regions of space. Recent research has shown that this so-called “looking-at-nothing” behavior is functional for memory retrieval of both visuospatial and verbal information. It has been explained as the result of an overlap between processes involved in encoding and retrieval of information stored in a multimodal, internal memory representation. However, the chain of events of programming and executing an eye movement to blank spaces is underexplored. More precisely, when do people start looking at blank spaces? Is it right after they’ve been listening to a critical piece of information or later when thinking about the correct answer? Even more, does the time-course of eye movement behavior change when responding correctly in comparison to giving a wrong response? A reanalysis of eye movement data by Scholz, Mehlhorn and Krems (2014, Psychological Research) revealed that people start looking-at-nothing at the onset of the probed item. This was the case for hits and correct rejections, but not for misses and false alarms. The results of the analyses reveal the time-course of looking-at-nothing and shed light on the mechanisms underlying eye movements to blank spaces for verbal information. Theoretical implications and dynamic systems approaches to model the data are discussed.

Solving complex problems intuitively - A contradiction in terms?

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Complex problem solving (CPS) in terms of controlling dynamic systems has always been associated with learning causal structures. However, some observations allow the assumption that this might not be the whole story. To explore the possibility of "intuitive CPS" more systematically, we have developed a dual-task paradigm in which subjects learn to control a real-time driven dynamic system using tangible sliders while judging the meaning of auditory presented sentences. The secondary task is intended to interfere with the acquisition of explicit causal knowledge. Based on a dual-processing framework, we predict that subjects are able to learn to control the system almost without causal knowledge, provided they are given enough time. We also predict that these subjects can transfer the acquired skill to very similar sets of systems and goal states only, whereas subjects who learn to control the system in the conventional manner should span much larger transfer distances. In the presentation we introduce the new paradigm, discuss the application of the dual-processing framework to CPS, and report the results of a pilot study.

Measuring discrimination against foreigners on the apartment rental market

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The measurement of discrimination is one of the oldest challenges in social psychology. Intriguing explicit and implicit methods are used and refined through contemporary times to overcome problems like norms of political correctness. We overcome these typical problems of discrimination research by observing actual behavior in field study settings. Using Conditional E-Mail Response Technique (CERT) in four field studies we measured behavioral biases on the apartment rental market in four different cities (Heidelberg, Berlin, Munich and Hamburg). Subjects were private lessors or accommodation brokers who offered single rooms or two-room apartments on an online platform dedicated to the apartment rental market. CERT utilizes response-rates and valence of responses to e-mail applications from different alleged senders within participants. While content of the e-mails was kept either constant or similar (and randomly paired) across conditions, the manipulated factors were names and e-mail addresses of the alleged applicants: indicating different ethnic backgrounds (Americans, Germans, Italians, Russians, and Turks). E-mail communication between the lessors/brokers and the purported lessees showed systematic biases – effectively discriminating against the alleged foreign applicants.

Telling ordinary lies: The role of distinctiveness in implicit retrieval of lies

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Telling lies is a fairly common event in daily conversations. In order not to be detected as a liar, it is important to remember the lies we told, otherwise we must fear social exclusion. Accordingly, it has been shown that knowledge about having lied before is retrieved automatically from long-term memory when encountering the same question again (Koranyi, Schreckenbach, & Rothermund, 2015). Despite its relatively frequent occurrence, telling a lie is still less common compared to telling the truth, which could explain why knowledge about lying is retrieved automatically from memory while having told the truth to a question is not. To test whether distinctiveness mediates the storage and retrieval of knowledge about lying/truthfulness, we manipulated the proportion of questions that participants had to answer deceptively in an oral interview, making lies either something special or something ordinary during this conversation. Subsequently, participants had to categorize the words “honest” and “dishonest” in a speeded classification task after being primed with questions of the interview. In line with our assumptions, automatic retrieval of knowledge about having lied or told the truth was stronger for the less frequent events.

Visuomotor processing and perception of natural morphed images in spider phobics

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Fear-relevant stimuli are preferentially processed by our visual system. However, which situations and stimuli are fear-relevant is not universal. In our study, we compared rapid visuomotor processing and perception of natural morphed images in spider-fearful and control participants. Natural images of four objects (a starfish, a crab, a bunch of keys, and a flower) were morphed into the image of a spider. We hypothesized that visual processing and perception would be different between groups for spider and spider-like stimuli. All stimuli were used as primes in a blocked response priming paradigm. Participants responded to the identity of the targets which were either object or spider. After the priming task, both groups rated all stimuli with respect to their perceptual appearance (object vs. spider), valence, arousal, and disgust. In line with previous studies, our results show an interpretive bias in spider-fearful individuals: ambiguous stimuli were perceived as more similar to spiders, as well as more disgusting, unpleasant and arousing. Also, spider-fearful participants showed faster responses to spider targets. Against our expectations, the observed priming effects were not different between groups, neither for spider nor spider-like primes. This was the case, even though we used natural images of high ecological validity.

Virtual Reality in the assessment of a manual bias towards food

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Biased attentional and cognitive processes are documented for various psychiatric conditions, mostly linked with illness-specific stimuli. Prominent cognitive bias modification paradigms aim at addressing specific cognitive-behavioral deviations and corroborate therapy outcomes. Interestingly, the bodily and motivational involvement in accessing critical stimuli differentially might further contribute to bias modification efficacy. Here, we introduce a novel experimental setup in Virtual Reality (VR) to include actual hand ward and grasp movements in manual interactions with critical stimuli. The aim of this study was to extend the well-established finding of the attentional bias towards food by stimulus specific motor-behavior. First, a behavioral bias towards food was documented during the course of grasping 3D objects of palatable food as compared to ball objects. Food objects were collected faster than ball objects and the difference increased with larger body-mass indices of the healthy participants. This finding was replicated in a second experiment, but the behavioral bias towards food was driven by high-calorie food objects exclusively, as compared to 3D objects of balls, office tools, and low-calorie fruits. Exploratory analyses of the hand movement trajectories might yield further insights into the real-time interactions between motor and cognitive-attentional processes. Current VR technologies offer promising tools in the assessment of biased behavior and could amend therapeutic programs. Yet, technological and conceptual limitations have to be

considered. For instance, a limited range of tracking precision, simulation sickness, and inter-individual differences in empathizing with virtual environments (i.e., presence) might modulate behaviors in VR. Future research thus should also directly compare VR with real-world setups to verify the applicability of VR techniques in possible diagnostic and treatment programs.

Model fit evaluation with the RMSEA facilitates the use of diffusion models in individual differences research

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Diffusion models have seen a huge rise in popularity in individual differences research, because they allow inferring which processing components contribute to a correlation between response times and other cognitive variables. However, before model parameters can be used in correlational analyses, it is important to assess whether they are valid predictors of an individual´s response time distribution. We propose that the root mean square error of approximation (RMSEA; Steiger & Lind, 1980), which is one of the most popular and most frequently used goodness-of-fit indices in structural equation modeling, should be used to assess absolute model fit in the diffusion model. The RMSEA is not only largely invariant to trial numbers, but it also allows identifying cases with poor model fit, to calculate confidence intervals, and to conduct power analyses. In two simulation studies, we evaluated whether the RMSEA correctly identifies well-fitting models irrespective of trial numbers. Moreover, we compared whether RMSEA values for well-fitting models in the diffusion model framework were comparable to values typically observed for well-fitting models in structural equation modeling. For this purpose, we simulated data sets from diffusion models with different numbers of free parameters. We varied the number of trials, the number of parameters varying between conditions, the degree of noise, the presence of response time outliers, and the number of estimated parameters. Our results indicate that the RMSEA correctly distinguishes between good- and bad-fitting models unless trial numbers are very low. Moreover, RMSEA values were in a value range expected from structural equation modeling. Finally, we computed cut-off values as heuristics for model acceptance or rejection. All in all, we could demonstrate that the RMSEA could be a valuable statistic facilitating the use of diffusion models in individual differences research.

Spatial encoding of touch depends on task demands in sighted and congenitally blind individuals

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Sighted humans concurrently encode tactile location with reference to both the skin as well as

to external space derived from combining skin location and posture. Congenitally blind humans, in contrast, do not by default integrate external reference frames to code touch location. We tested, whether these different encoding strategies are modifiable by task requirements. Sighted and congenitally blind participants localized tactile target stimuli, presented randomly on the palm or back of one hand, while ignoring a tactile distractor on the palm or back of the other hand. The distractor could, thus, appear at a congruent or an incongruent location. Hand posture was varied, either both palms faced downward (same orientation), or one palm faced down and the other up (different orientation). Critically, every participant performed the task under two different sets of instructions: Responses were instructed either anatomically, that is, with respect to palm or back of the hand, or externally, that is, with respect to "up" and "down" in space. Sighted participants performed similarly in both same and different orientation conditions under anatomical instructions, with faster responses in anatomically congruent than in incongruent trials. Under external instructions, this congruency effect reversed in the different orientation condition, with anatomically incongruent (but externally congruent) stimuli evoking fastest responses, suggesting a flexible weighting of spatial reference frames for tactile localization. Congenitally blind participants, in contrast, were not affected by task instructions. Instead, congruency effects were only observed when the hands had the same orientation. This result suggests that blind humans used posture information to gate the use of additional information for tactile localization, but nevertheless did not integrate posture-related, external information into their tactile location estimate.

Individual differences in combining depth information from binocular disparity and familiar size when reaching towards virtual objects

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Reaching movements towards stereoscopically presented virtual objects have been reported to be imprecise. This might be a problem for touch interaction with virtual environments. Estimating the distance to an object in personal space relies on binocular disparity and other depth cues but previous work on the influence of these information sources in relation to the control of reaching and grasping have produced conflicting results. We examined whether and how distance information from binocular disparity and familiar size are used for reaching movements towards virtual objects. A virtual tennis ball was stereoscopically presented using a five-sided CAVE. After forming a good mental image of the virtual scene, participants performed reaching movements towards the virtual tennis ball either with closed eyes (blind reaches) or open eyes (sighted reaches). To manipulate binocular disparity, the stereo base (the distance between the two viewing cameras) was either set according to the participant's interpupillary distance, proportionally smaller, or proportionally larger. To manipulate familiar size, the size of the virtual tennis ball was set either to the corresponding size of a real tennis ball, proportionally smaller or proportionally larger. The results showed that the disparity manipulation affected sighted reaches more than blind reaches, whereas the size manipulation

had a greater effect on blind reaches compared to sighted reaches. However, subjects differed in the weight they assigned to each depth cue. In sum, our results suggest that binocular disparity and familiar size are combined for distance perception in personal space with the weighting being task-specific and subject-specific.

Video game experience and its influence on visual attention parameters

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Experts with video game experience, in contrast to non-experienced persons, are superior in multiple domains of visual attention. However, up to now it remains an open question which basic aspects of attention underlie this superiority and to which degree these aspects benefit from practice. We approached this question in the framework of Theory of Attention (TVA) with two experiments in which we used whole and partial report procedures of TVA in separate conditions. In Experiment 1, we found advantages of video game experts (>6h playtime weekly, per year) compared to non-experts (<1h playtime) in perception threshold and visual processing speed; the latter being restricted to the lower positions of the whole report display. The observed advantages were not significantly moderated by general person related characteristics such as personality traits, intelligence, etc. Experiment 2 tested a potential causal link between the expert advantages and video game practice with an intervention protocol. We found no effects of action video gaming on perception threshold, visual short-term memory storage capacity, iconic memory storage, top down control, and spatial distribution of attention after 15 days of training. However, similar as to the expert study (Experiment 1), we found a selective improvement of processing speed at the lower positions of the whole report display after video game training compared to control. In addition, we found significant retest effects due to task repetition. While these findings suggest that selected aspects of visual attention can improve as a result of video game practice, they indicate that the degree of the practice related improvement of TVA parameters must be regarded as rather limited. These results are suggestive for the assumption that basic aspects of visual attention are rather stable characteristics of the visual system which can undergo limited changes perhaps only after very excessive and strong training interventions.

Investigating task inhibition with the diffusion model

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Inhibition of a no-longer relevant task is an important executive control process that facilitates switching to a new task. Task inhibition can be measured by assessing „n-2 repetition costs“ that occur when switching back to a task A after only one intervening trial (ABA task sequence),

relative to switching to task A after two or more intervening trials (CBA task sequence). N-2 repetition costs are usually measured in mean reaction time (RT) in ABA versus CBA. Here, I applied a diffusion model analysis that provides a more fine-grained picture of the cognitive processes associated with the ABA-CBA contrast. N-2 repetition costs were most pronounced in the drift rate parameter, with smaller drift rates in ABA than CBA, in line with previous findings from the task-switching literature. Moreover, diffusion model analysis revealed individual and age-related differences that could not be detected in analysis of mean RT. For instance, people who tended to ruminate showed longer non-decision times in ABA than CBA, whereas non-ruminators tended to show more response caution in ABA than CBA. In a similar vein, age-related differences were detected with diffusion-model analysis. Whereas in young adults, n-2 repetition costs were mainly reflected in drift rate, they were mainly observed in response caution in children. Older adults showed still a different picture, with n-2 repetition costs being reflected in both drift rate and response caution. Taken together, diffusion model analysis seems to be a promising tool for investigating executive control processes.

Modulation of cognitive flexibility by affective cues: The challenge of investigating mild positive affect

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Adaptive behavior requires both the rapid switching between different goals and to stick with and maintain a goal by shielding it from currently irrelevant information that may trigger alternative goals. Previous studies have provided evidence for an influence of positive affect on balancing these two complementary cognitive control functions. In particular, behavioral studies show that positive affect shifts the balance towards greater flexibility and a broader scope of attention as indicated by facilitated set-switching, but higher distractibility and reduced maintenance. However, some studies also highlight the fragility of this modulatory influence depending on specific experimental context conditions. Using emotional pictures, we aimed for replicating the differential effects of positive affect on goal maintenance in the face of distraction in the AX-Continuous Performance Task in a large sample based on a priori power calculations (beta=.8, d=0.57 from Fröber & Dreisbach, 2014). We did not find a comparable reduction of goal maintenance capability, but further analyses reveal a more specific effect of mild positive affect when considering the sequence of positive and neutral affect induction blocks in a within-subjects design. These results stress the complexity and fragility of emotional modulatory effects on cognitive control, but at the same time enable us to identify important constraints for detecting reliable modulatory effects in behavior.

The mind as an intuitive probabilistic pollster: A generalized model of the Social-Circle Heuristic

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How do people make inferences about the frequency of events in the world? How do they judge, for instance, which holiday destination is more popular or which first name is more common? For many types of events, one way to make such inferences is to search for relevant instances in one's social network. For example, to gauge the relative popularity of Australia as a holiday destination, people might 'poll' from memory members of their social network who have holidayed down under. The social-circle heuristic (Pachur, Hertwig, & Rieskamp, 2013) assumes that people sequentially search in memory for relevant instances in their social circles—such as family, friends, and acquaintances—and stop search as soon as one circle allows them to make an inference. Thus, the social-circle heuristic is a noncompensatory inference strategy. We develop generalized versions of the social-circle heuristic and compare their predictive accuracy with that of a compensatory instance-based inference model, availability-by-recall, which summarizes instances across all circles. Generalizations include subjective circle weighting, probabilistic orders of circle inspection, dynamic decision thresholds, and probabilistic stopping and decision rules. Allowing for probabilistic search and decision processes in this way (and taking into account the greater flexibility of the generalized versions), we find that a generalized social-circle heuristic can account for the judgments of a larger proportion of people than previously found. That is, acknowledging the probabilistic nature of instance-based inference increases the descriptive accuracy of noncompensatory models over compensatory ones. The generalized social-circle heuristic may help to illuminate developmental and other individual differences in the cognitive processes that underlie instance-based inferences about event frequencies.

The romantic red effect and the misattribution of arousal

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The aim of this three-factorial experiment was to show that arousal is the mechanism underlying the red effect. Using a misattribution of arousal paradigm, 81 participants were either exposed to an alleged arousing scented oil (misattribution of arousal condition), or to the scented oil without further description (control condition). Then, the participants were asked to rate the physical attractiveness of attractive and unattractive targets of the opposite sex in front of a white or a red background. Participants in the control condition rated attractive targets in front of the red background as more attractive than the same targets in front of a white background, confirming the romantic red effect. In addition, an opposite red effect could be found for unattractive targets. Participants in the control condition rated unattractive targets in front of a red background as less attractive than the same targets in front of a white background. In the misattribution of arousal condition both effects did not occur. These results

suggest, that arousal is the mechanism underlying the romantic red effect, leading for attractive targets to increased and unattractive targets to decreased attraction.

Perception of light source distance from shading patterns

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Illumination is thought to play a central role in the perception of shape and surface properties, but little is known about how we estimate properties of the illumination itself. In particular, the perception of light source distance has not been studied before. Varying the distance of a light source from an object alters both the intensity and spatial distribution of surface shading patterns. We tested whether observers can use such cues to infer light source distance. Participants viewed stereoscopic renderings of rough objects with Lambertian or glossy surfaces, which were illuminated by a point light source at a range of distances. In one experiment, they adjusted the position of a small probe dot in 3D to report the apparent location of the light in the scene. In a second experiment, they adjusted the shading on one object (by moving an invisible light source), until it appeared to be illuminated from the same distance as another object. Participants' responses on average increased linearly with the true light source distance in both experiments and all conditions, suggesting that they have clear intuitions about how light source distance affects shading patterns for a variety of different surfaces. However, there were also systematic errors: Subjects overestimated light source distance in the probe adjustment task, and in both experiments roughness and glossiness affected responses. Subjects perceived the light source to be nearer to smooth and/or glossy objects. Furthermore, perceived light source distance varied substantially between and within subjects. The differences between conditions were predicted surprisingly well by a simplistic model based only on the area of the image that exceeds a certain intensity threshold. Thus, although subjects can report light source distance, they may rely on simple – sometimes erroneous – heuristics to do so.

Movement plans for posture selection do not transfer across hand

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In a sequential reaching task, the grasp postures people select depend on their movement history. This motor hysteresis effect reflects the reuse of a former movement plan and reduces the cognitive cost of movement planning. Movement plans for hand trajectories not only transfer across successive trials, but also across hands. We therefore asked whether such a transfer would also be found in movement plans for hand postures. To this end, we designed a sequential, continuous posture selection task. Participants had to open a column of drawers with cylindrical knobs in ascending and descending sequences. A hand switch was required in

each sequence. Hand pro/supination was analyzed directly before and after the hand switch. Results showed a significant interaction of the factors "movement direction" and "hand switch", $F(1,23) = 26.434$, $p < .001$. A motor hysteresis effect was present directly before, but absent directly after the hand switch. This indicates that, in the current study, movement plans for hand postures transfer across trials within the same hand, but not across hands.

Investigating reference frames for goal-directed reaching using virtual reality

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It has been shown that humans integrate egocentric (i.e., relative to themselves) and allocentric spatial information (i.e., relative to other objects) when performing goal-directed reach movements. Previous studies have often investigated this question using abstract stimuli such as single LEDs. More recently, experiments from our lab used more naturalistic images, and found that horizontal shifts in the positions of surrounding objects (i.e., allocentric landmarks) significantly influenced reach endpoints. The present study aims to extend the ecological validity of this work by presenting a three-dimensional visual scene within a stereoscopic virtual reality (VR) head-mounted display (HMD). Additionally, this setup allowed to investigate the integration of egocentric and allocentric spatial information for reaching in depth. Using an Oculus Rift DK2 HMD, subjects viewed a breakfast scene depicting a table and six possible target objects. They could freely look around the scene, which disappeared following a button press. After a delay, the scene briefly reappeared with one object (the target) missing and the remaining objects shifted horizontally or in depth. When the objects vanished after one second, participants were asked to reach for the target`s remembered location on the table surface. The position of their right index finger was tracked and subjects always saw a cursor indicating their finger position in VR. We then compared their reach endpoints to the actual target object positions. We found that reach endpoints were biased horizontally for horizontal landmark shifts, i.e. to the right when objects were moved right and vice versa. These errors were comparable to previous studies using 2D scene images. Furthermore, shifting the landmarks in depth also influenced reaching, but effects were smaller and dependent on target depth. These findings suggest that humans use allocentric information from landmark objects (including depth) when reaching in 3D space.

Common principles guiding the perception of self-produced action effects

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Two phenomena have been implicated in the process of distinguishing between self-generated and other-generated action effects: action-induced blindness and sensory attenuation. Action-induced blindness indicates that action effects associated with a currently planned action

are not as easily and reliably detected as other sensory input even if the action in question has not been performed yet. Sensory attenuation refers to the finding that the processing of sensory effects produced by one's own actions is attenuated. The present study aims at connecting these concepts by addressing the perception of action effects. This approach allows an integrated theoretical perspective on previous accounts based on ideomotor theory and internal forward models.

Is there a playful improvement of system thinking? - The impact of Serious Gaming on understanding stock flow systems

Marcus Schwarz & Peter Sedlmeier

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There is an impressive body of empirical evidence that even well-educated participants perform rather poorly in formally simple dynamic task – so-called Stock-Flow (SF) Tasks (Cronin, Gonzalez & Sterman, 2009; Kapmeier, 2004; Ossimitz, 2002; Palaa & Vennix, 2005; Phuah, 2010; Schwarz, Epperlein, Brockhaus & Sedlmeier, 2013). As yet, numerous kinds of interventions have failed to have a noticeable impact on performance in SF-tasks. There is, however, meta-analytical evidence that a particular intervention – which is known as Serious Gaming (SG) (Sawyer & Smith, 2008) – has a wide range of positive effects on different cognitive tasks. Therefore, it was hypothesized to contribute a novel and effective approach to improving SF-understanding. The present study experimentally investigated the impact of SG on the understanding of SF-systems. Participants (n = 95) were randomly assigned to either a SG-intervention group or a control group, and were afterwards asked to perform several SF-tasks. Contrary to our expectations, participants' understanding of SF-systems generally did not improve due to the SG-intervention, although an interaction of gender and SG-intervention was observed. The results are discussed in regard to previous findings and possible explanations.

"I feel pretty!" The effects of red on self-perceived attractiveness

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The red-romance effect is a well-documented link between the presentation of the color red and the perception of other opposite-sex individuals in the affiliation domain. However, there is a gap on whether the color red also positively influences one's own attractiveness perceptions. Herein, we present three studies showing that individuals who choose the color red compared with other colors perceive themselves to be more attractive regardless of the interpersonal contexts. Furthermore, these enhanced self-attractiveness ratings are stronger following a visual opposed to a lexical display of the color red and do not affect ratings of extraversion and likeability (Studies 1 and 2). Additionally, in Study 3 changes in mood (neutral versus negative versus positive) did not influence whether the color red was preferred among a choice of four

colors (i.e, green, blue, yellow and red; Study 3). However, choosing red for a potential date led to a greater self-perceived attractiveness in the neutral (but not in the positive or negative mood) condition.

Delayed visual feedback shifts learning of a visuomotor rotation towards explicit adaptation

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Adapting to novel relations between goal-directed movements and their visual consequences is an important aspect of mastering a variety of modern tools. The mode of visual feedback presentation has important consequences for this kind of learning. Previous research indicates that both, the presentation of feedback after movement termination (e.g. Hinder et al., 2010; Schween et al., 2014) and the imposition of delays on concurrent visual feedback (e.g. Honda et al., 2012) negatively affect implicit visuomotor adaptation. In order to differentially assess the modulatory influence of feedback delays on the relative contributions of explicit and implicit processes to overall adaptation, we compared two groups receiving movement-terminal visual feedback immediately or with a 1.5s delay while practicing target reaches with a 30° visuomotor rotation. Implicit adaptation and explicit knowledge of the rotation were assessed separately with a series of posttests. The immediate feedback group displayed more implicit adaptation (Cohen's d=1.45 [.62, 2.26], p<.001) and less explicit knowledge (d=.84 [1.59, -.1], p=.044) than the delayed feedback group whereas overall adaptation did not differ significantly (p=.49). These results support previous speculations that feedback-induced decreases in implicit learning are accompanied by increased explicit learning and suggest that time-delays may be one source of the difference observed between concurrent and movement-terminal feedback. Our results further highlight system-inherent feedback-delays as a potentially important methodological variable in visuomotor adaptation experiments.

"Alle meine Entchen" variations – The irrelevant sound effect with musical stimuli

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On tests of verbal working memory, performance declines as a function of auditory distraction. The negative impact of to-be-ignored speech or sound on serial recall is known as the irrelevant sound effect. The irrelevant sound effect occurs with speech, sinus tones, and music as background noise and its magnitude varies dependent on the acoustic characteristics of the sound: Sound that changes acoustically from one token to the next (i.e., changing-state sound) is more disruptive to serial recall than repetitive, steady-state sound. However, with speech and sinus tones, not every acoustic variation leads to poorer recall. For instance, sounds varying in tempo do not impair recall more strongly than sounds in the same tempo. We tested whether this also holds for more complex tonal stimuli by using different versions of the first bar of the

German nursery song “Alle meine Entchen”: (1) repeated presentation of the original version, (2) versions varying in tempo (80-160 bpm), (3) versions varying in mode (e.g., Doric, Lydian – a manipulation that cannot be applied to speech or sinus tones), and (4) varying in both tempo and mode. We had 31 participants serially recall 9 digits on 75 trials, 15 trials in each of the irrelevant sound conditions as well as in the silent control condition. All four irrelevant sound conditions significantly differed from the silent control condition, but only the tempo variation (in conditions 2 and 4) caused a changing-state effect with poorer recall than when the same musical sequence was repeated (1). The mode variation did not affect recall performance. The results corroborate previous findings that not every acoustic variation leads to a changing-state effect, but vary from previous research in that the tempo variation with musical stimuli did so. This indicates that one cannot easily generalize from studies using stimuli such as sinus tones to more complex and authentic background noise such as music.

The perils of aiming too high: Discrepancy between goals and performance in individuals with depressive symptoms

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Prominent theories of depression assume that negative evaluation processes play a pivotal role in the development and maintenance of depressive symptoms. However, it remains to be understood, whether evaluation processes in depressed individuals are impaired by maladaptive goal setting. This study examined the hypothesis that depressed individuals set themselves inappropriate high standards, especially when goal feasibility is low. Depressed and non-depressed participants worked on an easy and a difficult version of a cognitive task. Prior to the task, individuals were asked to set themselves minimum acceptable levels of achievement. As expected, in the difficult version of the task, depressed participants set significantly higher goals than non-depressed individuals, so that their performance failed to reach their standards. Goals-performance discrepancies in depressed individuals were not caused by deficits in goal monitoring. The role of maladaptive goal setting for the etiology and maintenance of depression is discussed.

The concept of lying: Philosophical definitions and lay people´s concept

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Lying is an important moral category which affects us almost every day. If detected, lying is poison for many kinds of relationships, especially the ones based on trust. According to this, there has been a lot of empirical research about lies, e.g. about how to detect lies and the time children start telling lies. Given that these areas of research all assume a concept of lying and considering that philosophers have argued a lot about an adequate definition of lying that

captures people's use and understanding about this concept, it is quite surprising that there has been only very little empirical research about the concept of lying, i.e. which features people consider to be necessary and sufficient for a statement to count as an instance of lying. The standard definition of lying in philosophy is the following: Making a believed-false statement to another person with the intention that that other person believes that statement to be true (Mahon, 2008). The so-called statement condition of this definition claims that in order to lie, a person has to make a statement. While it seems rather obvious that such statement can be made verbally or in written form, it is less clear whether certain other kinds of behaving are considered as statements that have the potential to count as lying if the other conditions of the standard definition are met. Consider e.g. a person who is bald and wears a wig with the intention to make another person believe that she or he is not bald (which is the only thing this person does in order to cause this belief). Would people consider this behavior as an instance of lying? What about hiding one's wedding ring in order to cause the belief to be unmarried? While it is interesting to know what people think about specific cases, we also tested a general explanation according to which people's willingness to evaluate a behavior as lying is a function of the degree to which people consider a certain behavior as stating a proposition.

An investigation into cross-talk between language and motor processes: Influence of hand and grip type

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Recent research indicates that language processing and motor control interact consistent with embodiment approaches. Accordingly, previous work has demonstrated that action verbs processing affects the kinematics of reach-to-grasp movements. Specifically, action verbs are assumed to interfere with grasping when concurrently processed, but facilitate motor execution when processed before movement onset. Here, we examined whether this cross-talk is modulated by the sensorimotor demands of the grasp and whether it is related to hemispheric specialisation. In Experiment 1, participants performed a reach-to-grasp action concurrently with a visual lexical decision task with action verbs or concrete nouns and pseudo-words. In Experiment 2, the lexical decision task preceded the movement execution. In both experiments, we manipulated the hand used to perform the task (left, right) and the grip used (precision grip, power grip) in a blocked fashion. Preliminary analyses showed, for Experiment 1, marginally longer reach-to-grasp times when processing actions verbs compared to processing nouns. In addition, maximum grip aperture was affected by word class (action verb vs. noun) and grip type during action verb processing, but only for precision grips performed with the dominant, right hand, indicative of hand- and grip-specific interference. In contrast, for Experiment 2, preliminary analyses showed no evidence for an influence of word class on reach-to-grasp performance. Hence, Experiment 2 provides no support for language induced motor facilitation. Together, these results provide only partial support for the view that actions words and motor control interact in a functional manner.

Dopaminergic modulation of error processing: Evidence from event-related brain potentials

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Erroneous responses typically elicit error-related waveforms in the event-related potential (ERP), such as the error negativity (Ne or ERN) and the early and late parts of the error positivity (Pe). The generation of error-related ERPs appears to depend on the activity of the mesencephalic dopamine system. Accordingly, several studies have shown attenuated Ne amplitudes in Parkinson's disease (PD). However, few studies have addressed the role of dopaminergic medication for the modulation of Ne amplitudes in PD. Similarly, potential alteration of Pe in PD patients has been scarcely investigated. We compared two groups of patients with PD (on [PDon] vs. off [PDoff] dopaminergic medication) and healthy control participants. Electroencephalogram (EEG) was recorded while the participants completed the flanker task that reliably induces erroneous responses. ERPs of incorrect responses were analyzed and compared between medicated and unmedicated PD patients and healthy controls. Additionally, a subset of the PD patients was tested twice (once on and once off medication) to allow for a more powerful within-subject comparison of medication effects. PD patients showed reduced amplitudes of Ne and early Pe compared to controls irrespective of dopaminergic medication. Error-related Ne amplitude variation differed between controls and PDon, but not between the patient groups. Within-subject analyses revealed that Ne reduction was particularly pronounced under dopaminergic medication. Error-related early Pe amplitude variation was smaller in PDon patients than in controls, and Pe amplitudes appear to be attenuated by dopaminergic medication. In contrast, the late Pe was unaffected by PD or medication. Our findings are consistent with previous studies in that they show Ne and early Pe amplitude attenuation in PD. Comparison of PD patients on and off medication suggests that these effects are aggravated rather than counteracted by dopaminergic medication.

The interplay of global and local features of a Simon-like task

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A Simon effect usually is found regardless of whether the participants respond to spatial stimuli with two fingers of one hand or with one finger of both hands, respectively. When two fingers within one hand are used to press the response keys and the operating hand is alternating between blocks of trials, no Simon effect of hands is found (Heister, Ehrenstein, & Schröder-Heister, 1986). In agreement with that, the referential coding account (Hommel, 1993) but also response discrimination account (Ansorge & Wühr, 2004) suggest that reference frames vary between experiments due to the task setting and instruction. When a choice between hands is not necessary, it is reasonable that no Simon effect of the hands is found. To test this idea, we set up a four-choice Simon-like task, which requires a choice between hands, and a choice between two fingers of each hand, respectively. A strong Simon effect of the hands was

found, but no finger-Simon effect. Results are discussed in terms of global and local attention allocation, as well as with regard to sequential Simon tasks.

Search and destroy: Distractor cueing in visual search first leads to selection, then to inhibition of distractors

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There is growing interest in whether visual search for a target among distractors does not only benefit from knowledge about target features, but also from knowledge about distractor features. Recent studies suggest that precueing a distractor's color actually impairs search for a target, unless the precue provides also spatial information and is presented sufficiently long before the search display. This paradoxical effect has been explained in terms of a "search and destroy" mechanism, according to which a distractor must be first selected and actively inhibited in order to exclude it from the search process. In the present study, we directly tested this assumption by measuring event-related-potential (ERP) indicators of selection (N2pc) and inhibition (Pd). Participants searched for a colored target among distractors. In half of the trials, they were given valid information about one distractor by means of a color precue (e.g., "ignore red") and a preview display showing the color and location of all subsequent items in the search display. Analysis of ERPs to the preview display revealed that the distractor in the precued color elicited a reliable N2pc and Pd. In line with the "search and destroy" account, this result suggests that precueing distractor features in visual search first triggers selection of the distractor, followed by inhibition.

A question of scent: Aroma modulates self-other representations

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Previous studies have suggested that aromas may have distinct effects on cognitive-control states. Arousing olfactory fragrances (e.g., peppermint) are assumed to induce a more focused, exclusive state, whereas calming olfactory fragrances (e.g., lavender) are thought to induce a broader, more integrative state. Here, we will present recent findings showing that specific cognitive-control states that are induced via aroma exposure can affect the processing of social information. Specifically, we will show that being exposed to ambient odors can impact the degree of self-other integration (as indexed by performance on the Joint Simon task) and the degree of interpersonal trust (as indexed by performance on the Trust Game).

Comparing classical, web-in-lab and online data recording through the replication of five experiments

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The Internet has been used as a research method in experimental psychology for multiple decades. Still, the full potential of the Internet as a platform for psychological research is unclear: Only few systematic investigations tried to identify potential challenges in cognitive research when comparing standard in-lab technology to web technology – especially with regard to reaction time measurements. The aim of the present study was to investigate the replicability of five of the most prominent cognitive tasks and effects (Stroop, Flanker, Visual Search, Attentional Blink and Masked Priming) through the Internet. Using a three-step approach, we were able to disentangle potential confounds introduced by a change of the technology (Matlab vs. web technology) on the one hand and a change of other external influences (e.g. hardware, lab setting) on the other: In stage 1, a baseline measurement for all five tasks using in-lab standard technology was established. In stage 2, all five tasks were conducted in-lab but using web technology, hence keeping all extrinsic factors (hardware, lab setting, population) equal. In stage 3, the application was exported online to be performed at home. The main finding of our study is that we were able to fully replicate four tasks (Stroop, Flanker, Visual Search, Attentional Blink) over all three stages. In line with existing literature, we find an additive reaction time offset to the baseline measurement (about 60 ms for stage 2, about 100 ms for stage 3) throughout all experimental conditions. The Masked Priming results could not fully be replicated in any stage, surprisingly also not using standard in-lab technology. We conclude that conducting cognitive experiments through web technology is safe to perform and can help to obtain large quantities of data with equal quality as in-lab measurements.

Psychometric predictors of academic performance

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It has been shown that personalized tutoring systems can have a positive impact on learning outcomes. Using our theoretical understanding of human memory, we can build computational models that capture individual differences in forgetting and use those to create personalized learning schedules. Learners using such schedules are able to learn more facts in the same amount of time than learners studying with a classic flashcard system. We know that the parameters of the model can predict performance on a subsequent test very well. In this study, we explore to which extent the parameters of the model can predict academic performance (i.e., grades). In addition, we also measure working memory capacity, intelligence, motivation, and self-regulation. We investigate how those measures are related and to which extent they contribute to predicting academic performance in a sample of Dutch university students. This is informative in two ways: (1) it deepens our understanding of how those theoretical concepts are linked to each other, and (2) it advances our understanding of the factors that contribute to

study success.

Is working memory a palimpsest?

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One of the hallmarks of the working memory system is its flexibility: Information in working memory can be removed and updated as the need arises. Previous research has shown that residual traces of no-longer-required information are retained, with updating faster for items recently stored in working memory than for novel items (Oberauer & Vockenberg, 2009). To what extent are the representations currently in working memory influenced by these residual traces? We aimed to shed light on this issue by way of an experiment in which visually-presented squares changed colours over a variable-length sequence of updating steps. Participants were asked to retain the most recent colours in memory, and had to reproduce these colours at the end of each sequence by selecting them from a colour-wheel. If representations currently held in working memory are influenced by their predecessors, this should lead to a relationship between the colours participants select, and those that had been presented at preceding steps of the updating sequence. However, we found no evidence of such a relationship, with the selections seemingly unaffected by the colours of earlier items. This suggests that the residual traces of such items are distinguishable from the current contents of working memory, raising questions about the exact form these traces take.

The effect of mood on exploitation-exploration dilemma

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The decision between exploitation of current resources and exploration of new ones represents the exploitation-exploration trade-off. Resolving this trade-off may depend on emotional state of the decision-maker. Understanding how emotions influence the trade-off helps to design better policies that take into account individual differences and emotional states. Clinically depressed people might make impaired decisions to explore or to exploit in changing environments because of the difficulties to maintain rich representations of the task (Cella, Dymond, & Cooper, 2010). There are evidences that depression increases exploration, as depressed people set up higher thresholds for accepting options (von Helversen, Wilke, Johnson, Schmid, & Klapp, 2011). In healthy subjects, sad emotions trigger reward acquisition or substitution motivation (Raghunathan & Pham, 1999), which may promote exploration, when the current level of rewards is low. This arises the question whether healthy subjects would explore differently in environments that elicit either positive or negative affect. Our experiment consists in the “fishing pond” task (Rui, Wilke, & Czienskowski, 2009), in which participants have to collect fish from a pond, but they can switch to a new pond whenever they want. The

participants constantly choose between exploitation (staying at the current pond) and exploration (switching to a new one in the hope of finding more fish). We manipulate the frame of the task and measure the exploration behavior in positive and negative mood conditions. We expect that people in the negative mood environment explore more than people in the positive mood, given that the level of current rewards is kept constant between the two environments. The results of the experiment will be presented and discussed.

The influence of perceptual properties on the distractor-response binding effect

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Binding theories assume that a stimulus and a response that occur in close temporal proximity are bound together in an Event File. A repeated encounter of the stimulus can then reactivate the Event File, and with it the integrated response. Further, even task irrelevant aspects of the stimulus and/or other task irrelevant stimuli that occur in temporal contiguity are bound within an Event File (distractor-response binding), and if repeated, can recall the previously bound response. We investigated whether distractor-response binding effects were modulated by the perceptual similarity of the stimulus pictures. We were further interested in whether perceptual properties were integrated with the response and whether a repetition thereof would suffice to recall the previous response. Participants (N = 30) responded to a target in depicted stimulus display, while ignoring the distractors within the display. The results indicate that the perceptual properties of the stimuli were integrated with, and when later reencountered recalled with, the previously bound response.

rtdists: Distribution functions for accumulator models in R

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Accumulator models for jointly modeling both decisions and their response times provide one of the most widely used modeling framework in cognitive psychology. The primary exemplars are the standard diffusion model with trial-to-trial variability in bias, evidence accumulation rates and non-decision time, which applies to two-choice data, and the standard linear ballistic accumulator (LBA), with the same types of trial-to-trial variability, which applies to choices among any number of alternatives. We present an R package, rtdists, providing for the first time the basic functions required to simulate and estimate these models through maximum likelihood, Bayesian, and quantile-based methods; probability density functions, cumulative density functions, and random number generation functions. For the LBA, we also provide this functionality for new versions with four positive drift rates distributions: truncated normal, log-normal, Gamma, and Frechet. For all models the functions are fully vectorized allowing a different parameter value for each data point/accumulator, with the exception of the

non-decision time variability in the LBA.

Action event discrimination

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The scope of this paper is to present event segmentation of a motion continuum through the isolation of the minimum elements that distinguish an action, in order to create a motion id for each individual. Initially, we attempt to segment individual motion actions identified in sensorimotor terms. In other words, given a continuous motion, either cyclic (running-> walking -> jumping, etc) or acyclic (basketball throw/golf), what are the sensorimotor clues/configurations that enabled our societies to distinguish among them and label the different types of motion? The starting point is the segmentation of the events in motor action, based on the sensorimotor data (20 actions like walking, grasping, etc) that we have captured with our VICON system. We attempt to allocate the minimum set of features that distinguish each action, in order to create a motor id for each individual action. Moreover, we analyse the observer's perspective, as well, using the findings of our principal component analysis (Sionti, et al., 2014) and giving emphasis on the categorization of the events. By combining kinematics with eye-tracker, structural dimensional analysis of mental representation (Schack, 2012) and interview, we earn valuable cognitive information. Based on the results, we describe and define event features at different levels of interaction: self-regulated motor actions and vision-based events from observers' perspective.

The absolute value of numbers on the mental number line

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The SNARC (spatial numerical associations of response codes) effect is well-established in the field of embodied numerical cognition. It presumes a strong reliance of mental numerical concepts on spatial representations. More specifically, it generally assumes a mental number line that is responsible for the intuitive spatial allocations of numbers. The association of specific numbers with left or right space is highly flexible as it adapts to the active number range (e.g., a "5" is big in a range from 1 to 5, but small in a range from 4 to 8; van Opstal, Moors, Fias and Verguts, 2007). But how does the SNARC effect evolve when confronted with only a subset of numbers that constitutes a narrower or wider number range? Do we zoom into the mental number line, which would generate a similar SNARC effect for both ranges, or would the absolute numerical value induce a stronger effect in the wide range and a weaker effect in the narrow range? In a parity judgement task, we tested two groups of participants in a between-subjects design for their SNARC effects with either a narrow [3, 4, 6, 7] or wide [1, 2, 8, 9] number range. Participants that dealt with the narrow range showed a reduced SNARC effect

in that their left-hand advantage for small numbers and right-hand advantage for large numbers was less pronounced than that of participants in the “wide” group. This pattern does not decrease over the course of the experiment. The results suggest that the numbers from 1 to 9 are processed according to their absolute value and that for a narrower range the cognitive system does not merely zoom into the number line to put the presently relevant numbers at its endpoints.

Physical demands impact cognitive resource allocation: Bodily effort enhances learning and metacognition

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Based on recent findings that higher-level cognitive processing can be affected by bodily cues, we explore the role of physical effort in learning and metacognition. Bodily cues have shown divergent effects on cognitive tasks, such as the sensation of weight impairing performance in problem-solving tasks, but increasing metacognitive judgments regarding recall probability (Judgments of Learning; JOLs) in learning tasks. While previous research has primarily attempted to explain embodiment effects in terms of metaphorical links, such as weight being a bodily prime for importance, we focus on the role of physical demands and their relation to cognitive effort allocation. In two experiments, participants either wore a heavy backpack or no backpack while learning 20 words, providing a JOL for each one. In Experiment 1 (N = 18), wearing a backpack increased JOLs for easy words, but not for more difficult words. Crucially, wearing a backpack led to a higher retention performance. Experiment 2 (N = 30) revealed that, despite the large effect sizes obtained in Experiment 1, the effect of physical weight on learning and JOLs diminishes with more difficult words, indicating that a high overall cognitive load is able to override embodiment effects. Our results confirm that physical effort predominantly affects superficial information processing pathways. These findings challenge the explanatory power of metaphor-based accounts of embodiment in the context of more complex cognitive information processing.

Behaviorale und neuronale Korrelate der automatischen Verarbeitung Trauma-spezifischer visueller Stimuli bei Patienten mit Posttraumatischer Belastungsstörung

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Ein charakteristisches Merkmal der Posttraumatischen Belastungsstörung (PTBS) ist die automatische Verarbeitung störungsspezifischer Reize, die sich u. a. in intrusiven Symptomen wie intensiver physischer und psychischer Reaktion auf Trauma-assoziierte Stimuli äußert. Ziel der vorliegenden fMRT-Studie war die Untersuchung neuronaler Korrelate der automatischen Verarbeitung Trauma-spezifischer Reize bei Patienten mit PTBS, verglichen mit gesunden

Kontrollpersonen. Während bisherige bildgebende Studien zur PTBS vorwiegend Gesichter, Wörter oder generell negative visuelle Stimuli nutzten, wurden in der vorliegenden Studie komplexe Trauma-spezifische vs. neutrale visuelle Szenen dargeboten. Zwecks Manipulation der Aufmerksamkeit lösten die Probanden zeitgleich zur Stimulus-Präsentation eine visuelle Distraktionsaufgabe. Die subjektive Bewertung der Stimuli zeigte, dass die PTBS-Patienten Trauma-spezifische vs. neutrale Bilder als Angst auslösender beurteilten, verglichen mit den Kontrollpersonen. Als neuronales Korrelat der Angst auslösenden Bilder zeigten die PTBS-Patienten eine Hyperaktivierung im dorsalen anterioren cingulären Cortex (ACC) und im Hippocampus sowie eine Hypoaktivierung im ventralen ACC auf Trauma-assoziierte vs. neutrale Stimuli. Die vorliegende Studie konnte somit zeigen, dass Trauma-assoziierte Stimuli auch unter Aufmerksamkeitsbindung zu stärkerer Aktivierung in angstrelevanten Hirnregionen führen. Dies kann als Hinweis auf die Resistenz der automatischen Verarbeitung der emotionalen Bildinhalte gegenüber Aufmerksamkeitsmanipulation interpretiert werden.

Distractor familiarity in picture-word interference paradigm: An ERP study

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The picture-word interference is usually operationalized as the difference between processing efficiency of targets in semantically related (congruent) and unrelated (incongruent) word–picture pairs (Maanen et al., 2009). In the present study, we used the event-related potential (ERP) approach to determine the effect of distractor familiarity on the picture-word interference. Twenty-seven subjects participated in the experiment. The first stage included a presentation of black-and-white line drawings with the instruction to give one association for each picture. Subsequently, these pictures were used as familiar distractors. At the second stage, we recorded ERPs in response to the presentation of categorically congruent or incongruent picture-word pairs (natural or hand-made objects) while participants were performing a word classification task. Responses were given in 1000 ms intervals using a keyboard. All words were accompanied by familiar or unfamiliar picture-distractors. Results of the experiment showed a significant interaction between the factors “Target and distractor relation (congruence/incongruence)” and “Distractor familiarity” for both behavioral (reaction time) and ERP data ($p < .05$). A greater picture-word interference was observed in pairs with familiar distractors. Obtained results contradict contemporary findings in the field of word-colour interference (Stroop effect) (Navarrete et al., 2015). They can be regarded as the evidence for the classical horse-race model of interference (Morton & Chambers, 1973).

The effect of olfactory synaesthesia on odour language and cognition

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The human sense of olfaction has been considered vestigial over the centuries. Recent findings suggest we may have been underestimating our abilities. In this talk, we present new evidence regarding the human olfactory capacity from a group of odour-colour synaesthetes: individuals who involuntarily experience colour sensations when they perceive odours. We ask to what extent odour language and cognition can benefit from associations with other modalities. If synaesthesia is mediated by semantics, then olfactory synaesthesia provides an interesting opportunity to investigate the apparent weak link between odour and higher levels of cognition, such as language. We conducted a battery of tests and found that compared to control participants, odour-colour synaesthetes were more accurate at naming odours and were better able to discriminate between odours. The results suggest that odour language and cognition can be facilitated when grounded in other modalities.

Independence of irrelevant alternatives in decisions from experience: A challenge for reinforcement learning models

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Normative decision theory assumes independence of irrelevant alternatives (IIA), stating that the relative preference of two options is independent of other alternatives in the choice set. Previous research demonstrated systematic violations in decisions from description, leading to the development of novel process models of decision making. Yet, it remains unclear whether IIA is violated in decisions in which the properties of the options have to be learned by trial-and-error. Such decisions are usually analyzed within the framework of reinforcement learning, within which existing models do not predict violations of IIA. In a series of three experiments, context effects of preferential choice that challenge IIA (e.g., the similarity effect) were explored in a repeated-play-game paradigm with full feedback. Participants' behavior systematically violated IIA. However, these violations were mostly not in line with traditional context-effect research. Psychologically motivated models were compared to traditional reinforcement learning models and were found to better explain and predict the behavioral phenomena. The accentuation of differences model, focusing attention on distinct outcomes, is presented and discussed in detail. The present study is the first to demonstrate systematic violations of IIA in decisions from experience as well as to offer a psychologically motivated model to explain such violations.

Multilevel modelling of driving behaviour illustrated with driving simulator data

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In the field of traffic psychology, often studies with a huge amount of measurements are conducted. To analyse changes over time in driving behaviour, traffic psychologists mostly use repeated measures analysis of variance (RM-ANOVA). However, especially for such “big data” studies, multilevel modelling techniques (MLM) can be more informative than RM-ANOVA. With our study, we exemplarily demonstrate that multilevel-modelling is a useful tool to understand drivers’ capabilities and limitations more precisely. In particular, we designed multilevel models to investigate the effects of monotonous road scenery on drivers’ behaviour. In our study, 22 participants took part in a driving simulator task, completing a monotonous car-following scenario on a rural road. The results show that the driving behaviour changes during the monotonous ride and that this depends on the experienced fatigue.

Logging studies - A contemporary approach to data collection in psychology?

Clemens Stachl

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Behavior-related data collection in psychology often follows the beaten path through the realm of self-report questionnaires. Although this approach is widespread, economically attractive and easy, a series of well-known problems is associated with the subjectiveness of this method. Social desirability, faking, forgetting and unconscious behavior are just some of many issues that potentially bias results of self-report based studies. As an alternative, behavioral observation in laboratories is often used in order to study actual behavior. Although this approach allows for direct observation of behavior, questions arise about the generalizability of obtained results due to the lab setting where behaviors are observed in. Furthermore, classical behavioral observation studies are expensive due to the need for several raters and the high costs in resources and time in order to obtain data in reasonable quality. This indicates that one could either collect data from larger samples, accepting bias induced by subjective questionnaires, or data from direct behavioral observation from a smaller sample and accepting impaired generalizability. However, a desirable approach would be to unobtrusively collect data from a large sample through behavioral observation in a most natural setting without the need for too many resources in the form of time, money or personnel. These requirements make classical studies seem simply unfeasible. Fortunately, technology presents us with a possible solution to this dilemma. The increased availability of mobile sensor technology integrated in everyday objects such as phones, cars and wearables enable us to collect behavioral data at large scale in high dimensionality. We present a review of relevant literature and two studies conducted at Ludwig-Maximilians-Universität München, Germany. Results as well as benefits and challenges associated with this new approach are discussed.

Evaluative conditioning as memory-based judgment

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Evaluative conditioning is often referred to as the best case for a dual-process model of human learning. Whereas most human learning phenomena can be adequately explained by a single process of conscious learning, there are two phenomena that are often interpreted as evidence in support of a second automatic learning process. These phenomena are the presumed resistance of EC to extinction, and its claimed independence of awareness. In both cases, a dissociation between two dependent variables is interpreted as evidence for two distinct processes. We discuss how a dual-process account of these findings depends on either a certain level of explanation (i.e., a functional or information-processing level), or on a failure to separately consider the different phases of cognitive processing (i.e., encoding, storage, retrieval). We sketch a perspective on EC as memory-based judgment that accounts for EC using a single encoding (i.e., learning) process, and then reconsider the evidence on the roles of awareness and extinction from this new perspective. We also present the results of several studies and simulations in support of the single-process account.

Does the presentation and scoring of Pick-N items affect test reliability and validity? An experimental investigation of the Pick-N answer format

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Bei Mehrfachwahlaufgaben mit mehreren korrekten Antwortoptionen wird uneinheitlich gehandhabt, ob die Anzahl korrekter Antwortoptionen zu jeder Frage angegeben wird (Pick-N-Aufgaben) oder nicht (Pick-X-Aufgaben). Diese Studie untersucht den bisher unerforschten Einfluss dieser Information auf die psychometrischen Testeigenschaften bei dichotomer und partieller Testauswertung. Mittels Wissensmanipulation wurden in einer Onlinestudie drei Teilnehmergruppen mit unterschiedlich viel Wissen erzeugt. Anschließend durchliefen alle Teilnehmer einen zur Hälfte aus Pick-N- und Pick-X-Aufgaben bestehenden Test. Pick-N-Aufgaben zeigten deskriptiv höhere Itemschwierigkeiten als Pick-X-Aufgaben, besonders unter dichotomer Auswertung. Dichotome und partielle Testauswertung führten zu deskriptiv höheren Reliabilitäten der Pick-X-Fragen, verglichen mit den Pick-N-Fragen. Die Korrelationen zwischen diskriminanzanalytischer Gruppen-Rückzuordnung und ursprünglicher Wissens-Bedingung zeigten bei partieller Testauswertung teilweise signifikante Verringerungen der Validität durch den Hinweis auf die Anzahl korrekter Antwortoptionen. Bei dichotomer Auswertung beeinflusste der Hinweis die Validität nicht.

Reducing vulnerability to depression: Multispecies probiotics reduce cognitive reactivity to sad mood

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Recent insights into the role of the human microbiota and the gut barrier function in cognitive and affective functioning have led to the hypothesis that probiotic supplementation may act as an adjuvant strategy to ameliorate or prevent depression. Heightened cognitive reactivity to normal, transient changes in sad mood is an established marker of vulnerability to depression and is considered an important target for interventions. The present study aimed to test if a multispecies probiotic containing 8 bacterial strains that enhance the functioning of the gut barrier may reduce cognitive reactivity to sad mood in non-depressed volunteers. In a triple-blind, placebo-controlled, randomized, pre- and post-intervention assessment design, healthy half of the participants without current mood disorder received a 4-week probiotic food-supplement intervention with the multispecies probiotics, while the other half of the participants received an inert placebo for the same period. In the pre- and post-intervention assessment, cognitive reactivity to sad mood was assessed using the revised Leiden index of depression sensitivity scale. Compared to participants who received the placebo intervention, participants who received the 4-week multispecies probiotics intervention showed a significantly reduced overall cognitive reactivity to sad mood, which was largely accounted for by reduced rumination and aggressive thoughts. These results provide the first evidence that the intake of probiotics may help reduce negative thoughts associated with sad mood. Probiotics supplementation warrants further research as a potential preventive strategy for depression.

Motivated beliefs about the malleability of personality in present and future

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Across six studies, this research found consistent evidence for motivated implicit theories about personality malleability: People perceive their weaknesses as more malleable than their strengths. Moreover, motivation also influences how people see themselves in the future, such that they expect their present strengths to remain in the future, but they expect their present weaknesses to improve in the future. Several additional findings suggest the motivational nature of these effects: The difference in perceived malleability for strengths vs. weaknesses was only observed for the self, not for other people. When the desirability of possessing a certain trait was manipulated, that trait was perceived to be more malleable when it was depicted as undesirable. And these different beliefs that people have about how malleable their traits are, and how they will develop in the future, were associated with their desire for change, which is higher for weaknesses vs. strengths.

A dynamic field theory approach to prospective memory and intention deactivation

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Event-based Prospective Memory (PM) denotes the delay of intended actions until the occurrence of a retrieval-triggering cue. After its completion, the intention is not immediately deactivated but continues to interfere with the main task, resulting in prolonged response times (RT) and repeated intention initiation when a formerly relevant PM cue reappears. These so-called aftereffects could be the result of spontaneous bottom-up retrieval processes operating in the absence of attention-driven cue monitoring. However, it remains unclear how bottom-up retrieval is initiated and how it interacts with top-down monitoring processes to enable PM performance. We used a computational Dynamic Field Theory (DFT) model to integrate and formalize retrieval mechanisms proposed by PM literature in a common cognitive architecture. The task that was modeled allows manipulating parameters influencing PM performance and aftereffects (Walser, Fischer, & Goschke, 2012). In simulations, the model was able to reproduce typical RT patterns, including effects of the monitoring level, PM cue salience, aftereffects and RT distribution specifics. Additionally, time-evolving activation patterns of model components were used to generate hypothetical fMRI data that amend recent meta-analyses of neural PM correlates. By reproducing a number of empirical findings, we show that the model proves a useful tool in explaining the cognitive mechanisms underlying PM performance and intention deactivation. Furthermore, this integrative framework can be employed in developing behavioral and neural hypotheses that can be tested empirically.

Inferring pre-conscious perception from visual detection

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A central challenge to the study of unconscious perception lies in constructing valid measures of conscious and unconscious processing. With the development of continuous flash suppression (CFS), a novel variant of binocular rivalry, researchers have begun to infer unconscious processing from direct measures of conscious stimulus detection: In the breaking CFS (b-CFS) paradigm, differences in detection thresholds are often interpreted as evidence for differential unconscious processing. It is currently debated whether such findings should be placed on equal footing with evidence for unconscious processing obtained with other, more traditional methods, such as the classic dissociation paradigm. Much controversy revolving around the b-CFS paradigm reflects differences in the implicit assumptions made by different researchers. Here, we identify and evaluate the assumptions and theory underlying the b-CFS paradigm. We argue that b-CFS as well as other paradigms for measuring visual detection may indeed provide evidence for unconscious processing if the field agrees on a set of specific assumptions and if future studies comply with several methodological standards. To avoid terminological confusion, we propose to use the term “pre-conscious” perception to refer to such differential processing in visual detection paradigms.

Perceptual expertise enhances configural processing in access to awareness

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Access to visual awareness for human faces is strongly influenced by their spatial orientation: Under continuous flash suppression (CFS), upright faces break into awareness more quickly than inverted faces, and this effect of inversion is larger than for a wide range of other animate and inanimate objects. Here we asked whether this apparently specific sensitivity to the spatial configuration of upright faces reflects face-specific detection mechanisms or whether it reflects perceptual expertise more generally. We tested car experts who varied in their degree of car and face expertise and measured the time upright and inverted faces, cars, and chairs needed to overcome CFS and break into awareness. Results showed that greater car expertise was correlated with larger car inversion effects under CFS. These results demonstrate that configural processing in conscious access are not unique to faces but similarly exist for other objects of expertise. More generally, we interpret these findings as suggesting that access to awareness and exemplar-level discrimination rely on partially shared perceptual mechanisms.

Competition boosts cognition! - A tournament in mental arithmetic enhances motivation, processing efficiency, and psychometric quality

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We examined the effect of social competition on cognitive efficiency in speeded mental arithmetic. An energetic capacity model assumes that the ratio between spare and utilized processing capacity is not fixed but variable, depending on actual demands. If demands increase, spare capacity decreases and utilized capacity increases to be available for cognitive operations to perform. A still unanswered questions is whether and how competition affects energetic state and thus affects cognitive efficiency in self-paced task. To answer this question, we compared individuals' mental arithmetic performance (low vs. high difficulty) in a single (baseline) condition with performance in a duel (competitive) condition, examining response speed, accuracy, and variability (distributional skewness). In addition, we examined self-report stress state using the Dundee Stress State Questionnaire, before and after each test, being particularly interested in the measurement of motivation. The results were that the instruction to mobilize exceptional effort in preparation to an impending demand improved subjective engagement, and also improved performance speed and stability, while error rate remained low overall. This improvement was again more pronounced for blocks with difficult items as compared to easy items. Importantly, performance became not only more efficient but also more reliable as indicated by a cumulative reliability-plot analysis. In sum, we propose an account of competitive psychometric testing that might be crucial with regard to improving the psychometric quality of tests.

Binding in visual short term memory? - A multinomial modeling approach

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During the last 20 years, the study of visual short term memory has mainly focused on this system's capacity. The search for the "magical" number of items that can be held in visual short term memory led to a still ongoing debate about whether its capacity is defined by discrete slots or a flexible resource. Some of the more recent research on visual working memory shifted its emphasis, now focusing not only on how much can be stored but also on how information is represented. Integrated object representations and independent feature representations were both proposed as the unit of visual working memory, leading to another still ongoing debate. We examined an integrative approach combining the two approaches assuming a hierarchy of bound objects and independent feature representations in visual short term memory. A modification of the classically used change detection paradigm was used in which the size of the study array (number of presented rectangles) was manipulated in a randomized within-subject design. Subjects were asked to indicate color and orientation of one of the rectangles selecting one out of four response options in 600 trials. We applied three versions of a multinomial processing tree model to our data. The unrestricted version contained a parameter reflecting binding processes as well as two parameters reflecting the storage of independent features. The two restricted versions reflected the assumptions of the storage of only bound objects or only independent features. Values of individual model fit indicated no benefit of including a binding parameter. All in all, the independent features model showed the best fit, although overall the fit for all of the three tested models was not satisfactory.

Causes and consequences of errors in dual-tasking

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Efficient task performance requires a performance monitoring system that detects errors and initiates control adjustments in order to prevent further errors. These mechanisms are even more important when multiple subtasks are executed simultaneously or in rapid succession because between-task interference makes dual-tasking performance particularly error-prone. The present study investigated the hypothesis that error processing in dual-tasking has positive and negative consequences: On the one hand, it initiates control adjustments that prevent further errors when the same subtask is executed again. On the other hand, it causes interference and thus increased error probability in a simultaneously performed subtask. We conducted a dual-task experiment in which participants had to classify colors and tones that were separated by a variable stimulus onset asynchrony (SOA). Errors in the color task caused post-error slowing both in the tone task of the same trial and the color task of the subsequent trial. However, while the former effect was accompanied by additional errors in the tone task

and disappeared with an increasing SOA, the latter effect was not associated with additional errors and was independent of SOA. This suggests that errors in one subtask induce task-unspecific, transient interference in the other subtask, but task-specific and more long-lasting control adjustments in the same subtask on the upcoming trial. These findings imply that error processing in dual-tasking does not only prevent errors but is also the cause of errors.

Errors in target identification cause adjustment in target selection processes in a visual search task

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Performance errors in visual search tasks are frequently observed but rarely examined in detail. To find out about the origin of errors in a complex visual search task, we used a paradigm that involves both target selection and feature identification. Depending on the origin of the error within the time course of perception and attention, specific neural correlates of visual attention should be impaired. Both conventional ERP analysis and multivariate pattern analysis show that performance errors in this visual search task are caused in a late feature identification stage of visual attention. Whereas the N2pc, a neural marker of target selection around 200 ms post-stimulus, is not affected, the later SPCN (300-400 ms) is significantly reduced in error trials. This component has previously been linked to the storage of target stimulus features in working memory for integration and discrimination purposes. In a second step of analysis, we compared single-trial representations of these neural correlates of visual attention in trials preceding and following errors. Our results suggest an adjustment of visual attention after errors: post-error trials are associated with a decreased amount of target selection processes around 220-240 ms post-stimulus. We interpret these findings as neural evidence for an error-induced adjustment of target selection processes, presumably caused by a shift of attentional resources towards late feature identification.

Stopping correctly or going quickly? That is the question!

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In everyday life, changing environmental conditions call for the inhibition of one response and the initiation of another. The stop-change paradigm – an extension of the classical stop-signal paradigm – seems to be well suited to investigate the neural implementation and functional architecture of such inhibitory control processes. In our experiment forty healthy participants performed the stop-change paradigm. It was hypothesized that different inhibitory control mechanisms would be used in dependence of whether participants have foreknowledge of which response to stop or whether they do not have such foreknowledge. In the foreknowledge condition, we expected participants (1) to require significantly more time to stop the already

initiated go response, (2) to experience less interference and (3) to be able to change to the alternative response more quickly, a pattern of results which – according to previous research – points to the use of the indirect pathway in the foreknowledge condition and the use of the hyperdirect pathway in the no-foreknowledge condition. In accordance with our hypotheses, participants experienced less interference and were able to change to the alternative response more quickly when they had foreknowledge. However, they inhibited equally well in both conditions. As subsequent analyses of subgroups reveal, motivational and strategic biases might be possible explanations for our findings.

Modality matters - The tale of amodal cognitive control processes

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Modality compatibility refers to the similarity of stimulus modality and the modality of response-related sensory consequences. In a series of experiments to examine modality-specific influences in task switching, participants switched either between two modality compatible tasks (auditory-vocal and visual-manual) or two incompatible tasks (auditory-manual and visual-vocal). Switch costs were increased in modality incompatible compared to modality compatible tasks. We suggest that the modality compatibility effect is based on cross-talk of central processing codes due to ideomotor "backward" linkages between the anticipated response effects and the stimuli indicating this response. According to this generalized ideomotor idea, the modality match between response effects and stimuli would prime selection of a response in the compatible modality. Therefore, performance would be facilitated when switching between modality compatible tasks, whereas between-task crosstalk would hinder performance when switching between modality incompatible tasks. We will discuss direct empirical evidence for this between-task crosstalk, as well as its dependence on the degree of the underlying compatibility relation with regard to other modalities.

Interindividual differences in unconscious processing of affective visual information

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A fundamental question in the neuroscientific study of consciousness is how sensory stimuli are selected for conscious awareness. A well-suited tool to study access to awareness is continuous flash suppression (CFS), during which a visual stimulus presented to one eye is initially suppressed from awareness by presenting a high-contrast dynamic pattern to the other eye. Eventually, the initially invisible stimulus will overcome suppression and enter awareness. While it is well known that the time a given stimulus takes to break into awareness is determined by stimulus-related factors, we here studied how the individual relevance of a stimulus affects access to awareness. In two fMRI studies, we investigated individual differences in the effect of

affective and social relevance on access to awareness and associated neural correlates. In the first study, we presented healthy individuals with varying degrees of spider phobia with pictures of spiders that were suppressed from awareness by CFS. Applying multivoxel pattern analysis, we found that the average time that spider stimuli took to gain access to awareness in each participant could be decoded from fMRI signals evoked by suppressed spider stimuli in occipitotemporal and orbitofrontal cortex. In the second study, we studied the effect of a socially relevant stimulus, direct gaze, on access to awareness during CFS. Between-subject correlation and complementary single-trial analyses showed that the relationship between fMRI responses in the face-sensitive fusiform gyrus and access to awareness was modulated by gaze direction. This suggests that in individuals with higher sensitivity to direct gaze, lower levels of face-related neural activity were required for access of direct gaze to awareness. Taken together, our results suggest a role for high-level visual areas and orbitofrontal cortex in determining individual differences in the access of affective and socially relevant visual stimuli to awareness.

Comparing two different versions of the Modified Card Sorting Test: Do people with specific Internet addiction symptoms indicate problems in cognitive functioning?

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The Modified Card Sorting Test (MCST) is a frequently used neuropsychological paradigm, assessing higher executive functioning. It has already been adapted by using emotional stimuli, e.g. in persons with psychopathological symptoms (Deveney & Deldin, 2006). Several authors assume that persons' specific cognitions could be related to generalized or specific Internet addiction (SIA) symptoms (e.g. Brand et al., 2014). The study focuses (1) on the evaluation of an adapted version of the MCST using specific addiction-related stimuli and (2) on the performance of persons with SIA tendencies. Overall 90 participants (58f; 18-38 years, M=23.32, SD=4.45) took part in this study. One group (n=43) worked on the original version of the MCST (Nelson, 1976), the other group (n=47) on an adapted version with specific stimuli represented by icons of four popular online communication applications. Tendencies towards online communication addiction were measured by the short Internet Addiction Test modified for online communication (s-IAT-SNS; Wegmann et al., 2015). Participants who worked on the modified version made more mistakes compared to those who worked on the original task. Moderated regression analysis revealed that those participants with higher scores on the s-IAT-SNS performed better on the adapted MCST compared with those persons working on the original task with plain symbols. The results suggest that the utilization of specific stimuli was successful, although the adapted version seems to be a bit more difficult. The findings are in line with previous research showing deficits in executive functioning and decision making among excessive online users measured with neuropsychological paradigms. Nevertheless, when subjects are confronted with addiction-related stimuli, those with higher SIA symptoms indicated a better performance. This could be explained by better cognitive processing due to familiarity and higher vulnerability to the online communication stimuli.

Positive illusions and self-compassion: Predictors of better sleep quality and less nightmares?

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Sleep is necessary for well-being and even survival. Therefore, psychological research has been interested in risk factors for sleeping problems as well as protective factors. While research on mindfulness is on the rise, we took a more comprehensive view in investigating whether Positive Illusions (PI) - as a long established construct in health psychology - and Self-Compassion (SC) - as a new approach to well-being - are uniquely related to general reports of sleep quality and the occurrence of nightmares. Furthermore, we tested whether these effects are moderated by life events. The constructs were assessed with an online questionnaire to obtain a diverse sample (N=192). The results revealed that PI and SC were positively related to sleep quality. SC had a unique positive effect on sleep quality even if PI was statistically controlled for. The reverse was not true for PI. Life events did not moderate the relationships of PI or SC and sleep quality. Regarding nightmares, PI and SC were again significant predictors: higher scores of PI and SC were linked to lower occurrence of nightmares (on a 10-percent-level regarding SC). Furthermore, these relationships were moderated by life events. The link between PI as well as SC and nightmares was stronger and only significant for higher loads of recent life events. In sum, the current research suggests that PI and SC may enhance sleep quality and protect against nightmares. However, future research will have to provide evidence for this kind of hypothesized causal relationship.

Interaction of brightness and responsiveness in the human pupil

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The pupil is regarded as a window to the human mind. To the present day, various correlates of pupil expansion and contraction could be identified. However, it is hardly possible to compare effect sizes of different studies as no common standards for key methodological approaches have yet been established. Particularly lighting conditions influence the extent of the pupil‘s responsiveness to cognitive processing; as a consequence, the majority of studies keep ambient light conditions constant during data acquisition. However, this ensures comparability only within not between investigations and prevents research from cumulating knowledge with regard to effect sizes of pupil responses under different environmental conditions. Our current research aims to model benchmarks of pupillary responsiveness under varying levels of illumination. Data collection is currently in progress. The results will shed light on the interaction between light reflex and cognitive pupil dynamics under certain conditions of mental workload. The overall objective is to determine sensitive parameters and to establish standards that take into account both discrete and continuous changes in lighting conditions during pupillary measurement.

The benefit of endogenous preparation of task order in dual tasks

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The coordination of task order of two simultaneous tasks under dual-task conditions requires executive control processes. Such processes are demonstrated by increased dual-task performance costs in dual tasks with the requirement to decide about varying task order vs. task situations with no such requirement and constant task order. However, so far, these performance costs were mostly investigated in dual tasks with exogenous task-order control: task order was indicated by stimulus presentation order. However, it is unknown whether participants are able to prepare task order endogenously and, if so, the benefit of such a preparation is unknown. To investigate endogenous task order preparation, participants performed dual tasks with a random as well as a predefined task order. Under the latter condition, task order systematically and predictably changed after every trial, after every second trial or after every forth trial. Furthermore, predefined task order was realized with short as well as long inter-trial intervals to manipulate the duration of potential exogenous task-order preparation. The results are discussed in the context of dual-task processing models and models of executive control.

Are experiential simulations functionally relevant for comprehension?

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Theories of embodied cognition state that people mentally simulate the described events and situations during language comprehension. While there is plenty of evidence for the existence of such simulations, it remains unclear whether they are actually needed for the comprehension process or whether they are just an optional by-product. Here, we present two experiments in which a secondary task (finger tapping vs. foot tapping) was occupying the systems needed for hand- and foot-related simulations, respectively, while the participants had to perform a lexical decision task on hand- and foot-related words. Responses were executed by hand or foot, depending on the colour of the words. If simulations were functionally relevant for comprehension, occupying the hand system should have a larger impact on hand- than on foot-related words, whereas occupying the foot system should have the opposite effect. Contrary to these predictions, we found a larger impact of the secondary task on hand- than on foot-related words in both experiments. That is, occupying the foot or hand system, respectively, did not have differential effects on the processing of hand- and foot-related words. Importantly, we found evidence for the presence of experiential simulations during word processing, since foot responses were faster to foot- than to hand-related words, whereas hand responses were faster to hand- than to foot-related words. These findings indicate that although the words indeed elicited specific experiential simulations, these simulations did not

play a functional role in the comprehension process.

A dorsal processing bias under continuous flash suppression? Evidence from priming experiments

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Numerous non-invasive methods exist to transiently suppress visual input from perceptual awareness. It is a widely accepted notion that these experimental "blinding" methods can be placed along a functional hierarchy of unconscious processing, depending on the degree of stimulus information that can escape perceptual suppression and influence behavior (e.g., by priming). Recently, it has been suggested that continuous flash suppression (CFS) may allow to bias unconscious processing along a second orthogonal axis related to the type of stimulus processing. According to the notion of a CFS-specific "dorsal processing bias", processes typically ascribed to the dorsal vision-for-action stream can escape CFS and remain functional, while ventral vision-for-perception processes are suppressed when stimuli are invisible under CFS. Here, we will first provide an overview of neuroimaging and behavioral studies that either examined this dorsal processing bias or based their conclusions on it. We will show that both evidence for preserved ventral processing as well as lack of dorsal processing can be found in published experiments. Next, we will present the results of a series of priming experiments which tested the hypothesis that the stimulus elongation (as a potential key feature of object manipulability) can be extracted under CFS and facilitate the categorization of manipulable objects. We will discuss our findings within the growing body of evidence regarding the level and type of visual information that can be processed under CFS. Finally, we will outline a number of methodological considerations for future CFS research to resolve current controversies.

Spatial compatibility effects in human-machine interaction

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Spatial separation and distortions between perception and action often specifies tool use in modern human-machine interaction. Theories of common coding propose that sensory and motor information is represented within the same cognitive domain. Consequently, they are likely to interact with each other and interfere action control if spatial relations between perceived and to-be-produced events do not correspond. In the experiment we systematically varied the spatial correspondence between user, input and output device. In the control condition (spatial alignment), the user was positioned centrally to the input and output device. In three experimental conditions (partial spatial alignment), the user's sitting posture (trunk not aligned), the input device (hands not aligned) or the output device (head not aligned) was

90°-rotated to the left, and the other components remained in their original position and were spatially aligned. Participants performed ipsi- or contralateral hand movements in response to colored stimuli, while the spatial stimulus location had to be ignored (Simon task). They did not see the stimuli and hands directly, but received visual feedback on a projection screen. Results showed a significant Simon effect for reaction times: Compatible responses were faster than incompatible responses. The Simon effect increased in conditions with only partial spatial alignment, and was most pronounced for the 90°-rotated output device. Error analysis ruled out the speed-accuracy trade-off as an explanation for effects in reaction time. The findings show that user orientation and spatial correspondence between user, input and output device interferes cognitive processes. In conclusion, spatial alignment in human-machine interaction is of particular importance in time-sensitive and hazardous work places where responses have to be very fast and very accurate at the same time, for instance in air traffic control or in remote maintenance and control.

Towards a framework for human judgments of quantitative information: The Numerical Judgment Process (NJP) model

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Numerical information appears everywhere in society and many important judgments are based on numerical information. This contribution presents a theoretical process framework for human unaided intuitive numerical judgments that are based on numerical information, the Numerical Judgment Process, NJP model. The framework includes measurement theoretical set representations of objective and subjective numbers, relations and operations. A judgment process includes one or several of the following stages: (1) problem reading, (2) recognition, (3) association, (4) similarity assessment, (5) problem interpretation, (6) computation, (7) marker nomination, (8) start value selection and (9) adjustment. When making a judgment, three main types of strategies are used alone, in sequence or interchangeably in and across stages: (i) Associative strategies, in which e.g., an answer is retrieved immediately, (ii) Computational strategies, in which, different algorithms are applied to the information and (iii) Analogue strategies, in which, the most prominent strategy involves identification of a marker (e.g., the most important attribute) that provides a start value (e.g., a response value related to or equal to the value on the most important attribute) for an anchoring and adjustment process strategy. The paper concludes that a generic framework of intuitive judgments will facilitate further studies of the psychological subprocesses activated when a judge makes an unaided numerical judgment.

Minimal evidence for optimal Bayesian updating in visual perception

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Bayesian ideal observers behave in a way that preserves Bayes' rule: they optimally combine prior information and current likelihood of data to produce posterior distributions of belief and corresponding optimal responses according to some loss function. We utilized Bayesian Decision Theory to bring prior information, likelihood of data, and loss function under explicit mathematical control in a test of ideal Bayesian performance against plausible alternatives. Participants made location-based judgments about visual stimuli presented under varying degrees of information loss. They were given the prior distribution of locations and awarded points for responses based on squared error loss. Two Bayesian models – one ideal and one posterior probability matching – plus a discrete-state model of detection and guessing were fit to participant data. Participants deviated considerably from ideal in conditions devoid of sensory information, leading to failure of the Bayesian ideal observer model in Experiment 1. The ideal model fared slightly better in a second experiment; however, the posterior matching model fit best for the majority of participants across both experiments.

Congruency effect explained by numerical distance on the ratio bias task

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Ratio-bias or denominator neglect (Pacini & Epstein, 1999) refers to the phenomenon that when asked to pick the larger of two fractions, people tend to pick the one with the larger nominator in it, even when the value of the given fraction is the smaller (e.g., picking 19/100 over 2/10). To study this intuitive responding, congruent and incongruent versions of the task were created: on incongruent trials (e.g., comparing 19/100 to 2/10) the intuitive answer is not the mathematically correct one; on congruent trials (e.g., comparing 21/100 to 2/10) the intuitive answer is also the correct answer. Previously, participants were found to answer incongruent trials slower than congruent ones (Bonner & Newell, 2010), which has been interpreted as evidence that people can detect the conflict between competing heuristic and normative intuitive answers (De Neys, 2012). Contrary to this account, we found that the effect of congruency can be better explained by the effect of the numerical distance between the numerators resulting from the component-based representation of fractions (Bonato et al., 2007).

The Affect Misattribution Procedure: In search of spontaneous face evaluations

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The AMP has been claimed to be one of the most promising alternatives to the Implicit Association Test (IAT) and the evaluative priming task (Gawronski & Ye, 2015), in particular because of its satisfactory reliability estimates, its large effect sizes, and its theoretical embedding in sequential priming tasks that have a long tradition in social cognition research. In the AMP, participants are briefly presented with a prime stimulus displaying the construct of interest (e.g., the portrait of a Black or a White person in a prejudice AMP). Then, a neutral target stimulus follows, typically a Chinese character, that is masked after 100 ms. Participants are to evaluate whether the presented Chinese character is visually more pleasant or more unpleasant than the average Chinese character. The basic assumption is that participants misattribute their evaluation of the prime to their evaluation of the neutral target's pleasantness. In seven experiments (overall N = 186), we examined prejudice in different domains (Blacks vs. Whites, Muslim vs. non-Muslim women, Arabs vs. Germans, old vs. young people, and terrorists vs. liked celebrities). Surprisingly, in six out of seven experiments, participants did not show any prejudice effects in the AMP. Conversely, an additional IAT experiment (N = 20) using the same Black and White stimuli and Muslim and non-Muslim stimuli as in the AMP experiments revealed significant prejudice effects in the Black-White IAT and the Muslim-non-Muslim IAT, respectively, with ds > 1. It thus appears that participants were prejudiced, but this was not captured by the AMP. Increasing the salience of the categories relevant to prejudice by means of a categorization task prior to the AMP did not change the pattern of null findings, either. Accordingly, the AMP's null results cannot be attributed to low category salience (see also Gawronski, Cunningham, LeBel, & Deutsch, 2010). We discuss possible reasons for the present null findings.

Memory retrieval benefits motor sequence learning

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We investigated the effects of retrieving motor sequences from memory on subsequent learning of novel motor sequences. Participants learned four sets of motor sequences in separate parts of the learning phase. Each part was followed by one of three tasks: retrieval of the items of the current learning-phase part, restudy of these items, or an unrelated distractor task. All participants received all of these three tasks. The order of the tasks was counterbalanced between participants. The final test phase required the recall of items from all four learning-phase parts. Recall of motor sequences that were learned after a previous item set had been retrieved was better than recall of motor sequences that had been learned after the previous item set had been restudied or after the previous item set had not been retrieved nor restudied (i.e. was followed by an unrelated distractor). The recall of the latter two item types

did not differ significantly. Moreover, to-be-retrieved motor sequences did not benefit compared to restudied motor sequences but were slightly worse recalled, which corresponds to the typical memory disadvantage of testing without feedback on tested items over a short retention interval. These findings demonstrate that memory retrieval enhanced later recall of motor sequences learned subsequently to that retrieval. The results suggest that retrieval caused a reset of encoding.

Numbers and space: Matters of magnitude

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Numbers are an omnipresent tool of modern society to communicate information of magnitude. However, while the carried information is precise in terms of mathematics, human interpretation of numbers is not. A commonly known effect representing the interaction of numbers and space is the Spatial Numerical Association of Response Codes (SNARC), which is characterized by the fact that smaller numbers are answered faster with the left hand and larger numbers are answered faster with the right hand. In our study, we investigated the SNARC as well as the distance effect and their respective interactions with the numerical and visual magnitude format (stimulus size). By using two overlapping number lines, 2-6 with reference 4 and 5-9 with reference 7, it was possible to change the numerical interpretation of the stimuli (5 and 6), without changing the visually perceived information. Depending on the task condition, participants were asked to answer via button presses, whether the stimulus presented on the screen is numerically larger or smaller than the respective reference (4 or 7), irrespectively of the actual stimulus size. ERP analysis of N1 and P300 components as well as behavioral data show an interaction between the two magnitude formats (stimulus size and numerical magnitude). While the distance effect as well as its interaction with both magnitude formats occurs in the behavioral data, the SNARC effect proved to be elusive, despite being described under similar conditions. Our results suggest that while both effects are based on magnitude, the integration of different magnitude formats is processed in different ways.

Does social mindfulness require deliberate thinking? An experimental investigation

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Social mindfulness has recently been proposed as a type of prosocial behavior that involves both a cognitive component of perspective taking and an affective component of empathetic concern. Particularly the cognitive component of social mindfulness implies that, unlike other types of prosocial behavior (e.g., cooperating in social dilemma games) which have been proposed to mainly involve automatic processes (known as the “spontaneous cooperation

effect"), social mindfulness involves processes of executive functioning and thus of deliberate thinking. In three studies we tested the hypothesis that social mindfulness should be increased under conscious compared to automatic cognitive processing, using different experimental manipulations. In Studies 1 and 2, participants (N = 422 and N = 107, respectively) were either asked to thoroughly think about their decisions in a social mindfulness task (deliberate thinking condition) or to decide as fast as possible, based on their gut feelings (intuitive thinking condition). In Study 3 (N = 178), we finally used a cognitive load manipulation to trigger either deliberate (no cognitive load) or intuitive thinking (high cognitive load). Contrary to the idea that social mindfulness requires conscious processing, in all three studies we only found a negligible effect of mode of thinking on decision making. By contrast, prosocial personality traits (Honesty-Humility and Social Value Orientation) had a main effect on decision making, irrespective of experimental condition. In sum, the findings suggest that being socially mindful does not require conscious processing, but is rather influenced by stable personality traits capturing prosocial tendencies.

Generalization of conditioned fear response in individuals with and without PTSD related to childhood and adolescent interpersonal violence

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Background: Etiological concepts of PTSD comprise maladaptive fear conditioning processes as a crucial mechanism by which PTSD symptoms are developed and maintained. Specifically, individuals prone for an excessive threat-reactivity to trauma-relevant stimuli run high risk in developing PTSD. However, underlying fear generalization processes are not yet sufficiently understood. The current effort aims at investigating generalization of conditioned fear response in PTSD by applying an experimental paradigm that allows the testing of fear transfer. Methods: Fifty-six trauma exposed individuals with (n=28) and without PTSD (n=28, TC) and 28 healthy control subjects (HC) underwent a fear conditioned-generalization paradigm. In a contingency learning procedure, one of two circles (different sized) was associated with an electrical shock (= danger cue), while the other represented the conditioned safety cue. The generalization test further comprised eight circles of intermediary size, creating a continuum of similarity from danger to safety cue. Primary outcome variables comprised online risk ratings and fear potentiated startle. Results and Conclusion: Behavioral and psychophysiological results point to overgeneralization and alteration of conditioned fear in traumatized individuals: Behavioral analyses revealed increased risk perception overall and faster reaction times in response to learned danger cues, as well as an increased fear transfer to stimuli that were less similar to the danger cue in TC and PTSD individuals. Contrary, solely PTSD subjects did not differentiate between danger and safety cue on a psychophysiological level. Thus, trauma exposure per se was associated with a failure in fear suppression to similar cues, whereas a lack of physiological discrimination during fear acquisition characterized PTSD subjects, respectively.

Impact of cognitive and sensory information processing during reconsolidation of fear-memory in humans

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Background: Indelibility of emotional memory can cause extreme fear and anxiety, potentially leading to mental disorders. A strategy referred to as 'disrupting reconsolidation' points to a novel method for permanent fear reduction, which has been shown for ß-adrenergic receptor blockade or extinction training upon memory retrieval. Yet, it's been increasingly discussed, whether implementing therapeutic interventions within the reconsolidation time window might boost their efficiency. The present work therefore experimentally investigates effects of well-known clinical strategies on disrupting fear memory reconsolidation processes in healthy human subjects. Methods: Participants (N=80) underwent a classical differential fear condition paradigm. Approximately 24h later and 5 minutes upon memory reactivation, participants were exposed to either one of two established psychotherapeutic interventions that is a) cognitive reappraisal, or b) multimodal sensory information, or received c) 40 mg propranolol, a ß-adrenergic receptor antagonist, or d) a placebo pill. Primary outcome variables comprised online risk ratings and fear potentiated startle. Results: Administration of a single dose of propranolol resulted in a differential effect on the physiological expression of fear 24 hours later, whereas none of the applied methods did result in fear erasure. Conclusion: Yet, our findings do not support reconsolidation interference by clinical strategies. Nevertheless, increasing evidence points to a number of parameters also referred to as boundary conditions that may limit the occurrence of reconsolidation. Future research is needed to characterize successful disruption methods more precisely.

Enhanced temporal sensitivity and prolonged duration judgments in situations of mutual gaze

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Faces that exhibit emotionally negative expressions in mutual gaze have been shown to induce a dilation of perceived duration. The influence of gaze by itself on time perception, however, has rarely been investigated, and the few existing studies yielded inconclusive results. We investigated whether direct (mutual) gaze as compared to averted gaze affects perceived duration. In a first experiment, subjects estimated the duration of dynamic direct gaze over a range of 1 to 9 s. Focusing on durations of around 1 s in a second experiment, subjects had to categorize direct gaze and averted gaze stimuli as either being short or long in duration (temporal bisection). The experiments provided task-dependent results for temporal overestimation of direct gaze stimuli compared to averted gaze stimuli. The second experiment indicated effects of gaze direction on temporal sensitivity, with duration judgments being more precise when mutual gaze was induced. Arousal ratings did not significantly differ between direct and averted gaze stimuli and thus did not account for the differences in the duration judgments. These results are discussed with regard to a social interaction hypothesis, according

to which humans should be highly sensitive to small differences in mutual gaze duration.

Goal tracking in humans - A new paradigm to test new and old predictions

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How human learn about causal and predictive relationships is often investigated either in causal learning paradigms, e.g. allergy task, or in aversive Pavlovian conditioning procedures, e.g. SCR conditioning. Here, we present a new appetitive conditioning task for humans which uses both participants gaze behaviour as well as their movement of the computer mouse as indicator for their learning about predictive and causal relationships between events in a computer game. We show how this computer game can be used to investigate basic learning processes in humans. First, the paradigm allows systematic comparison of learning processes between humans and the most studied organism in this field, the rat, as it is functionally equivalent to a magazine training and goal tracking tasks in the Skinner box. Second, we successfully used it to test new predictions made for example by the Kalman Filter, a Bayesian model with similarities to the associative Rescorla-Wagner Model.

101 shades of grey: How graphical instead of numeric display improves decision time in risky choices without reducing normative accuracy

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Past research has shown that people make decisions that imply over- or underweighting of rare events, depending on the format in which they are displayed. Therefore, Hilbig and Glöckner (2011) developed an open-sampling approach which uses a matrix to present a large representative outcome sample and showed that this leads to more appropriate decisions. This study examines how the open-sampling approach can be modified and improved to further increase the normative accuracy of decisions and/or decrease the time needed to respond appropriately. Because past research has shown a) that colors can be processed faster than numbers and b) stimuli in the periphery of the visual field can be perceived more easily when they are colors than numbers, we compared the standard numeric open-sampling approach with a modified version of the matrix using squares filled with different shades of grey: whereas white represented the maximum outcome, black was used for the minimum outcome and shades of grey represented the intermediate outcomes. This procedure is supposed to ensure faster processing of the outcome sample as well as a broader perception of stimuli. We used a between-subjects-experiment design to compare both sampling formats with normative accuracy and decision time serving as dependent variables. Analyses show that participants' decisions in both conditions are similarly accurate, but that participants in the color condition

achieved this in significantly less time.

The Tower of Hanoi exploration: Learning from error states

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The Tower of Hanoi Task is one of cognitive sciences drosophilae. The seminal work of Simon (1975) led to a specific perspective: a focus on strategic knowledge and the problem space (Anderson & Douglass, 2001; Welsh & Huizinga, 2005). A blind spot around the problem space was identified (Tobinski, 2014): error states around the golden rule (larger on top of smaller disk) have never been taken into account before. The TOH consists of an instruction of all information necessary to deduce an error-free solution. The question is: how does the quality of rule knowledge influence the process of solving the TOH? A new version has been digitalized (TOH-D): The control group (CG) uses the classical version with three disks (TOH-D3). The first experimental group (EGA) also obtains the complete rule instruction while the second experimental group (EGB) does not. EGB has to explore the golden rule - a disk crashes if a larger disk is placed above it. This disk crash occurs also in EGA. In a following phase, all groups use the classical version with 4 disks (TOH-D4). In the study, 45 students (22 female; mean age: 17.25 years) from German higher secondary school participated. The difference of group EGB in error production is substantial in TOH-D3 (ANOVA, $F(2, 42)= 41.1$, $p<.005$). There is no difference in TOH-D4. Regarding error causation as chance for semantically knowledge generation, the question whether there is a correlation between golden rule errors in TOH-D3 and the amount of unsuccessful moves in TOH-D4 is interesting. The golden rule error significantly correlates positively with planning failure in group EGA, $rs = .59$, p (one-tailed) $<.05$, and correlates highly significantly negatively in group EGB, $rs = -.68$, p (one-tailed) $<.005$. EGB seems to profit from the observed information, which is learning from error states. These results point back to the roots of problem solving as trial-and-error behavior, thus deeper analysis of error handling will follow this initial study.

What is the role of space representation in pain perception?

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Crossing the hands over the midline reduces the perceived intensity of nociceptive stimuli applied onto the hands. It is unclear how much of this effect relies on the representation of the space surrounding our body. Here, we used the crossed hands paradigm in patients with unilateral spatial neglect, a neuropsychological condition characterized by the inability to detect, attend and respond to contralesional (most often left) stimuli, as consequence of a brain damage affecting spatial attention and representation. Importantly, neglect patients have a spared ability to process stimuli in the non-affected space, as such providing the model to

investigate the effect of space representation in nociceptive processing. Thirty patients with brain damage (16 with spared representation of space, who acted as controls, and 14 with spatial deficits) rated mechanical punctate pinprick stimuli applied onto the crossed or uncrossed hands. We hypothesized that if the so-called 'crossed-hands analgesia' is based on representation of space, patients with unilateral spatial neglect would not show any reduction of the perceived intensity of the stimuli when applied onto the crossing hands. In line with this hypothesis, we observed the 'crossed-hands analgesia' effect in patients with brain damage but spared representation of space, but not in neglect patients, that instead perceived as more intense stimuli applied onto the left contralesional hand when the hand was positioned in the right healthy space. These results indicate that space representation plays a fundamental role in the processing of nociceptive stimuli.

Zeitwahrnehmung und zeitbasierte Bewertungen im Usability-Testing

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Zeitwahrnehmung ist ein wichtiger Bestandteil des menschlichen Erlebens und beeinflusst sowohl Entscheidungs- als auch Bewertungsprozesse. Im Usability Testing wird diese subjektive Komponente allerdings selten betrachtet, wohingegen objektive Zeitmaße im Sinne der Effizienzmessung häufig eine zentrale Rolle spielen. Neben solchen „harten" Usabilitykriterien sind im Rahmen der Usabilityerfassung aber auch weiche Kriterien wie Zufriedenheit und subjektive Bewertungen von Interesse. Letztere können auch eine temporale Dimension besitzen. Im Rahmen einer Usabilitystudie (N=44) wurden neben objektiven Bearbeitungszeiten, prospektive, verbale Dauerschätzungen sowie die erlebte Schnelligkeit und die Akzeptabilität der benötigten Zeit bei der Lösung dreier Aufgaben auf einer Webseite erhoben. Variiert wurden dabei die Usability der Webseite (gut vs. schlecht) und lautes Denken (mit vs. ohne). Wie erwartet, führten sowohl schlechte Usability als auch das Verwenden von lautem Denken zu längeren Bearbeitungszeiten. Basierend auf dem Attentional-Gate-Modell (AGM) wurde vorhergesagt, dass lautes Denken durch Binden von Aufmerksamkeitsressourcen zu einer Verkürzung der Dauerschätzung führt, während schlechte Usability durch eine Frustrationsinduktion eine Verlängerung mit sich bringt. Die Ergebnisse zeigten das erwartete Muster für die erste Aufgabe, nicht aber für die restlichen. In Bezug auf erlebte Schnelligkeit und Akzeptabilität wurde ein Effekt der Usability, nicht aber des lauten Denkens bestätigt. Die Ergebnisse können praktisch genutzt werden, um Usabilitytests methodisch zu erweitern und eine weitere Brücke zum Bereich UX-Testing zu schlagen. Dauerbewertungen könnten darüber hinaus als indirektes Maß für subjektiv erlebte Usability dienen. Auf einer theoretischen Ebene soll diskutiert werden, warum die Vorhersagen des AGM nicht vollständig bestätigt werden konnten und ob es sich hierbei um einen Lern-, Gewöhnungs- oder Framingeffekt handelt.

Process models of cue- and exemplar based decision making: A drift diffusion approach

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People can use several strategies to make good decisions, but which strategy is optimal depends on the context (Karlsson et al., 2008). Formal modeling approaches have been used to determine the conditions under which people rely on which strategy. Cue abstraction models (CAM) propose that people make decisions about objects by linearly integrating learned cue weights predictive of a criterion (Juslin et al., 2003). Exemplar based models (EBM) suggest that people make such decisions based on the similarity to learned exemplars (Nosofsky & Palmeri, 1997). Both model classes fit choice responses well, but a principled unitary approach for comparing CAM and EBM based on both choice and RT data has not been proposed. This is surprising in light of the fact that both model classes implicitly assume that some form of evidence accumulation underlies the decision process. We demonstrate using simulations and fits to actual choice decision tasks how drift diffusion models of evidence accumulation (e.g., Ratcliff, 1978) can be integrated with CAM and EBM to accommodate choice and RT data. This approach explicates the evidence accumulation mechanism underlying decisions, resulting in dynamic process models of cognition. The approach also puts more stringent constraints on experimental studies of strategy classification, allowing us to more confidently classify people as relying predominantly on cue- or exemplar based strategies in their decision process. The implications for our understanding of the dynamics of decision making strategies are discussed.

The role of spatial (in-)congruence in the rubber hand illusion

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The rubber hand illusion consists in the perceived ownership over an artificial hand, accompanied by biases in spatial perception and movement patterns. In recent years, it has become a standard paradigm in body perception research. However, its implementation differs considerably between studies, making it hard to identify its core components and to compare results. For instance, in most studies, the artificial hands are placed proximal to the veridical hand at considerable distances. The rubber hand illusion therefore heavily relies on overcoming the more or less obvious spatial incongruence between the artificial and the real hand. Thus, small details of the experimental setup may influence the emergence of the illusion. Furthermore, various dependent variables may be affected to different degrees. This talk reexamines the results of several studies performed by our group and others in respect to the question how spatial (in-)congruence affects the rubber hand illusion. The combined results show that, as expected, ownership ratings, position ratings, and motor responses all depend on the relative positions of the veridical and the artificial hand. More to the point, however, our observations indicate that these markers of the illusion may be affected differentially. These findings bear relevance for future implementations of the rubber hand illusion and call for a

more standardised experimental framework. We will suggest some guidelines and discuss the implications for our understanding of the processes underlying the rubber hand illusion.

The effect of time pressure on metacognitive control processes

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Metacognitive abilities involve the monitoring and control of one's own cognition (Flavell, 1979; Nelson & Narens, 1989). Developmental research suggests that children around 6/7 years of age seem to already have accurate monitoring processes in place, however, the ability to translate these into adequate control processes develops later. With 10 years of age, children proficiently engage in self-regulated learning by using their metacognitions to guide their control processes. (e.g., Dufresne & Kobasigawa, 1989; Lockl & Schneider, 2003). The majority of metacognitive research has investigated monitoring-control processes under self-paced conditions, however often we find ourselves in situations of time pressure when acquiring novel knowledge. Such time pressure might influence learning and metacognitive-guided self-regulation. Indeed, time pressure has been identified as a hot cognitive situation, which affects human behaviour in various domains, such as decision-making and risk taking (e.g., Ordonez, & Benson, 1997; Suter, & Hertwig, 2011). In the current study, we tested a group of 10-year olds (N=29), 14-year olds (N=31) and adults (N=29) in a study time allocation paradigm in which participants had to study easy and hard picture pairs in a self-paced and a timed condition. First, we were interested to see whether time pressure would affect metacognitive self-regulation and efficiency and whether these effects would differ between children and adults. Results showed that participants from all age groups clearly engaged in self-regulated learning and this was not affected by time pressure. Interestingly, participants from all age groups were more efficient in their study time allocation in the time pressure condition than in the self-paced condition, suggesting that under self-paced conditions learners are more likely to engage in distracting course of action.

Conversation modulation in in-vehicle speech-dialogue-systems: Strategies for multitasking considering the cognitive workload of the driver

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Due to technical progress, the number of internal and external devices that can be used while driving a car increased enormously in the last decade. Even the user-behavior in consumption of such devices and especially the internet changed and users want to be connected at all time. Using such technologies while driving a car leads to a higher workload for the driver which can interfere with the driving task and decrease the driving performance which results in impaired traffic-safety. Earlier research has shown that the shift from manual control to speech control -

like it is the case in using mobile phones or ordinary speech-dialogue-systems - did not solve this problem accurately. This will, of course, eliminate the manual workload and offers the driver the opportunity to keep his eyes on track, but there will still be the cognitive workload for producing utterances, listening to system statements, understanding and monitoring the dialogue. We developed and investigated a system that - like an in-car passenger - is capable of analyzing the vehicle state, the environment and the driver's workload to modulate the dialogue in a way that the driver is not distracted by the system in moments of high demand from the traffic situation, which will increase driving performance and traffic safety. The challenge of creating such an adaptive system is to implement a modulation strategy which decreases the driver's workload and increases the driving performance without disturbing the fluency of the dialogue, so that the user is not affected in a negative way by the modulation or even the suppression of the dialogue. Further research will have to show the beneficial impact of Conversation Modulation on driving performance and to elaborate new strategies for different types of workload in a context-aware manner. Also constructs like Trust, Acceptance and Mental Models should be taken into account to evaluate the usability of such systems.

Warning signals reduce distraction in a target-distractor task: An eyetracking study

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Eye movements in a visual search task are drawn towards items irrelevant to the search (distractors). Advance information about the position or features of distractors can reduce this effect by enhancing inhibition of distractors. The present study investigated whether spatial information is necessary for this effect or whether inhibition can also be enhanced by a signal that merely warns of an impending task without providing any other information about the distractor. We found that warning signals speed the initiation of a saccade to the target, but also speed the inhibition of distractors. This finding suggests that the oculomotor system possesses inhibitory resources that can be prepared in advance of task onset and that do not have to be preallocated to a specific spatial location or feature.

Beyond letters and digits: Estimating TVA processing rates for various visual stimulus types with temporal order judgments

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Selective visual attention is investigated with various methods and diverse stimulus material. Interesting stimuli include – but are not limited to – shapes and symbols, salient stimuli in pop-out patterns, and even natural images in which the deployment of attention to different objects is of interest. Bundesen´s Theory of Visual Attention is an advanced mathematical model, which allows to measure the influence of attention on the processing rates of simple

stimuli. This measurement is typically performed by conducting masked item report experiments. Consequently, the method is limited to stimuli that can be used for such a task. Typically, these are highly overlearned and need to be masked with sufficient efficiency. These requirements exclude many interesting stimulus types, such as those mentioned above. Here, we present a novel approach that overcomes these limitations. By employing temporal-order judgments and fitting the data with a model derived from the original TVA equations, processing rate estimates can be obtained for almost arbitrary stimulus types and attention manipulations. The temporal-order judgment task, in which participants judge the order in which two stimuli appear, does not require masking. Furthermore, the response can be decoupled from the stimulus identities. These benefits result from the fact that only a binary judgment of whether one of the stimuli appeared first is required. Here, we show the modeling and the estimation of attention effects for experiments with highly different stimulus types that have been conducted according to the proposed procedure. The application of hierarchical Bayesian estimation allows for the assessment of attention effects on the subject and group level in one coherent model.

Limited working memory capacity promotes intergroup bias in third-party punishment

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Human society is made possible by long-term cooperation among unrelated individuals. One human tendency critical to sustaining cooperation is the willingness to enact third-party punishment – the sanctioning of individuals who have not directly harmed the self. Research has found that third-party punishment is subject to intergroup bias, in which people punish out-group members more severely than in-group. However, the psychological processes underlying this tendency remain unexplored. Some work suggests that this bias stems from people`s evolutionarily adapted predisposition to seek out and maintain alliances. As a result, people may automatically engage in biased forms of punishment, favoring in-group over out-group members when their capacity for deliberation is impaired. We tested this hypothesis directly, examining whether intergroup bias in third-party punishment emerges from reflexive, versus deliberative, components of moral cognition. In three experiments, we manipulated both the participants´ group relationship to a transgressor and the extent to which they relied on reflexive or deliberative judgment, and observed punishment decisions. Across different group-membership manipulations (nationalities and baseball teams), reflexive judgment heightened intergroup bias in third-party punishment. In other words, people punished out-group members more severely than in-group members, but only under conditions that inhibit deliberation.

Intuitive metacognitive judgments: On being accurate without beliefs

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When predicting future memory performance, people often judge that their memory will be better for semantically related word pairs (e.g., lamp – light) than for unrelated pairs (e.g., apple – car). However, recent work has yielded inconsistent results on whether experience-based processes (e.g., processing fluency) contribute to this relatedness effect. Based on these findings, we examined whether experience-based processes alone produce a relatedness effect on judgments of learning (JOLs). In two experiments, people made JOLs and took a test on groups of three words that were either remote associates of a single solution word (coherent triads) or had no common associate (incoherent triads). Coherent triads are known to appear no more related than incoherent triads but to be processed more fluently. Both experiments revealed higher JOLs for coherent triads than for incoherent triads. Memory performance was also better for coherent triads than for incoherent triads. Therefore, the current study presents direct experimental evidence that experience-based processes contribute to the relatedness effect on JOLs.

Attitude formation towards groups by evaluative conditioning of their members

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Evaluative Conditioning is a parsimonious construct for attitude acquisition. We discuss three theoretical possibilities how Evaluative Conditioning might explain attitudes towards groups. While two of these are established, we test the novel third possibility that people might form attitudes towards groups by evaluative conditioning of group members. Five experiments paired evaluatively neutral men with evaluatively neutral sport club emblems; then, we paired these men with likeable or unlikeable animals. Although sport clubs themselves were never paired with stimuli of valence, participants rated clubs positively or negatively depending on men-animal pairings. Sport clubs paired with persons that were paired with likeable animals were liked; conversely, clubs paired with persons that were paired with unlikeable animals were disliked. Clubs paired with persons of different conditioned valence (both CS+ and CS- stimuli) received intermediate likeability ratings. The reverse effect was not found: pairing the club logo with positive or negative animals did not influence ratings of the club members. These data highlight the importance of evaluative conditioning for social psychology and suggest a new way to form and change attitudes towards groups.

Efficiency of the reaction time data preprocessing methods

Philipp Upravitelev

Game Insight

The present study investigates the difference between methods of preprocessing of reaction times (RT) data and efficiency of these methods. RTs are known to be non-normally distributed so that the mean value is shifted to the left leaving long thick right tail of the distribution. The skewed RT distribution violates the assumptions of the majority of widely used statistical methods for hypothesis testing (ANOVA, t-Student criteria). In addition, long tail of the distribution challenges detection of outliers. I had used the dataset from the British Lexicon Project (Keuleers, Lacey, Rastle, Brysbaert 2012) for approximation of parameters of the RT distribution. Several simulation studies were run for testing the methods frequently applied for data normalization (log-transformation, inversion as 1/RT) and cutting outliers (limiting by thresholds, standard deviation, quantiles and their combinations). The efficiency of normalization was measured by the values of the skewness and curtosis and by the Kolmogorov-Smirnov test. Outliers were simulated as the values from the distributions with another parameters (for instance, with mu * 3). I have found that the skewed t-distribution (Jones, Faddy 2003, unlike the results of Zandt 2000) fits RT distribution and log-transformation best. RT analysis of word stimuli with five letters length revealed that cutting reaction times faster than 100ms and slower than 2500ms allows to distinguish outliers with the best precision and recall rate. Also, the applied methods have shown their own impact on the results of hypothesis testing and it is suggested that current methods of RT data analysis are not robust to outliers and depend on the shape and parameters of the distribution.

Is age really cruel to experts: Compensatory effects of activity

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Age-related decline may not be as pronounced in complex activities as it is in basic cognitive processes, but ability deterioration with age is difficult to deny. However, studies disagree on whether age is kinder to more able people than it is to their less able peers. Additionally, previous studies that investigated this hypothesis suffered from methodological problems, such as lack of activity records for players, inappropriate functions to describe skill development over age and range restriction of ability measures. In this paper, we investigated the age is kinder to the more able hypothesis by using a chess database that contains activity records for both beginners and world-class players. The descriptive data and leave one out cross-validation suggested that the skill function across age captures the three phases as described in Simonton's model of career trajectories: initial rise to the peak of performance, post-peak decline, and eventual stabilization of decline. We therefore modeled the data with a linear mixed-effect model using the cubic function that captures three phases. The results show that age may be kind to the more able in a subtler manner than has previously been assumed. After reaching the peak at around 38 years, the more able players deteriorated more quickly. Their

decline, however, started to slow down at around 52 years, earlier than for less able players (57 years). Both the decline and its stabilization were significantly influenced by activity, measured by number of games per tournament. The more players engaged in tournaments, the less they declined and the earlier they started to stabilize. The best experts may not be immune to aging, but their previously acquired expertise and current activity enable them to maintain high levels of skill even at an advanced age.

On the impact of age and format on proportional reasoning

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Decisions in everyday life crucially hinge on numerical judgments. Converging evidence from behavioral and neuro-functional studies points to a unitary, abstract number module that provides us with the cardinal meaning of perceived absolute numbers, irrespective of format or modality often referred to as number sense. While the number sense has served as an extremely useful concept in explaining how absolute numbers are perceived and manipulated, the cognitive and neural mechanisms underlying the perception and manipulation of proportional numerical information remains elusive. We tested the notions that proportional judgments (a) rely on a common, abstract magnitude code, i.e. the number sense which (b) remains intact across lifespan. Participants from three age groups (age ranges: 8-10, 20-31, and 60-73 years) engaged in two tasks. First, they indicated which of two bags contained the larger proportion of yellow to blue items. Proportions were presented as random dot patterns, icon arrays or Arabic digits (children only solved non-symbolic versions) and varied in terms of ratio (1.14; 1.20; 1.25; 1.33; 1.60; 2). Second, we used a standard non-symbolic magnitude comparison task to determine the internal Weber fraction. The effect of ratio was substantially modulated by format and age. Internal Weber fraction showed a U-shaped relationship with age. The correlation between ANS accuracy and performance in the proportion task was strongest in elderlies and absent in children. The impact of congruency of visual with numerical parameters was smallest in adults, who also showed highest proficiency in normalizing nominator magnitudes with denominator magnitudes. Our results show that the processing of proportional information and its relation to the ANS are highly dependent on the format and that the impact of domain-general factors such as strategies and normalization varies with age.

The pupillary signatures of post-error slowing and error awareness

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Making an error on a decision task often leads to an increase in reaction time (RT) on the subsequent trail. This post-error slowing (PES) effect is often explained by an adjustment of

response caution. However, it is unclear whether (1) we need to be aware of the error for PES to occur, (2) PES is an adjustment solely driven by making an error, or if difficult-but-correct trials result in a similar effect, and whether (3) measures of cognitive effort index the response caution adjustments. To answer these questions, we ran a lexical decision experiment with target words and pseudo-words (fake-words that conform to relevant orthographic rules) embedded within trials of filler-words and filler-nonwords while recording pupillary responses. Furthermore, we assessed error awareness by allowing participants to correct a manual response by a vocal utterance. A reliable PES was found in response to errors. As expected, pseudo-words elicited larger pupillary responses than words, and errors evoked a large pupillary response. However, an even larger pupillary increase was observed when the subject was aware of making an error. Trials with uncorrected errors showed a similar pupil response as correct trials from the same category, suggesting that pupil dilation reflects error awareness rather than the magnitude of the PES effect. Interpreting these results in terms of diffusion models suggests that the decision boundaries are not stable over time.

Can bilingualism affect numerical cognition? New insights from the neural correlates of bilinguals' arithmetic problem solving

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How do bilinguals solve arithmetic problems in each of their languages? We investigated this question with functional magnetic resonance imaging (fMRI) by exploring the neural substrates of arithmetic processing in bilinguals. Bilingual adult participants were highly proficient both in German and French as they attended primary school in German and secondary school and higher education in French. 20 German-French bilinguals were scanned with fMRI (3T) while performing arithmetic problems (i.e., additions). We presented both simple (i.e., addends < 10) and complex (i.e., >10 and <100) problems in order to disentangle pure memory retrieval that occurs in very simple problems from arithmetic computation that occurs in more complex problems, because both simple and complex problems rely on verbal processes that might be handled in a specific way by bilingual individuals. Arithmetic problems were presented via headsets in a verification paradigm and bilinguals performed the tasks in both languages. Results showed that all arithmetic tasks elicited a broad fronto-parietal network in both language sessions. We contrasted BOLD signal for both language sessions. Taken together, our results indicate that highly proficient bilinguals rely on differential activation patterns, underlining differential solving procedures, to solve simple and complex additions in each of their languages. Moreover, we combined these results with functional connectivity (resting-state) and morphometric analyses of the bilingual brains. The present study provides novel insights into how bilinguals solve arithmetic problems and also reveal general implications for the role of language in bilingual as well as non-bilingual individuals' arithmetic problem solving

Pupil dilation in cognitive control tasks - Is it conflict, effort, or both?

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An increasing number of studies have recently started to measure pupil diameter in the context of cognitive control. These studies typically observe that response conflict induces pupil dilation. However, it is not clear yet whether this dilation reflects conflict processing or the subsequent mobilization of cognitive control and effort to overcome this conflict. We describe a series of recent studies that have started to reveal how pupil dilation changes as a function of response conflict and task difficulty. Our observations indicate that pupil dilation is not only sensitive to conflict processing, but that it also reflects different processes related to the mobilization of cognitive control and effort.

A theory of visual attention in the temporal domain

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In our every waking moment the world around us changes, as do our current goals and objectives. Logically, our attentional processes have evolved to reflect this inherently dynamic challenge of attending at the right place and time. Nevertheless, most current computational theories of attention describe attentional mechanisms at play in static settings. The theory of visual attention (TVA; Bundesen, 1990) has offered highly influential characterisations of attentional selection and capacity in static displays, however, only recently TVA-based empirical studies (Matthias et al., 2010; Sørensen et al., 2015; Vangkilde et al., 2012, 2013) and models (e.g., Petersen et al., 2012, 2013) have begun investigating the temporal dynamics and changing intensity of attention. In this presentation, recent findings linking temporal biases and attentional processes are reviewed and related to a proposed interpretation of TVA, which incorporates intensity aspects of attention (Bundesen, Vangkilde & Habekost, 2015). Furthermore, it is argued that a valid extension of TVA into the domain of temporal attention should be at the heart of TVA-based research in the coming years.

Processing of cognitive tasks and the impact of embodied information

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Substantial research in the field of embodied cognition showed that incidental weight sensations influence person perception as well as peoples' judgments about a variety of social issues and objects. Many studies reported that heaviness compared to lightness increased the perception of importance, seriousness, and potency. In two experiments, we broadened this

scope by investigating the impact of weight sensations on cognitive performance. In Experiment 1, participants performed an anagram problem-solving task while they held a heavy or a light clipboard in their hands. We found that the number of correctly solved anagrams was reduced when participants were haptically stimulated by a heavy weight. Reduced performance was accompanied by an increase in the perceived effort. Given these results, we examined in Experiment 2 whether weight sensations would also affect the individual processing style in a cognitive task, indicated by a specific response heuristic. For that purpose, participants performed a novel two-alternative forced-choice task while again holding a light or a heavy clipboard. They showed a significant right side bias when they held a heavy clipboard in their hands, but no side bias when holding a light clipboard. After the task, participants in the heavy clipboard condition also reported to be more frustrated than participants in the light clipboard condition. In both experiments, we measured several additional variables that might mediate such effects of embodied information. However, we did not find evidence for mediated effects that had been proposed by previous literature. Overall, the results indicate that weight effects go beyond judgment formation and highlight new avenues for future research in cognitive psychology.

Outside the lab: Is evaluative conditioning a viable account for understanding advertising effects in new media?

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Brand placement in new media (e.g. video games, web pages) has become a prominent advertising technique. At the theoretical level, this technique is expected to increase the liking for brands due to both, mere exposure (MEE) and evaluative conditioning (EC). Based on theoretical accounts of MEE and EC, I argue that attention towards the brand fosters EC (over MEE) effects. Crucially, EC (but not MEE) can lead to unintended boomerang effects on brand attitudes. In two studies, I demonstrate that boomerang effects only occur when attention is directed towards the brands. Finally, I will discuss whether it is plausible that users of interactive media pay attention towards the brand, and in turn whether EC is a viable construct for explaining advertising effects outside the lab.

Attention to graphemes in grapheme-color synesthesia

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Grapheme-color synesthesia is a rare perceptual phenomenon where written letters or numbers induce sensations of color. Using EEG alpha oscillations (9-11 Hz) and a spatial priming task, we investigated whether color-inducing graphemes attract attention in synesthetes. The participants saw color-inducing or real-colored graphemes in either the left or the right visual

field and performed an orientation judgment on a Gabor patch that was subsequently presented at the same or the opposite location. Achromatic non-color inducing graphemes were shown as a baseline condition. Responses to both real-colored graphemes and color-inducing graphemes were faster than those in the baseline task. Color-inducing graphemes, but not real-colored graphemes induced an asymmetric pattern of alpha activity, with a relative power decrease in left posterior areas and a corresponding increase over right posterior sites. The asymmetry did not depend on the presentation location of the grapheme. We discuss the alpha power modulations in the context of spatial shifts of attention.

Emotions and words: An embodied approach to the representation of abstract words

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Background: Recent embodied cognition studies support a link between the comprehending of concrete or action words and body movements and states. Findings concerning abstract words, the referents of which cannot be perceived by our senses, are less clear. The present study examined the influence of induced emotional states on the processing and representation of abstract words. Method: A lexical decision task was combined with affective picture priming. 40 German nouns and 40 pseudo-words were taken from the database provided by Lahl, Göritz, Pietrowsky, and Rosenberg (2009). They were randomly presented to 24 healthy adults. Each stimulus followed a picture prime which was a photo of either a happy or a sad face from the Karolinska database (Lundqvist, Flykt, & Öhman, 1998) or a neutral pattern. Words differed in their rated valence and concreteness, leading to four different categories: positive-abstract, positive-concrete, negative-abstract and negative-concrete. The groups were matched for frequency, length and rated arousal. An interleaved picture evaluation task ensured attention to the emotional content of the picture primes. Results and Discussion: For abstract but not concrete words, decisions were facilitated when emotional content of prime and target were congruent. Furthermore, effects established in previous research could be replicated, such as processing advantages for positive and concrete words. These results confirm an involvement of emotional states in the comprehension of abstract words.

New exposition data on drivers' secondary task occupation at red lights and in free flow traffic in three German cities

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While conversing on the telephone was a common secondary task while driving in 2009, this might have changed over the last years as it has in general communication behavior. Interaction with telecommunication devices has been shown to severely interfere with the driving task. Drivers have been observed to compensate for possible dangers in driving simulator studies by

timing their secondary tasks to less critical situations. Aim of the present study was, on the one hand, to evaluate, if drivers do compensate by doing more tasks while waiting at red lights at intersections compared to free flow traffic. On the other hand, the relative amount of texting and conversing on the telephone while driving was observed. At four signaled intersections and six comparable sites with free flowing traffic in three German cities (Braunschweig, Hannover, 2x Berlin), more than 7000 observations were made. Secondary task occupation, the relative amount of texting and observed compensation strategies will be presented.

Emotional information processing in memory predictions

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Research: There´ve been some theories which explain the influence of emotional information on memory, but little is known about how emotion affects the monitoring of learning in a meta-level. Current experimental work highlights the robust effects of emotion in metacognitive judgments, in the way that it leads to enhanced memory predictions. Method: In a cued-recall paradigm, 45 students (M=25, SD=4.4) were presented with 60 word pairs blocked in three emotional categories (positive, negative, and neutral words) and selected from the Berlin-Affective-Word-List. To control for arousal and emotional state and trait parameter, physiological measures as well as self-report questionnaire data have been raised. Results: An emotionality (positive, negative, neutral) x Measure (JOL, Recall) repeated-measures ANOVA revealed a significant 2-way interaction, $F(2,45)=6.8$, $p<.01$, $\eta^2 = .14$. Participants were overconfident in their memory for positive ($t(44) = 3.7$, $p<.01$) and negative words ($t(44) =4.9$, $p<.01$), but not for neutral words. The JOL resolution was above chance and did not differ based on emotionality ($M = .35$ for emotional, and $M = .45$ for neutral words, $t(42) = 1.4$, $p>.05$). Against the emotional-salience-effect, cued recall was not better for emotional words relative to neutral words. The study provides evidence that immediate cued recall reveals an overconfidence in memory predictions (JOLs) and a memory disadvantage for emotional words.

Pattern matters in interior space perception

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In the field of visual optical illusions, it is a well-known phenomenon that the perceived spatial extent of a given object is influenced by the texture of the object's surface. For example, in the Helmholtz-square, a black and white striped square appears larger in the direction perpendicular to the orientation of the pattern, while compressed in the direction parallel to the stripes' orientation. But can one transfer the effects of stripe orientation observed for the Helmholtz-square to the perceived extent of larger surfaces such as the walls of interior spaces? In his 1867 book, von Helmholtz suggests that this is the case. However, we challenge this view.

We conducted a series of experiments in which we presented striped wall patterns and varied the orientation of the stripes (horizontal versus vertical) and their spatial frequency (number of stripes per degree of viewing angle). Subjects estimated the width and height of stereoscopically presented virtual interior spaces. Our results show strong effects of the spatial frequency of the striped pattern, but virtually no effects of pattern orientation.

Framing information as social influences information search and choice in probabilistic inference tasks

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When making decisions, people are often exposed to relevant information stemming from qualitatively different sources. For instance, when making a choice between two alternatives, people can consider factual information about the alternatives (i.e. non-social information) and rely on advice from other people (i.e. social information). Prior research in categorization has shown that when both social and non-social information were available, social information — but not non-social information — was considered even when it did not have any informational value. The goal of the current work was to investigate whether framing information as social or non-social information would also influence information search and choice in probabilistic inference tasks. In a first study, we found that framing medium validity cues as social information increased the probability that they were looked up compared to a task where the same cues were framed as non-social information. A second study showed that framing a high validity cue as social information led to a more focused search and facilitated decision making in a non-compensatory environment. Taken together, these results suggest that when information from social and non-social sources is available, social cues are given more weight and are faster learned than non-social cues.

Subjective risk perception in urban cycling: Assessing the validity of opinion-based Volunteered Geographic Information

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The increasing number of opportunities to collect Volunteered Geographic Information (VGI) creates new means to plan, manage and improve our cities. However, utilisation of VGI in urban planning and policy making is slow, mainly due to controversies surrounding its reliability and validity. This is particularly true for the case of opinion-based VGI, where citizens' contribution cannot be matched against an objective ground-truth, such as in the case of perceived cycling risks. We took a first step towards a framework for validating VGI contributions based on a data set collected by a major German newspaper in the city of Munich. Respondents were invited to mark and textually describe locations considered dangerous for cycling on an online map of

their city. They were also able to confirm already existing contributions. In a recent exploratory study, we investigated whether the comments contributed online and anonymously were comprehensible and reproducible in a more controlled lab-setting. A 360-degree panoramic view of a sample of 19 locations was sourced from Google Street View and presented through a head-mounted display (an Occulus Rift 2). Participants were asked to rate the subjective risk associated with the given location as well as grade their agreement with the original VGI contribution. The main focus of the analysis is the level of agreement of participants with the original VGI contribution and its number of online confirmations. Furthermore, the results are analyzed with respect to the viewing behaviour of the participants and spatial complexity of the area visible from the respective VGI contribution. Our analyses will provide insight to which degree contributions of VGI projects are valid (and thus for example useful for urban planning), and which factors can impair the validity of individual contributions. Furthermore, potential connections to more objective indicators of risk (e.g., accident statistics) are discussed.

Systematic logical inclusion fallacies within single polytomous dimensions

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The discussion of conjunction fallacies or, more generally, inclusion fallacies (IFs) is usually limited to dyadic relationships with dichotomous events. One rational approach predicting IFs is based on pattern probabilities which supplement standard relative frequencies (e.g., von Sydow, 2011). These subjective probabilities treat logical patterns as explanans given some data (the explanandum). We here address the perhaps even more basic issue of probability judgments concerning nested hypotheses that are composed out of mutually exclusive classes on a single polytomous dimension. On the theoretical side we present a variant of Bayesian logic (BL) applicable to probability judgment about predications in such a domain. The two reported frequency-based experiments with transparent set inclusion and clearly formulated hypotheses use material from the prominent Linda tasks (one experiment is concerned with jobs, the other with political attitude). Additionally, the experiments explore the ordinary language connective 'AND' either interpreted as logical conjunction or as sum of classes (cf. Hertwig, Benz & Krauss, 2008). The results of the experiments suggest that both interpretations can indeed be elicited in a systematic way. However, the results additionally corroborate systematic occurrences of IFs even in the simple one-dimensional structures. As predicted, the results show substantial deviations from standard extensional probability and they suggest that a pattern approach, like the one formalized by BL, plays a crucial role in explaining an important class of IFs. Even though we concede the plausibility of other causes of conjunction fallacies as well, our findings rule out several other explanations of CFs here. They are, for example, at odds with a confirmation account of inclusion fallacies. Interestingly, polytomous BL stresses more directly that intensional (pattern) probabilities should depend on the representation of subclasses.

Enhancement of tactile signals during reaching

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The perception of tactile stimuli that are presented on a moving hand is systematically suppressed. This is most likely caused due to our brain predicting the sensory consequences of the planned movement and cancelling out the expected incoming signals. Here, we examined whether tactile signals can also be enhanced if they are relevant for the task. We asked participants to reach towards either a visual (LED) or proprioceptive target (thumb and index finger of their unseen stationary hand) and to discriminate two tactile stimuli that were simultaneously presented on their digits: a reference stimulus on the little finger of their stationary hand and a comparison stimulus on the index finger of their moving hand. As expected, the tactile stimulus on the moving hand was strongly suppressed during movement, as reflected by the increased points-of-subjective-equality (PSE) and just-noticeable-differences (JND). Importantly, the suppression was stronger when participants reached towards the proprioceptive than the visual target, presumably because they enhanced the sensation on their target hand and thus the reference stimulus was perceived as stronger than it actually was. In a second experiment, the reference stimulus was presented on a location irrelevant for the task (sternum). We found no differences in the strength of tactile suppression between reaching to proprioceptive and visual targets. This supports the assumption that participants enhanced the sensation of the reference stimulus in the proprioceptive condition of the first experiment. Therefore, stimuli on the moving hand needed to be much stronger in order to be perceived as equally strong as the reference. This novel finding suggests that tactile perception is not only suppressed due to movement, but can also be enhanced if it is beneficial for the task.

Testing models of peripheral encoding using metamerism in an oddity paradigm

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Most of the visual field is peripheral, and, compared to the fovea, the periphery encodes visual input with less fidelity. What information is encoded and what is lost in the visual periphery? A systematic way to answer this question is to determine how sensitive the visual system is to different kinds of lossy image perturbations. A difficulty of this approach is that in addition to information loss in the visual system, there are other factors that can reduce performance in behavioural experiments; for example, task performance may be limited by cognitive factors such as attention or memory. Here, we develop and explore an experimental paradigm that probes the detectability of perturbations of natural image structure with high sensitivity. Observers compared modified images to original natural scenes in a temporal three-interval oddity task. We consider several lossy image transformations, including Gaussian blur and textures synthesised from the Portilla and Simoncelli algorithm. While our paradigm demonstrates metamerism (physically different images that appear the same) under some conditions, in general we find that contrary to an extreme "lossy representation" account of

peripheral encoding, humans can be capable of impressive sensitivity to deviations from natural appearance. The results force us to consider richer representations of peripheral image structure.

The role of ambiguity in the perception of aesthetic language: A proverb study

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Recent research on aesthetic features in proverbs has shown that the presence of those features was detrimental for semantic ease of comprehension in reading. Participants read different versions of the same proverbs that either contained two kinds of aesthetic features (rhyme, brevias/meter), only rhyme, only brevias/meter, or were fully de-rhetorized. After reading each proverb, participants rated the proverbs with regard to comprehensibility. Results showed that proverbs that contained both kinds of features (i.e., rhyme AND brevias/meter) where more difficult to comprehend, but there was no graded effect on comprehensibility when only rhyme or only brevias/meter was present. In the present study, we used the same proverbs to extend the above-summarized findings: 1. In addition to rate proverbs with regard to comprehensibility, participants also rated proverbs on ambiguity, as ambiguity has been hypothesized to be the core aspect of semantic ease of comprehension that is affected by aesthetic language-features. 2. We used a self-paced reading task to present the proverbs to collect reading process data in addition to rating data. N=20 participants read all four versions of each proverb in randomized blocks, 120 proverbs in total. The results showed that ambiguity provided a more sensitive scale for ease of semantic comprehension compared to comprehensibility, as ambiguity ratings also revealed a genuine main effect of the brevias/meter feature, which was absent in the comprehensibility ratings. With regard to reading time measures, we observed that the presence of aesthetic features in proverbs lead to longer average word reading times. Moreover, ambiguity ratings turned out to be a significant predictor of reading times, and superior to comprehensibility ratings. This suggests that presence of aesthetic features in written language specifically increase the interpretative possibilities for readers, but do not generally make language harder to comprehend.

Temporal structure in reading times predicts switching between different reading tasks - An inquiry into the language game hypothesis (LGH) of reading

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The present research investigates the language game hypothesis (LGH) of reading. A central tenet of LGH is that reading is rule-abiding cognitive activity, and that the degree of rule-abidingness in reading can serve as a metric to distinguish between different reading tasks. Rule-abidingness can be operationalized by the quantification of temporal structure in

time-series, for example using Recurrence Quantification Analysis (RQA). To test whether temporal structure distinguishes between different reading tasks, three studies were conducted. All text materials were English. Reading times were measured by button presses. Participants in studies 1 and 2 were native English speakers, participants in study 3 were non-natives. Study 1: N=10 participants read a text of 1100 words and another n=10 participants read a list of random words. Results showed that the degree of temporal structure in word reading times during text reading was higher compared to reading times during random word list reading. Study 2 tested a more specific prediction of LGH, namely that changes in the degree of temporal structure are predictive of switches between different reading tasks. N=30 participants read again a text of 1100 words, but half-way during the reading, the ordered text switched to a random word list or vice versa. Results showed that when participants transit from ordered text to random word list reading (or vice versa), a phase-transition in reading times occurred with a loss of temporal structure around the transition point from one reading task to the other. Study 3 replicated these results with non-native speakers of English. The three studies provide first evidence for LGH, showing that measures of temporal structure can distinguish between different kinds of reading tasks, and that changes in the degree of temporal structure predict switches between tasks. This effect was also observed in non-native speakers, indicating that it might be invariant across different languages.

Effects of age and cognitive control availability on deactivation of completed intentions

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Several times throughout a day, we form intentions that are postponed until the right circumstances are met to perform them (prospective memory, PM cue). Surprisingly, intentions are not always directly deactivated after intention completion, but they entail aftereffects in terms of slower ongoing-task performance and/or commission errors on repeated (no longer relevant) PM trials. If completed intention representations do initially persist activated, how does our cognitive system ultimately deactivate them? To date, little is known about the mechanisms underlying intention deactivation. Preliminary evidence suggests that – at least for older adults – failures of intention deactivation might be linked to deficits in cognitive control functions. In order to investigate the role of cognitive control availability during intention deactivation, we manipulated control demands via conflict strength during the processing of no longer relevant PM cues using the Majority Function Task (Fan, Guise, Liu, & Wang, 2008). If availability of cognitive control was crucial for successful intention deactivation, aftereffects of completed intentions should be most pronounced under high cognitive control demands. These effects should be even stronger for older compared to younger adults. Contrary to hypotheses, we found comparable aftereffects of completed intentions for younger and older adults. Importantly, first testing revealed that aftereffects increased from low-conflict to high-conflict trials, which suggests that intention deactivation relies upon availability of cognitive control.

The pupil light reflex: The other direction of the pupillary response

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Hearing impairment is associated with increased level of stress and need for recovery. The autonomic nervous system has a direct role in the physical response to stress, while observation of pupil dilation has been used to evaluate sympathetic function in people with normal and impaired hearing for years. A reliable method is needed to better assess the parasympathetic activity of people with hearing impairment. Measurement of the pupil light reflex could be an ideal method to achieve this goal. The purpose of the current study is to find the possible connection between hearing impairment and changes in the parasympathetic nervous system as reflected by the pupil light reflex. I will review the facts that pupil light reflex being tested in detecting parasympathetic related diseases, as well as the recent development of its usage in cognitive studies. Results from my experiment where pupil light reflex was tested as a metric to differentiate people with and without hearing impairment will be presented.

The effect of atomoxetine on random and directed exploration in humans

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The explore-exploit dilemma refers to the question of whether it is better to stick with a known quantity, or explore unknown options that may yield less or more value. Two strategies for solving this dilemma are directed exploration and random exploration. Directed exploration involves computationally-demanding consideration of the value of exploring at any given time, whereas random exploration simply relies on a portion of random choices to discover valuable options. Random exploration may be governed by baseline norepinephrine (NE) levels, with higher NE levels increasing response variability. We pharmacologically manipulated baseline NE levels with atomoxetine, and examined the effect on exploration using a specially designed task that allows extraction of independent random -and directed- exploration indices. At the group level, treatment did not affect either form of exploration. However, we anticipated that any treatment effects might be subtle, due to the modest dose and the timing of the task relative to the time of treatment. Therefore, we obtained salivary cortisol samples as a method of indirectly assessing the strength of the treatment effect in each subject at the time of task performance. This measure correlated with random exploration in several task conditions: participants who showed the most positive treatment-induced change in salivary cortisol showed the largest treatment-related increase in random exploration. In contrast, salivary cortisol did not predict treatment effects on directed exploration. We cautiously interpret this as evidence that baseline NE levels regulate the degree of random but not directed exploration.

Please don't care about the sound: Inhibition of reactions to sounds measured by an auditory Go/NoGo paradigm

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In everyday life, people are confronted with visual and acoustic cues and have to react to them or to inhibit a reaction. Experimental Go/NoGo tasks with visual stimuli are frequently used to measure attention and inhibition abilities. Nevertheless, many everyday situations involve auditory signals, where persons have to initiate a behavior while reactions to other auditory cues have to be inhibited. The aims of the current study (N = 106) were (1) to test an auditory Go/NoGo paradigm and to describe participants' performance, (2) to examine convergent validity by analyzing the relation with neuropsychological tasks assessing attention, inhibition, and further executive functions, as well as (3) to analyze ecological validity by correlating task performance with self-reported impulsivity. We found that the participants could distinguish between different sounds and react or inhibit if necessary. Secondly, we also found theoretically plausible correlations between the auditory Go/NoGo performance and the Color Word Interference Test, the Trail Making Test, and the Modified Card Sorting Test. However, there were no significant correlations with the self-reported impulsivity. Based on our findings, we conclude: First, our findings suggest that the adaption of the Go/NoGo paradigm with auditory cues was successful. Regarding the second aim, correlations with neuropsychological tasks indicate the association of the Go/NoGo paradigm with attention and inhibition capabilities which is in line with other results using a version with visual stimuli. In contrast to our assumptions, there were no relations to self-reported impulsive behavior. In future research, the auditory Go/NoGo paradigm may be used in experimental studies to address cognitive control impairments potentially exclusive to particular auditory cues relevant to psychological disorders.

Temporal stability of attention capture effects measuring manual responses and eye movements

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Visual attention can be captured either in a bottom-up way by the properties of an object, or in a top-down manner depending on the goal of the observer. Such attention capture has been shown by a large amount of research using mostly reaction time measurements of manual responses but also eye movement parameters. Despite this, little is known about an individual's temporal stability of such effects. In order to analyze temporal stability of bottom-up versus top-down attention capture, we used a visual search paradigm. Participants had to search for a color-defined target and report a stimulus inside the target. Top-down matching distractors had the same color as the searched-for target; non-matching distractors had a different color than the target. In addition, we used trials with a color-singleton target including no distractor. Bottom-up capture was reflected in a difference between trials with a non-matching distractor

and trials without a distractor. Top-down capture was reflected in a difference between trials with a matching distractor and trials with a non-matching distractor. For instance, manual reaction times and target fixation latencies were fastest for trials without a distractor and slowest for trials with a matching distractor, with a significant difference between matching-distractor and non-matching-distractor trials. Furthermore, our results suggest that bottom-up as well as top-down attention capture effects are stable across time with one week or four weeks intervals.

Taxing the taxonomy of Dehaene et al. (2006) - Identifying the subliminal, preconscious, and conscious thresholds of visual perception in a complex, real-world task

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The present study investigates the role of instructions on the subliminal, preconscious, and conscious processing of visual information (and their thresholds), as proposed by Dehaene et al. (2006) in a real-world task. Facing a penalty kick situation, participants viewed a goalkeeper that was standing either in the exact middle of the goal or being displaced by different distances to the left or right. In Experiment 1, participants indicated the greater goal side (attention directed toward the relevant stimulus) at above chance-level already for small displacements of 0.1%, hinting at the subliminal perception of the true goalkeeper position. In Experiment 2, participants chose the greater goal side at above chance-level for small displacements of 0.2%, when they were not aware of the displacement (attention directed away from the relevant stimulus), signaling effective preconscious stimulus processing. Together, these findings provide evidence for different modes of information processing during soccer penalty kicking.

The role of episodic memory in illusory correlation – Evidence for the distinctiveness account

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Our social world is composed of many groups of varying sizes and desirable behavior is, in general, more prevalent than negative behavior. In this context, illusory correlation (IC) refers to the phenomenon that people tend to associate majorities with desirable behavior and minorities with undesirable behavior, even though group membership and behavior might actually not correlate. The heightened accessibility of distinctive group-behavior combinations in episodic memory like minority members behaving undesirably is assumed to result in ICs. The so far accumulated empirical evidence for this account is, however, equivocal. In our online questionnaire study, we sought to clarify the role of episodic memory in the generation of ICs, using an optimized methodological approach that took primacy and recency effects into account. In order to reduce the impact of response bias, the frequency of items from the majority, minority, and novel distractors in the source memory task were equated and unbiased

hit rates were calculated as measures of source memory accuracy. Evaluative trait ratings for the minority were less favorable than for the majority and the frequency of negative behavior of the minority was overestimated, thus indicating that the online questionnaire successfully induced an illusory correlation. As predicted by the distinctiveness account, source memory for negative behavior of the minority was elevated as compared to positive behavior of the minority even after controlling for response bias via unbiased hit rates. Furthermore, source memory for positive behavior of the majority was also elevated as compared to negative behavior of the majority. These findings corroborate the claim that heightened availability of distinctive group-behavior combinations generates illusory correlations.

SNARC meets SPARC in the MRI – Interdependence of compatibility effects depends on the semantic content

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Stimulus-Response-Compatibility (SRC) plays a major role in choice-reaction tasks. In specific cases, SRC leads to phenomena, such as the Spatial Numerical Association of Response Codes (SNARC, number processing) or the Spatial Pitch Association of Response Codes (SPARC, pitch processing) effect. In these compatibility effects, small numbers or low pitches lead to faster responses with the left hand, whereas large numbers or high pitches lead to faster responses with the right hand. We investigated the combination of SNARC and SPARC in one and the same stimulus: numbers spoken in different pitch heights. In a previous behavioral study, results point to an automaticity of both effects. To investigate the nature of the super-additive interaction in the behavioral study, we measured the neural activity during magnitude judgment in an event-related fMRI study. Additionally to the numerical condition (number words), we included a categorical condition ("small" and "large") as variation of stimulus type. Behavioral results confirmed the super-additive pattern for numerical stimuli. In contrast, categorical stimuli showed a congruency effect for SNARC and SPARC compatibility and generally slower responses. The fMRI results show that categorical stimuli led to higher activity in the medial temporal gyrus, which is responsible for semantic processing. Further, the bilateral auditory cortex shows a threefold interaction between Stimulus Type, SNARC and SPARC compatibility, with different congruency patterns for numerical and categorical stimuli, but still in line with the behavioral data. We conclude that interdependency between SNARC and SPARC compatibility effects, and therefore automaticity, depends on the semantic content of the stimuli.

Two-faced morality: Distrust increases flexibility of moral judgments

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Experiences of trust and distrust pervade our social interactions. A distrust mindset shapes information processing in a way that enables individuals to deal with situations where appearances cannot be taken at face value and ostensible facts must be questioned. Distrust hence not only induces non-routine information processing, but also enhances creativity and cognitive flexibility. Creativity has been linked to the rationalization of one's unethical behaviors and thus increased cheating. Similarly, cognitive flexibility fosters moral hypocrisy, that is, the endorsement of different moral standards for the self compared to other persons. Therefore, we hypothesized that distrust, compared to trust, would increase flexibility of moral judgments. In particular, distrust should promote moral hypocrisy. Three studies (N = 742) investigated these predictions. Study 1 established a positive relationship between dispositional distrust and moral flexibility. In two experimental studies with a 2 x 2 between-subjects design, participants were asked to imagine or recall a situation in which they either trusted or distrusted another person. Subsequently, participants judged various moral transgressions that were framed to be committed either by themselves or by other persons. We found significant interaction effects, indicating that distrustful participants judged moral transgressions less severely for themselves than for other persons, whereas trustful participants did not show a hypocrisy effect. This pattern also emerged for targets that were unrelated to the initial experience of trust or distrust (Study 3). The findings suggest that individuals who distrust other persons are themselves rather flexible in their moral judgments, applying double moral standards.

Was it me? – Filling the interval between actions and effects increases agency but not sensory attenuation

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Sensory stimuli resulting from one's own actions are perceptually attenuated compared to identical but externally generated ones, thus enabling the organism to discriminate between self-initiated events and events caused by the environment. Sensory attenuation therefore seems to strengthen a sense of agency for action effects, though the precise relation of both phenomena is insufficiently understood at present. We therefore measured attenuation of the event-related potential (ERP) to self-generated sounds and following judgments of agency while systematically varying the relation between a button-press action and a following sound effect in different blocks of trials. That is: Each button press triggered a tone either immediately, after a delay of two seconds or after a delay of two seconds which was filled with an animated visual stimulus. These active conditions were contrasted with a passive condition with participants listening to the same sound without action. P2 amplitudes of the ERP were significantly attenuated when the tone was triggered immediately compared to all other conditions, whereas the P2 amplitudes of both delayed conditions were not attenuated compared to the

passive condition and there was no effect of the filler animation on the P2. This indicates that the predicted sensory feedback decays after a while. Agency also was highest when actions were immediately followed by the tone, but still present in the delay conditions. Judgments of agency further differed between both delay conditions with higher ratings for filled than for unfilled intervals. These findings demonstrate a partial dissociation of sensory attenuation and sense of agency, suggesting a strong contribution of predictive mechanisms to the former effect and an additional contribution of postdictive mechanisms to the latter.

Task-specific preparation of attentional set and of task sequence-specific adjustment of response caution

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Choice reaction tasks that involve multi-element stimuli may be associated with differing demands of attentional selection. We investigated the management of task-specific sets of attention in such situations by asking participants to switch between a selective attention task, in which a centrally presented target letter was flanked by two instances a distractor letter (i.e. Eriksen flanker task), and a task necessitating a comparison of all the letters in a display (i.e., same/different task). The tasks were indicated by a cue that preceded the imperative stimulus by 800 ms. Attentional set was assessed by intermixing trials of a visual search task randomly after both Eriksen task cues and same/different task cues (i.e. invalid cuing). In the search task, a prespecified target digit occurred randomly in any of the three locations used for the presentation of letters in the letter tasks. Search task trials cued as Eriksen flanker task displayed a more pronounced center-to-periphery gradient of search times, indicating the adoption of a narrower focus of visual attention, than search task trials cued as same-different task. By contrast, the search time pattern was unaffected by the type of task (i.e., Eriksen or same/different) executed on the directly preceding trial, suggesting that task-specific attentional sets were effectively overwritten during preparation for the following trial. However, the type of the previously executed task interacted with the type of the cued task, yielding faster and more error prone performance in the search task after a cue indicating a task repetition than after a cue indicating a task switch. These results demonstrate task-specific preparation of the set of visual attention appropriate for the anticipated task, as well as the adoption of a more liberal response criterion, when preparing for a task repetition than for a task switch.

The role of instructions in learning-based reconfiguration of task sets

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Previous research indicates that instructed task rules determine how humans represent and

perform a task. Moreover, instructed task sets seem to shield goal-directed performance from distracting influences. In the present study we investigated whether this “stabilizing function” of instructions hinders or even prevents incidental learning and use of regularities not mentioned by instructions, compared to situations in which task sets are established by trial-and-error learning. We used a global-local paradigm that required responding to the identity of local target letters embedded in global letters not in the target set. We compared conditions in which participants received S-R mapping instructions with conditions in which they had to find the (same) rules by trial and error. After establishing the task set, people were exposed to incidental learning blocks in which irrelevant global letter identity covaried with the required response. Incidental learning and use of irrelevant global letter identity was measured by way of global-local deviants. Participants in the instructed conditions showed less evidence for learning-based use of global letter identity for responding than participants in the rule finding conditions, indicating that instructions aggravate mental set effects and indeed hinder incidental learning and use of task-irrelevant regularities.

“You are not supposed to see this” - How information about non-consensual distribution affects picture perception

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The exchange of intimate photos has become more and more common over the past decade, fueled by extended media use. One downside of this media usage is the distribution of such photos to unintended audiences. Although the pictures circulated do not always contain explicit material, they attract attention, which may lead to negative consequences for those shown in the images. One reason, these photos attract attention, may be driven by the knowledge of viewing something intended to be kept private. In this study we investigate how the knowledge about the consensual (active) or non-consensual (passive) distribution affects the perception of intimate pictures by others. We created a picture set containing 16 images of men and women posing in underwear while having all sexual characteristics covered. Participants were randomly assigned to two conditions. One group was informed that the depicted person herself distributed the picture. The other group was informed that the images were distributed without the consent of the person shown. Both groups saw the same pictures: first in a free-viewing condition, second to rate attractiveness and third to rate how intimate they considered the picture and how uncomfortable distribution would be for the depicted person. Eye movements were measured throughout picture presentation. Additionally, participants completed questionnaires on rape-myth-acceptance and other-objectification and pornography consumption. We expect participants in the passive condition to objectify the depicted people more and investigate how this is linked to eye movements and the other ratings. Furthermore, gender differences are expected. Preliminary results will be presented and discussed.

Do episodic examples facilitate mapping and transfer in analogical problem solving?

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The need for programming skills is increasing in the field of psychology, starting with configuring online surveys, programming experiments and analyzing huge data sets resulting from physiological data (e.g. functional magnetic resonance imaging). A behavior which can be observed while teaching to program is that novices often solve programming tasks by trying to use previously used examples (episodic examples) or similar ones (Weber, 1994). The related psychological paradigms to this behavior are analogical problem solving and case-based reasoning. Common models of analogical problem solving emphasize the structural features of the analog while superficial features are neglected or play a minor role. The present experimental study focused on the episodic features of examples, and how they foster novices in the process of solving programming tasks. For that purpose the participants (N=36) in this study learned the statistical programming language R in a first session. In a second session a week later, a random set of both episodic and structural equivalent (isomorphic) examples were presented as hints to solve five programming tasks. For each task the quality of analogical mapping and transfer, the transfer performance, and the activation of explicit knowledge was measured. The quality of analogical mapping and transfer was operationalized as a ratio of correct code fragments while the time to solve a task was used as a measurement for the transfer performance. The activation of explicit knowledge was tested by five sets of multiple choice questions after each programming task. Results indicated that episodic examples as hints have no statistical significant difference on mapping and transfer as its isomorphic equivalents. These results indicate a higher influence of structural features than the influence of superficial features. In addition, methodical issues concerning the study design and operationalization and its implication for further research were discussed.

Crossmodal negative priming

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Participants` responses are impaired when, in a sequence of two displays (i.e., the prime followed by the probe) each comprising a target and a distractor stimulus, the prime distractor is repeated as the probe target. This phenomenon is referred to as negative priming (NP). NP is well-established in vision, audition, and touch. That is, the requirement to respond to stimulus features that correspond to a previously-ignored representation of the same stimulus features harms performance. To address whether the representations involved are modality-specific versus amodal, it is crucial to test whether NP can also be observed across modalities. To this end, we conducted an NP experiment using rhythms as stimuli. Rhythms (i.e., temporal patterns) allow exactly the same stimulus information to be delivered to the participants` ears and hands. Thus, this variant of the NP paradigm enabled us to investigate genuinely crossmodal NP. We observed crossmodal NP effects, indicating that the ignoring of a stimulus is

not completely modality-specific but may operate on an amodal stage of information processing.

Impact factors on the evaluation of news articles: An emotion-based account

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Based on an emotion-oriented theoretical account on media perception, this experiment examined factors triggering suspense while reading news and how this is related to news evaluation. Knobloch-Westerwick and Keplinger (2007) found that the affective disposition toward main characters and the perceived likelihood of a negative outcome increased the experienced suspense during reading that, in turn, increased the liking of the news content and the lingering interest in the topic. We replicated and extended this study by using a 2x2x2 between-subject design. We systematically varied the perceived likelihood of a bad ending (high vs. low) and the affective disposition toward the main character (positive vs. negative). In addition to these factors already investigated in the original study, we also varied the personal relevance of the news content (high vs. low). We hypothesized that a high likelihood of a bad ending increases the liking of the news only if the personal relevance is low. 551 participants were randomly assigned to one out of eight groups and read two news articles differing regarding the three factors. They rated their experienced suspense, the liking of the main character and of the news itself, the likelihood of a bad ending, and their lingering interest in the topic. We replicated the central findings reported in the original study, but we did not find an effect of the perceived likelihood of a bad ending on suspense experiences. Importantly, personally relevant news lead to a higher liking of the news, independent of its valence; that is, we did not find the expected interaction between personal relevance and the likelihood of a bad ending. Also, personal relevance increased the lingering interest in the news topic when the likelihood of a bad ending was low, but not when it was high. We conclude that besides experienced suspense, the personal relevance of the news content is a significant contributor to news evaluation.

Verbal facilitation effect instead of verbal overshadowing in young children

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The “verbal overshadowing effect” refers to the phenomenon that the verbal description of unfamiliar faces can impair later recognition of these faces. So far, research on eye witness memory and verbalization has focused on older children and adults. The aim of the current study was to examine whether a verbal overshadowing effect occurs in 4- to 6-year olds, too, and whether visualization (i.e., drawing the seen face) might elicit a visual overshadowing effect. Instead of a verbal overshadowing effect, a verbal facilitation effect was observed in

children. Moreover, verbal intelligence was a significant predictor for recognition accuracy in the verbalization group but not in the control group. No effect of visualization was revealed on recognition accuracy.

Mirror, mirror on the wall - The impact of mediated attractiveness priming on individuals' self-esteem

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Not only does physical appearance represent a fundamental cue for social perception processes, but also acts as an impulse for personal self-reflection in terms of social comparison. With this in mind, media characters provide diverse reference points which are involuntarily utilized to adjust one's self-attributed capabilities upwards or downwards. Since media personae oftentimes can be characterized as supernormal with respect to excessively pronounced individual characteristics, such comparisons might elicit serious consequences. Drawing from vast literature on the overrepresentation of overly attractive personae apparently causing problematic effects on an individual's body image, we conducted a study with 86 mainly student participants (f = 65, age M = 22.26 years, SD = 2.63) on short-term priming effects including commercial photos of – according to common social standards – highly attractive and unattractive persons as a between-subject factor as well as time of measurement as a within-subject factor. After controlling for interindividual differences in trait self-esteem and narcissistic tendencies, results demonstrated a medium-sized interaction effect concerning participants' physical self-esteem ($F (1,82) = 5.91$, $p = .02$, $\eta^2 = .07$) with higher values after exposure to unattractive media personae ($t (39) = –2.47$, $p = .02$) and slightly lower values after exposure to highly attractive stimuli ($t (45) = 0.88$, $p = .38$). Interestingly, no effects were found with regard to their general state self-esteem ($F (1,82) = 0.00$, $p = .99$) or self-evaluated physical characteristics ($F (1,82) = 0.12$, $p = .73$). These findings point towards more complex mechanisms behind self-related media priming processes. Thus, attractiveness priming affects individuals' self-conceptions domain-contingently with subtle distinctions between absolute and relative physical appeal. Furthermore, results indicate different reference values between attractive and unattractive media personae.

"Attention! Stop!" – Drivers' reactions upon a multi stage warning system for urban areas

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Warning drivers optimally in critical situations may increase traffic safety. Yet, especially in urban areas such situations show various characteristics and criticalities, with all kinds of road users (e.g., pedestrians, bicyclists) interacting and different driver reactions becoming necessary. Therefore, in the research project UR:BAN a multi stage warning system was

developed, to enable drivers to prevent accidents. Situation adaptive, this warning system is to elicit a moderate deceleration in less critical situations by presenting drivers with a warning (first warning stage), yet an emergency brake upon receiving an acute warning (second warning stage) in very critical situations or ones that escalated despite the warning. A driving simulator study investigated how well drivers differentiate between both warning stages and to what extent this has to be learned. The driving behavior of 24 drivers (M = 26.8 years, SD = 8.2 years) was analyzed in eight critical urban situations over four learning phases as well as subjective ratings of the system. The driving behavior showed that learning is not necessarily required and drivers can differentiate well between both warning stages according to the driving and subjective data. Thus, this multi stage warning system seems promising for future driver assistance in urban areas.

Looking for trouble, then looking for cops: Rule-violations sensitize towards authority-related stimuli

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Rule violations have usually been studied from a third-person perspective, identifying situational factors that make violations more or less likely. A first-person perspective of the agent that actively violates the rules, on the other hand, is only just beginning to emerge. Here, we show that committing a rule violation sensitizes towards subsequent negative stimuli as well as subsequent authority-related stimuli. In a Prime-Probe design, we used a rule violation task as the Prime and a word categorization as the Probe. Also, we employed a control condition that used a rule inversion task as the Prime (instead of rule violation). Targets were categorized faster after a violation than after a rule-based response if they related to either negative valence or authority. Inversions, however, primed only negative stimuli and did not accelerate the categorization of authority-related stimuli. A heightened sensitivity towards authority-related targets thus seems to be specific to rule violations. Therefore, we propose that rule violations include an authority-related component that makes rule violations qualitatively different from simple rule inversions.

CLT meets ACT-R: Modeling load-inducing factors in instructional design

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The introduced project sheds light on selected aspects of learners´ cognition arising from demands related to instructional situations, which are prone to induce impairing overload. A prominent theory in this context, the Cognitive Load Theory, specifies distinct factors contributing to the overall cognitive load construct. While task complexity based on learners´ previous knowledge constitutes intrinsic load, effects of inappropriate instructional

presentation add to extraneous load. Either aspect affects performance on a more structural and momentary level. By contrast, schema acquisition and automation, characterizing germane load, comprise process-related features on a longer temporal perspective. Such distinction receives support by an already conducted experimental study that varied the described load-inducing factors separately in a controlled experimental setting. Obtained results raise the important question, how load-inducing factors influence in particular the development of cognitive schemata, an essential prerequisite to successfully perform a learning task. When attempting to investigate relevant cognitive processes underlying distinct temporal models of load progression, existing approaches of load measurement like subjective questionnaires or physiological indicators face limitations in terms of accessibility or effort. Experimental manipulation provides a controlled way of assessment, although the inspection of performance-related outcome measures merely operates on indirect means as well. For this reason, a cognitive model using the cognitive architecture ACT-R holds great benefits for clarifying cognitive determinants in schema acquisition at a fine grained level, to derive predictions on load effects during this process. For the both declarative and procedural nature of cognitive schemata, it will operate on a set of vested subsymbolic mechanisms related to memory, learning and skill acquisition, e.g. production compilation, activation or reward.

Trust moderates gaze behavior – An experimental study in the field of vehicle automation

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Vehicle automation is supposed to innovate and improve driving comfort, safety and traffic efficiency in the near future. In the course of upcoming launch of automated vehicles, the characteristics of cooperation between automation and the human driver becomes more and more important. In this study, we compared the impact of different levels of parking assistance (automated parking assistant vs. park distance control) on self-estimated trust and safety, as chosen impact factors on human-machine-interaction. Furthermore, we investigated the relation between gaze behavior as objective parameter and trust. Our participants (N = 23, 4 female, 19 male) used each of the systems, which were implemented in a BMW i3, for five parallel parking maneuvers. The results showed a comparatively high initial level of trust for the automated parking assistant, which increased even further over time. However, the values of trust in the automated parking assistant stayed below the level of trust in the park distance control system regarding any point of measurement. The analysis of gaze data showed that our subjects reduced lo observe surroundings when using the automated parking assistant. We found that they focus the rear view camera display twice as long compared to the park distance control condition. Finally we discuss our findings, especially the role of experience, in a more abstract way to generalize our findings on other automation technologies.

Seeing this, hearing that – Semantic interference in picture and sound naming tasks

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The picture-word interference task is a prominent tool to study word selection in speaking. Participants name pictures, while ignoring task-irrelevant distractor words. An important finding is the semantic interference effect (Lupker, 1979): If target picture (e.g. horse) and distractor word are semantically related (e.g. dog), naming latencies are longer than if they are not related (e.g. drum). This finding has been argued to reflect competitive lexical selection processes (e.g., Levelt, Roelofs, & Meyer, 1999). However, in models assuming non-competitive selection, this semantic interference effects has been argued to reflect post-lexical control mechanisms, evoked specifically by the use of distractor words (e.g., Finkbeiner & Caramazza, 2006). In the present study we investigated whether semantic interference effects are indeed restricted to distractor words or can also be observed with non-lexical distractor stimuli. We either used natural sounds (e.g. barking) as distractors in a picture naming task or pictures as distractors in a sound naming task. In both tasks, participants responded slower when the distractor was semantically related compared to when it was unrelated to the target. The present results illustrate the feasibility of sound naming tasks (providing a novel experimental paradigm in addition to commonly used picture naming tasks) to study language production processes. Most importantly, these findings demonstrate that semantic interference effects are not limited to distractor words. This suggests that semantic interference effects reflect general semantic-lexical selection processes as proposed by language production models assuming competitive lexical selection.

Manipulation of indirect discrimination of gay men and mental health outcomes

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Background: Gay men have a higher prevalence of mental disorders than heterosexual men (King et al., 2008). What are influencing factors of this relationship? We manipulated indirect discrimination online and assessed state mental health outcomes. We predicted that discrimination predicts state mental health problems and that this relationship is mediated by stress. We further predicted that stress is moderated by identification of the gay ingroup. These hypotheses are derived from findings on discrimination and mental health in ethnic minorities (Mewes, Asbrock, & Laskawi, 2015). Method: Indirect discrimination was induced with a text about so-called “gay-bashing”, a violent form of physical discrimination. The control group read a text about cats. More than 500 gay men participated in the study. Results and Discussion: The results of the study will be presented in the Conference. The results will be discussed.

Prime competition in fast motor responses: When a second prime supersedes the first

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The method of response priming is a useful paradigm to investigate perception and attention, in particular visual processing and visuo-motor responses. In a typical response priming experiment, a participant has to respond as quickly and as accurately as possible to a target stimulus preceded by a prime. The prime and the target can either be mapped to the same response (congruent trial) or to different responses (incongruent trial).The purpose of this study is to investigate the effects of two sequential primes followed by one target in a response priming experiment. In particular, we examine whether the second prime is able to cancel response activation by the first one. Each prime can be congruent or incongruent to the target, resulting in four conditions (con-con, con-incon, incon-con, incon-incon). We designed a stimulus layout where any number of primes can be presented in sequence without mutual interference. Under the assumption that the second prime enhances the first prime (con-con or incon-incon trial) or counteracts it (con-incon or incon-con trial), the SOAs between primes 1 and 2 are equal to the SOAs between prime 2 and the target (13, 26, or 40 ms). We find that the second prime can delete effects of the first one, that with increasing SOAs the second priming effect exceeds the first one, and that in the long run the priming effect is dominated by the second prime. In accordance with rapid-chase theory, we conclude that sequences of primes lead to concomitant sequences of motor activation.

Does a bird chirp higher than he can fly? Spatial representation of pitch height during language comprehension

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The simulation account of language comprehension proposes that comprehenders mentally simulate the described objects, situations, and events when they read or listen to sentences. Comprehension is thus assumed to involve meaning representations that are similar in nature to those involved in direct experience. In the current study, we investigated this hypothesis with respect to auditory meaning aspects. Several studies investigating spatial compatibility effects in the field of physical tone perception have shown that auditory pitch height is automatically associated with an upper (high pitch) or lower (low pitch) location in vertical space. In previous studies conducted in our lab, we found such spatial compatibility effects also during the reading of sentences describing auditory events of different pitch heights (e.g., ”the bear growls deeply” or “the soprano singer sings an Aria”). In the current study, we directly compared sentences describing pitch height (‘pitch sentences’) with sentences describing the location of an object in vertical space (‘location sentences’, e.g., ”the sign hangs high/low”). Half of the sentences in both groups explicitly contained the words “high” and “low” (‘explicit’), whereas in the other half pitch height and object location was only implied (‘implicit’). Experimental sentences and

nonsense filler sentences were presented visually to the participants who performed a sensibility judgment task on a vertically mounted response apparatus. We found a significant spatial compatibility effect, which was not modified by sentence group (pitch vs. location). However, compatibility only significantly affected response latencies for explicit sentences, suggesting that the observed compatibility effects reflect word- as compared to sentence-based simulation processes. Implications for the simulations-account of comprehension will be discussed.

Interests affect cognition: Gender differences in recalling contents from action and romantic movies

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We investigated the impact of movie genre preferences on memory for movie content. Previous studies revealed that, on average, women have a stronger preference for romantic movies than men, whereas men have a stronger preference for action movies than women. Starting from this well-documented gender gap in movie preferences, we predicted that women would recall more contents from romantic movies than men, whereas men were expected to recall more contents from action movies than women. In two experiments, male and female participants watched 30-minute clips from action and romantic movies and then answered 30 questions on movie content and additional questions. We presented clips from two American movies in Experiment 1 (Die hard vs. Notting Hill), and clips from two French movies in Experiment 2 (Payoff vs. The fabulous world of Amelie). Results of both experiments showed a male advantage in recalling information from the action movie, and a female advantage in recalling information from a romantic movie. Further analyses showed that these effects were independent from participants' familiarity with the movie and not mediated by participants' liking of a particular movie. In general, the results of our study provide further evidence for an effect of (gender-related) interests on memory performance.

Measuring the (dis-)continuous mind

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According to mouse-tracking studies, curved aggregate trajectories reflect continuous and simultaneous competition between options. The assumptions underlying this conjecture, including whether the aggregate trajectory is a proper representation of trial-level trajectories, remain however inappropriately assessed. In this project, we apply a novel clustering procedure to dozens of published datasets to test the assumed homogeneity in trial-level trajectories. We find that most data sets contain, in substantial proportions, trajectory types that are inconsistent with the aggregate trajectory, as well as the idea of simultaneous and continuous

competitions, e.g., trials demarking a clear change of mind. Our results demand caution for the use of mouse-tracking as an indicator of continuous and simultaneous competition.

Effects of top-down control on feedback processing: How feedback validity influences feedback-locked event-related potentials

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The processing and evaluation of external feedback are crucial prerequisites for optimal decision-making. Therefore, these mechanisms require taking into account the reliability of feedback so that learning from potentially invalid feedback is prevented. Currently, little is known how and to which extent information about the validity of feedback affects feedback processing and evaluation. On the one hand, it seems plausible that top-down control should inhibit the utilization of potentially invalid feedback for learning. On the other hand, early reinforcement learning could be unaffected but later attentional feedback processing could be attenuated. In the present EEG study, we investigated this question by considering neural correlates of feedback processing, that is, the feedback-related negativity (FRN) and the feedback-locked P3. The aim of our study was to investigate how explicit information about feedback validity biases feedback processing and evaluation. Participants had to work through a sequential learning task, in which feedback had to be used to maximize reward. On a proportion of trials, feedback could be invalid, i.e. it provided incorrect information about the outcome of the previous decision. The proportion of invalid feedback was constant during a block but varied between blocks. We found that the amplitude of the FRN was not affected by prior information but both P3a and P3b were affected. The results indicate that processing of low validity feedback was inhibited, but this top-down effect was limited to later attentional processes, whereas early reinforcement learning remained unaffected.

Two timing mechanisms in voluntarily delayed actions: Evidence from timescale specific variability of temporal control

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Precise timing is essential for many human behaviours. While reactions operate in “real time” to process sensory information instantaneously, actions are only triggered at the “appropriate time”, being embedded in the anticipatory control. Within a variant reaction time paradigm, we required participants to react as fast as possible or act with a predefined time delay (400 - 5000 ms) to a visual target. The primary analysis included comparisons of the fits of piecewise linear models and exponential decay models to different measures for the response variability. The results showed a basic pattern: decreasing variability with increasing requested delay interval,

and greater variability for shorter delays compared to longer delays. More importantly, the piecewise linear function with a turning point around 1 sec was the best-fitting model in any analysis. We suggest that precise temporal control on actions is reached after a rather long delay, and a 'temporal marker' of 1 sec may reflect two distinct timing mechanisms underlying the ability to quantify time in milliseconds and seconds. Our results allow better insight into the reafference principle and models of human timing.

Neural bases of bistable perception in the human brain

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Ambiguous visual stimuli, and in particular binocular rivalry, provide a great experimental tool to study the neural basis of conscious vision. When viewed continuously, such stimuli cause the perceptual state of the observer to alternate between the two possible interpretations despite unchanged visual input. A great number of neuroimaging studies linked bi-stable perception to activity in lower-level sensory, but also higher-level attention-related areas of the brain such as parietal and frontal regions. In this talk, we will discuss a series of studies from our lab that used fMRI, TMS and tDCS trying to understand how different brain areas contribute to transforming the constant sensory input into a changing perceptual experience.

Perceiving attractiveness and distinctiveness in unfamiliar voices and faces

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Facial attractiveness has been linked both to the averageness (or typicality) of a face and, tentatively, to the attractiveness of the voice of the corresponding speaker. However, the relationship between vocal attractiveness and distinctiveness has not been studied before. Here, we report correlations between ratings for attractiveness and two common measures of distinctiveness ("distinctiveness-in-the-crowd" - DITC, and "deviation-based distinctiveness" - DEV) for both face photographs and voice samples from a set of 64 young adult speakers (32 female). Intriguingly, we found strong negative correlations between attractiveness and DEV, both for voices and faces, thus supporting the averageness account of attractiveness for both domains. By contrast, the correlation between attractiveness and DITC was absent for voices, and was moderately positive for faces. This strongly suggests that both measures of distinctiveness reflect different constructs. In contrast to earlier findings with smaller sets of speakers, vocal and facial attractiveness were uncorrelated in the present data, as were vocal and facial distinctiveness ratings.

What´s next? The impact of working memory capacity on interrupted sequential task performance

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Interrupted task performance is associated with high cognitive memory load caused by placekeeping of relevant task information during interruptions. Previous studies focused on the impact of task characteristics on interrupted task performance, explaining their findings with interindividual differences in working memory capacity (WMC). Capitalizing on this previous work, we investigated the impact of WMC on post-interruption performance in a task which required to perform a memorized sequence of actions, simulating the performance of a multi-step procedure in an operational environment. In the laboratory experiment, n = 33 undergraduate students performed a sequential task called Wortklau. The sequence of Wortklau consists of eight steps defining eight choice rules which have to be applied to visual presented stimuli. The participant's task was to perform 30 sequences of Wortklau. Interruptions occurred about 26 times randomly distributed within the sequences and involved a short-term memory task. Individual WMC was assessed using the Memory scale of the Berliner Intelligenzstruktur-Test. Effects of WMC on post-interruption performance emerged for resumption times and error rates measured by sequence errors (resuming with the wrong step) and non-sequence errors (wrong response to correct step). Results indicate that participants with high WMC resume faster to the Wortklau task after an interruption and make less non-sequence errors, but perform the sequence of Wortklau as accurate as participants with low WMC. We assume that high WMC enables participants to rehearse the next step of the Wortklau task while working on the interruption task.

The neurodynamics of sequential memory retrieval during decision making

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Which neural structures contribute to memory-based decision making? Previous research has shown that specific circumscribed areas in posterior cortex represent and process information regarding different attributes stored in long term memory (LTM), and that areas in prefrontal cortex perform executive control processes (e.g., maintaining, manipulating and updating memory contents). In this study, we used dynamic causal modeling (DCM) of fMRI data to investigate the interplay of neural signals between these brain structures. Specifically, we measured hemodynamic time series of participants who made decisions based on previously memorized attribute information using the take-the-best (TTB) heuristic, a simple strategy that relies on the sequential retrieval of information. Through a model comparison of various DCMs, representing different hypotheses about the interplay between the structures, we obtain insights on how the effective connectivity underlying the generation of behavioral and hemodynamic responses of LTM retrieval changes during the decision process. According to the best-performing DCM, the architecture of the neural system is based on bidirectional baseline

connections between each attribute-specific representation area and the left dorsolateral prefrontal cortex (DLPFC). At the onset of retrieval, a brief modulation of backward connections from DLPFC to all representation areas occurs. This initial backward spread of activation is followed by sequential modulations of the forward connections between DLPFC and the areas representing the attributes, each time information of the respective attribute is retrieved by TTB. These results indicate that the activation of representations in LTM generally involves both automatic and controlled processes. This complicates the common assumption of limited and "frugal" information search in memory-based decision making and highlights that models of decision making need to take into account the neural architecture of memory.

Dissociative effects of feedback-valence on automaticity and precision in motor learning

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Extrinsic error information helps reducing performance errors during motor learning, but may disrupt automatic skill execution depending on perceived feedback valence (i.e. positive or negative). We conjectured feedback with positive valence to support performance precision as well as the process of motor automatization (viz. dual-task cost reduction).This hypothesis was tested on 56 participants practicing an elbow-extension-flexion-sequence (720 trials). They were instructed to produce the task as precisely as possible with regard to three reversal points within a time limit of 1200 ms. Error feedback was provided on 14% of the trials, as substantially higher feedback frequencies have proven detrimental to motor automatization (Krause, Agethen, & Zobe, 2015). Feedback-valence was induced by normative feedback: systematically manipulated reference lines in a visual feedback display indicated performance of a putative peer-group either to be superior (negative valence, NE) or inferior (positive valence, PO) to participants' actual performance. Also, an active (neutral valence) and a passive (no practice) control-group were conducted. As a result, dual-task costs (n-back error) significantly decreased solely in the PO-group, $p=.003$, partial eta-squared=.51, but in no other group, $p>.431$. Surprisingly, the mean absolute error for the motor task significantly decreased (i.e., precision increased) in the NE-group, $p=.010$, partial eta-squared=.41, but in none of the other groups, $p>.477$. Thus, positive feedback-valence appears to enhance skill automatization, while – unexpectedly – only negative feedback-valence seems to enhance movement precision. These effects may be modulated by motivational factors.

Welche Folgen haben selbstfahrende Autos für die Verkehrssicherheit?

Wolf-Dietrich Zuzan

Von den Produzenten selbstfahrender Autos wird argumentiert, dass sich durch diese Fahrzeuge die Verkehrssicherheit verbessern ließe. Die Technik sei sicherer als der Lenker. Die Verkehrspsychologie forschte bisher nach dem für die Bedingungen der Straße geeigneten

Lenker und versuchte mit psychologischen und pädagogischen Maßnahmen den Lenker an diese Bedingungen anzupassen. Ein anderer Ansatz war die sich selbst erklärende Straße. Man bemühte sich die Verkehrsumwelt so zu gestalten, dass der Lenker zu einem angepassten Verhalten veranlasst wurde. Schon seit langem war bekannt, dass man mit Hilfe der Straßengestaltung das Fahrverhalten beeinflussen kann im Sinne von Leit- oder Hemmprinzip sowie auch mit Hilfe der „Psychobremse“. Zu den frühen verkehrspsychologischen Untersuchungen zählte das Studium der Auswirkungen von Leit- und Randlinien. Man erkannte, dass man Bedürfnisse gezielt verzögern konnte wie zum Beispiel durch die Ankündigung einer Überholmöglichkeit. Nun wird versucht die biologische Intelligenz des Lenkers durch die artifizielle Intelligenz des Computers zu ersetzen und es gibt zahlreiche Versuche Erfahrungen mit solchen Fahrzeugen zu sammeln und die Technik zu perfektionieren. Es kommt aber trotz allem zu Unfällen, weil die anderen Lenker mit dem genau nach Gesetz fahrenden Versuchsfahrzeug nicht zurecht kommen und häufig auffahren. Eine endgültige Bewertung der Verkehrssicherheit der Versuchsfahrzeuge ist demnach noch nicht möglich. Hoch sind aber die Erwartungen der Verkehrsteilnehmer. Man erwartet sich weniger Verkehrsstau und kürzere Fahrtzeiten aber dieselben Menschen fühlen sich gleichzeitig beunruhigt, die Haltung zum selbstfahrenden Auto ist also ambivalent.

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