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# Abstracts

edited by  
Ulrich Ansorge, Erich Kirchler,  
Claus Lamm, and Helmut Leder



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**TeaP 2013**

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**Abstracts**  
**of the 55<sup>th</sup> Conference**  
**of Experimental Psychologists**

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Edited by Ulrich Ansorge, Erich Kirchler,  
Claus Lamm, and Helmut Leder

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# Contents

<b>Keynote lectures</b>	<b>7</b>
<b>Talks</b>	<b>13</b>
<b>Posters</b>	<b>319</b>
<b>Addendum</b>	<b>i</b>
<b>Author Index</b>	<b>iii</b>



## Keynote lectures







Martin Eimer

## Top-down control of visual attention

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In natural visual environments, multiple visual objects compete for access to perception, memory, cognition, and action. Almost always, current task goals determine which of these objects will succeed in this competition. While everyone agrees that intention and attention are closely linked, the mechanisms that are responsible for the control of visual selectivity by top-down goals remain controversial. William James believed that voluntary attention is determined by anticipatory preparatory processes that activate mental representations of looked-for objects: “The image in the mind is the attention”. In modern attention research, James’ “images in the mind” have re-appeared under the label ‘attentional templates’ – representations of task-relevant visual attributes in working memory that guide the attentional selection of template-matching objects and events.

In the first part of this talk, I will develop a general neurophysiologically inspired account of what attentional templates are, where they reside, and how they guide the attentional selection of visual objects. This account suggests that James was very much on the right track: “Images in the mind” do indeed play a crucial role in the top-down control of visual attention. I will distinguish space-based and feature-based attentional mechanisms and argue that both contribute in different ways to the attentional selection of visual objects. In the second part of the talk, I will discuss findings from our recent electrophysiological and behavioural experiments that studied the internal structure and the capacity of attentional templates, and investigated how these templates affect visual processing in real time.



Ludwig Huber

## **Comparative cognition: Challenging the anthropocentric view of imitation**

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Imitation is a major engine of cognitive and social development throughout human life. It provides the foundation for language acquisition, skill learning, socialisation and enculturation. However, two sets of fundamental issues remain unresolved: 1) What are the evolutionary and developmental sources of human imitative potential? 2) How is imitative potential brought under intentional control? In this talk I want to review several studies on social learning in non-human animals that share an irritating feature, they don't fit into the dominant, anthropocentric theories of social learning. Tortoises show clear evidence of learning a difficult spatial problem by observing a conspecific model despite the fact that they are solitary. Archer fish and common marmosets exhibit high fidelity copying of movement patterns of a conspecific model, thereby solving the correspondence problem of imitation (transforming visual information into matching motor acts). Dogs seem able to imitate – at least in ostensive-communicative contexts – selectively. They also exhibit deferred imitation and goal emulation. Together these data suggest that several core components of human cultural learning, such as high copying fidelity, intentional inhibition and selectivity, are shared by many species. It is therefore likely that these behaviours emerge from general learning abilities rather than from specific mechanisms of advanced (human) sociality (Huber et al. 2009).

Huber, L., Range, F., Voelkl, B., Szucsich, A., Viranyi, Z., & Miklosi, A. (2009). The evolution of imitation: what do the capacities of nonhuman animals tell us about the mechanisms of imitation? *The Philosophical Transactions of the Royal Society B*, 364, 2299–2309.



Arthur M. Jacobs



Raoul Schrott

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## Gehirn und Gedicht: Wie Wörter wirklich werden

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Wirklich ist, was wirkt (Lewin). Bezogen auf die Leseforschung stellt sich damit die Frage, welche messbaren Wirkungen Wörter und Sätze, Verse oder Geschichten auf neurokognitiver Ebene haben. Klassische psychologische Modelle des Lesens fokussieren kognitive Prozesse und bleiben stumm, was die Beteiligung affektiver und ästhetischer Vorgänge am Leseakt betrifft. In diesem Vortrag diskutieren wir solche Prozesse im Rahmen eines allgemeinen neurokognitiven Modells des literarischen Lesens. Das Modell integriert Elemente der Rhetorik, Rezeptionsästhetik, kognitiven Poetik und Psychonarratologie mit neurolinguistischen Ansätzen und erlaubt Vorhersagen bezüglich emotionaler Effekte des Lesens, die mit empirischen Befunden aus Studien zur Worterkennung und Satz- bzw. Textverarbeitung kontrastiert werden.



# Talks



## **Sleep can eliminate list-method directed forgetting**

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Accumulating evidence shows that sleep can stabilize memories. In contrast, little is known about the interplay of sleep and forgetting. Here, we examined whether sleep influences directed forgetting, the finding that people can intentionally forget obsolete memories when cued to do so. In list-method directed forgetting (LMDF), subjects initially study two item lists. After the first list, they receive a cue indicating either that the list is no longer relevant and can be forgotten, or that the list is relevant and should be remembered. Irrespective of original cuing, memory for the first list is finally tested, and the forget compared to the remember cue typically impairs recall, i.e., induces directed forgetting. Here, we applied LMDF and assessed memory for the first list after 3 delay intervals. Directed forgetting was present after a 20-min delay and a 12-hr delay filled with wakefulness; in contrast, the forgetting was absent after a 12-hr delay with regular sleep. Thus, LMDF after a delay may be successful when wakefulness follows upon encoding, but not when sleep follows upon encoding. On the basis of prior work on both LMDF and sleep, the suggestion arises that sleep may revive obsolete memories by reactivating their original encoding context.

## **The effect of preferences and beliefs on contribution levels in an anonymous public goods game**

**Kurt Alexander Ackermann, Ryan O. Murphy**

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There is a large body of evidence showing that a substantial proportion of people contribute positive amounts in Public Goods games, even if the situation is one-shot and completely anonymous. Clearly, this is in conflict with the prediction neoclassic economic theory makes. One of the most promising explanations why people deviate from normative behavior in this context refers to an interaction between peoples' social preferences (i.e. social value orientation (SVO), other regarding preferences) and their beliefs about the behavior of others. We follow this line of thinking and extend it by suggesting that the inclusion of a third variable may further explain contribution levels in an anonymous one-shot Public Goods game, namely people's beliefs about other people's SVOs. We find that these three variables (SVO, beliefs about other people's contributions in the Public Goods game, and beliefs about other people's SVOs) together account for a large proportion of the variance in contribution levels.

## **Intact emotion-cognition interaction in schizophrenia patients and first-degree relatives: Evidence from an emotional antisaccade task**

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Schizophrenia patients have deficits in cognitive control as well as in different emotional domains. The antisaccade task is a measure of cognitive control that requires the inhibition of a reflex-like eye movement to a peripheral stimulus. Antisaccade performance is modulated by the emotional content of the peripheral stimuli, with emotional stimuli leading to higher error rates than neutral stimuli, reflecting an implicit emotion processing effect. The aim of this study was to investigate the impact on antisaccade performance of threat-related emotional facial stimuli in schizophrenia. 15 patients, 22 first-degree relatives and 26 controls, matched for gender, age and verbal intelligence, carried out an antisaccade task with pictures of faces displaying disgusted, fearful and neutral expressions as peripheral stimuli. We observed higher antisaccade error rates in patients compared to relatives and controls. Relatives and controls did not differ significantly from each other. Antisaccade error rate was influenced by the emotional nature of the stimuli: participants had higher antisaccade error rates in response to fearful faces compared to neutral and disgusted faces. As this emotional influence on cognitive control occurred across groups we conclude that implicit emotional face processing is intact in patients with schizophrenia and those at risk for the illness.

## **Temporal integration and the attentional blink**

**Elkan Akyürek**

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Temporal integration occurs when successive sensory inputs are perceptually aggregated over brief time intervals. Awareness of the individual stimuli subsumed in the temporally integrated percepts is impaired considerably. Temporal integration has been implicated in two-target rapid serial visual presentation tasks, in particular when the targets follow each other directly at Lag 1. In support of this idea is the observation that report order errors are unusually frequent at that lag. However, attentional mechanisms such as prior entry can also explain the occurrence of these order errors, as well as the associated escape from the attentional blink. Putting these two accounts to the test, we used a novel paradigm in which targets could be perceptually combined in a meaningful way, so that their aggregate appearance was a possible target identity also (e.g., “/” and “\”, forming “X”). The results revealed that observers indeed frequently reported the integrated percept, confirming the temporal integration account. Subsequently, we examined temporal integration across longer intervals and multiple successive targets. Temporal integration of targets was found to occur across a rather broad temporal range, suggesting that temporal integration may not only occur over short intervals, but may also be involved in building longer (attentional) event episodes.



## Individual differences in the neuronal processing of metacontrast stimuli

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Visual backward masking techniques are ubiquitous in research on conscious and unconscious processing. A briefly presented target stimulus is followed by a second masking stimulus, that is assumed to interrupt neuronal processing of the target and thus impedes its visibility. Issues of individual differences usually are neglected in research on visual masking. However, in several recent studies on metacontrast masking we have shown that participants differ qualitatively in the time course of masked target discrimination. Whereas one type of participants shows increasing discrimination performance with increasing stimulus onset asynchrony (SOA) between target and mask, another type of participants exhibit decreasing discrimination performance with increasing SOA. These differences in discrimination performance have been shown to correlate with differences in subjective phenomenology of target mask sequences but also with differences in response criteria and the use of different perceptual cues. Here we will present neurophysiological data that shed light on the neural correlates of these differences showing that processing of identical stimuli leads to different brain activation patterns in different observers and that for two types of observers different brain areas covariate with behavioral masking functions. Implications for underlying mechanisms and the locus of individual differences in metacontrast will be discussed.

## Same story but different? – An eye movement study of reading fact vs. reading fiction

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Prior context-information of whether a text is based on facts or based on fiction has been shown to be crucial for the construction of a situation model (a model of what the text is about; van Dijk and Kintsch, 1983). Zwaan (1994) reported that reading in a factual mode resulted in a stronger situation model than reading in a fictional mode. Zwaan stated that reading fiction implies a focus on the text basis and attention to less important information because the reader typically assumes that every word in the text counts and could bear a meaning which might become relevant later. Recent fMRI results point into the same direction: When reading fiction, the reader's construction of a situation model appears to remain flexible (Altmann et al., 2012). We conducted an eye movement study and investigated if meaning making and the construction of a situation model were accompanied by a stronger focus on the text basis during reading fiction compared to reading about facts.

## **Stimulus similarity explains differential memory effects for positive and negative information**

**Hans Alves**

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Negative information seems to have advantages compared with positive information, which are often attributed to the relative higher adaptive importance of negative information compared to positive information. The present research assumes that these advantages are caused by the differential similarity of positive and negative information to other positive and negative information. Two experiments investigated the relationship between stimulus similarity and recognition memory. Assuming that similarity is higher among positive information than among negative information, we predicted and found memory to be more sensitive towards negative information, but response biases (likelihood to classify stimuli as “old”) to be stronger for positive information (Study 1). Regression analyses showed that inter-stimulus similarity explains these effects, over and above valence per se. In Study 2, we used stimulus subsets that varied stimulus similarity orthogonal to valence. As sensitivity and response bias changed accordingly, we conclude that relative stimulus similarity explains valence asymmetries in memory.

## **Dual processes in episodic memory: Evidence from reversed association in a yes/no recognition test**

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Several recent theories of episodic memory postulate the existence of two separate processes or dimensions that inform yes/no recognition decisions (e. g. fuzzy trace theory, FTT). For instance, FTT distinguishes between a similarity judgment based upon gist memory and an identity judgment based upon verbatim memory. Despite recent support for an one-dimensional account, empirical dissociations of two dimensions have been demonstrated repeatedly. However, the single- or double-dissociation approach does not provide unequivocal evidence for the existence of two separable underlying dimensions. Here, we used a reversed-association and state-trace approach to test whether the findings can be explained by one-dimensional models. This approach amounts to testing whether a monotonic relation exists between two dependent variables across conditions. If monotonicity is found to be violated, this finding could not be accounted for by a single underlying dimension. Using various stimuli (category and DRM word lists; pictures of objects and sceneries), we demonstrated violations of monotonicity for both dimensions in a yes/no recognition test. These findings provide considerable support for a two-dimensional nature of episodic memory.

## Prefrontal cortical mechanisms underlying individual differences in cognitive flexibility and stability

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A novel task paradigm assessing both flexible switching between task rules (cognitive flexibility) and performance in the presence of irrelevant distractors (cognitive stability) was developed based on neurocomputational theories of working memory. This theoretical work relates variability in cognitive flexibility and stability to the concept of attractor stability of prefrontal neural networks. As a proxy for this concept we introduce the behavioural 'spontaneous switching rate' (SSR) in response to ambiguous cues. Using fMRI in healthy human subjects, we investigated the neural underpinnings of cognitive flexibility and stability as well as the theoretical suggestion of an antagonistic model of cognitive flexibility and stability by assessing interindividual differences in the SSR and their relation to brain activity and functional connectivity. Results showed a common network consisting of parietal and frontal areas for task switching and distractor inhibition. More flexible persons had reduced activation and functional coupling in frontal areas including the inferior frontal junction (IFJ), during task switching. Finally, the individual spontaneous switching rate antagonistically affected the functional coupling between IFJ and the superior frontal gyrus during task switching and distractor inhibition, respectively, indicating that individual differences in cognitive flexibility and stability are indeed related to a common prefrontal neural mechanism.

## Lernen mit Texten und Bildern: Werden verbale und piktoriale Informationen integriert?

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Ein wichtiger Schritt beim multimedialen Lernen ist die Integration der Text- und Bildinformation (Mayer, 2009; Schnotz, 2005). In Anlehnung an drei Vorstudien (Arndt, Schüler & Scheiter, 2012) wurde zur Untersuchung dieser Text-Bild-Integration ein modifiziertes Paradigma von Gentner und Loftus (1979) verwendet. Den Lernenden wurden verschiedene Satz-Bild-Kombinationen dargeboten, die sich aus Kreuzung der Faktoren Bildtyp (allgemein vs. spezifisch) und Satztyp (allgemein vs. spezifisch) ergaben. Ein allgemeines Bild zeigte beispielsweise einen Turm und ein spezifisches Bild einen Leuchtturm. Diese Bilder wurden entweder mit dem allgemeinen Satz: „Auf der Insel steht ein *Turm*“ oder dem spezifischen Satz „Auf der Insel steht ein *Leuchtturm*“ kombiniert. Im Falle einer Integration der spezifischen Bildinformation und der allgemeinen Satzinformation (und vice versa) sollten die Lernenden in einem späteren Forced-Choice-Wiedererkennungstest fälschlicherweise den spezifischen Satz (bzw. das spezifische Bild) wiedererkennen. Dies konnte bezüglich der Satzerinnerung gezeigt werden ( $p < .05$ ), was für die Annahme spricht, dass die spezifische Bildinformation in das allgemeine Modell des Satzes integriert wurde. Zusätzlich wurden die Blickbewegungen der Probanden aufgezeichnet, um jene Fälle zu identifizieren, in denen die kritische Information betrachtet wurde. Insbesondere in diesen Fällen sollte die Integration nachgewiesen werden können. Die Blickbewegungsdaten werden aktuell ausgewertet und auf der Konferenz berichtet.

## **Mental health and prospective memory: A hierarchical MPT modeling approach**

**Nina R. Arnold, Mateja F. Böhm, Ute J. Bayen**

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Prospective memory (PM) refers to remembering to perform an action in the future. Researchers have pointed out the influence of mental health on PM (e.g., Harris & Cumming, 2003; Kliegel & Jäger, 2006; Rude, Hertel, Jarrold, Covich, & Hedlund, 1999). 130 students took part in a laboratory event-based PM task and completed depression and anxiety questionnaires. We used the beta-MPT version (J.B. Smith & Batchelder, 2010) of the multinomial processing tree (MPT) model for event-based PM (R.E. Smith & Bayen, 2004) to estimate the prospective and the retrospective components of PM. While traditional MPT models use data that are aggregated over participants and items, the beta-MPT estimates individual model parameters and avoids the disadvantages of groupwise analyses. We found a negative relationship between state anxiety and the prospective component of PM, but no relationship between depression and PM. This result concurs with the review by Kliegel and Jäger (2006) that event-based PM is related to anxiety.

## **A future state of mind: The role of attentional allocation and “forgetting” in choice**

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A growing body of work indicates that preferences are constructed through a dynamic process which is heavily reliant on attentional allocation. In two studies employing eyetracking methodologies we investigated the role of attention on decisions involving choices between varying numbers of options. In Study 1 participants choose from either two, three, or four possible donation recipients. The data supports the supposition that attention plays a pivotal role in the decision process with the inclusion of attention providing greater predictive accuracy than decision models based solely on initial preference ratings. Furthermore, we find that a model placing increased weight on incoming information, while simultaneously “leaking” previously accumulated information, provides the best fit for the data suggesting that memory processes likely play a role as well. In Study 2 we increased the number of options to eight and included choices between candy bars. We find that the model developed in Study 1 provides a good fit for both kinds of choices, even when eight options are available. Together, these results provide further evidence of attention’s role in the construction of preference and hints that working memory plays an important role as well.

## Inhibitory control in older adults' episodic memory

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One leading account to explain cognitive decline in old age is the inhibition-deficit hypothesis (IDH; Hasher & Zacks, 1988). According to this hypothesis, older adults experience increasing difficulty in down-regulating the activation of task-irrelevant information, leaving fewer resources for the processing of task-relevant information and inducing cognitive decline. Intriguingly, although the IDH has received considerable support in several cognitive areas, research in episodic memory has revealed conflicting results. In the present experiments, we evaluated the IDH using two tasks that have been suggested to be particularly suited to examine inhibitory control processes in episodic memory: *Retrieval-induced forgetting* [RIF], which reflects inhibitory control of interfering memories during selective retrieval, and *directed forgetting* [DF], which reflects the (inhibitory) ability to intentionally forget “unwanted” memories when cued to do so. We replicated previous work by finding efficient RIF and efficient DF in “young-old” participants (60-75 years). Going beyond the previous work, we additionally found both forms of forgetting to decline gradually with individuals' age and to be inefficient in “old-old” participants (above 75 years). These findings indicate that RIF and DF are “late-declining” capabilities, supporting the proposal of an inhibitory control deficit in (very) old age.

## Theory of mind: A finite-mixture model for responses in the sandbox task

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Theory of mind (ToM) is the ability to ascribe mental states to oneself and others. The Sandbox task is a recently developed test of ToM (Bernstein, Thornton, & Sommerville, 2011; Sommerville, Bernstein, & Meltzoff, in press). In this task, Sally buries a toy at a first location (L1) in the sandbox. Afterwards, in Sally's absence, Anne buries the toy at a second location (L2). In the memory-control condition, participants answer the question “Where did Sally bury the toy?” In the false-belief condition, participants answer the question “Where will Sally look for the toy when she returns?” In previous work, participants showed significantly more bias toward the object's actual location in the false-belief condition than the memory-control condition; however, bias scores in the memory-control condition were still significantly above zero. We propose a finite-mixture-model of Sandbox responses to quantify how much memory failures bias scores in the false-belief condition. This approach disentangles ToM from other cognitive processes by modeling memory-control and false-belief responses, thereby permitting a more precise quantification of ToM. We apply our finite mixture model to a sample ( $N = 263$ ) of 3-year-olds, 5-year-olds, 9-12 year-olds, young adults and older adults to estimate the developmental trajectory of ToM.

## **Regulation of valence-based disturbances operates in a reactive rather than proactive manner**

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Valent, i.e. positive or negative information has the power to interrupt ongoing information processing, even when it is unrelated to the current task (as indicated e.g. by the emotional Stroop effect). Such valence-based interruption might be regulated as a consequence of either experience of previous disturbance (reactive regulation) or preparation for forthcoming disturbance (proactive regulation). In three experiments we studied such reactive and proactive regulation of interrupting valent pictures. The results indicate that especially negative information hampers the processing of an unrelated categorization task. Furthermore, previously presented negative information seems to sensitize to subsequent valent interruption compared to previous neutral information. In contrast to these reactive regulation effects, cuing the upcoming valence category of the interrupting information showed essentially no effects. Consequently, the experience of task disturbance does seem to modify the impact of subsequent irrelevant valent information, whereas the preparation for such disturbance does not.

## **Executive function and theory of mind in middle childhood**

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There is evidence for a link between executive functioning (EF) and theory of mind (ToM) development in preschool children. Recent research has further differentiated the two constructs, EF into 'hot' affective and 'cool' cognitive components (Zelazo & Müller, 2002), ToM into affective and cognitive aspects (Shamay-Tsoory et al., 2010). However, the relation between these refined constructs still needs to be examined in nonclinical school-aged children.

Therefore, the aim of this study was to relate cognitive and affective ToM performance to cool and hot affective EF in a school-aged community sample.

ToM was assessed using a cartoon paradigm. As measures of cool EF a set shifting, a Stroop and a working memory task were employed. Hot EF was assessed using a child-version of the Iowa gambling task and delay of gratification.

Preliminary results of 500 children show associations between ToM and set shifting (affective ToM:  $r = .13$ ,  $p = .014$ , cognitive ToM:  $r = .16$ ,  $p = .002$ ; age partialled out). In addition, cognitive ToM correlated significantly with the Stroop task ( $r = .12$ ,  $p = .019$ ; age partialled out). No significant associations emerged between ToM and working memory or hot EF. These findings enhance our understanding of the precise kind of link between ToM and EF in middle childhood.

## Towards causal models in psychophysiology

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Skin conductance responses (SCR) are widely used to operationalise sympathetic nerve activity (SNA) and thereby make predictions about underlying psychological (emotional and cognitive) processes. Here, we replace operational definitions with a causal model of how SNA generates SCR, taking observation noise and model imprecision into account. Using probabilistic model inversion, SNA estimates supposedly not only have higher time resolution, but better precision in predicting an underlying psychological process, due to suppression of noise. Here, we validate this approach in a series of experiments. First, by measuring SCRs to simple stimuli (electric stimulation, white noise, auditory oddballs, targets in a visual detection task) we demonstrate that the peripheral system can be approximated as linear and time-invariant. Building on linear time invariant (LTI) systems, we create neural models for different experimental situations. We measure SCR in response to neutral and emotional pictures, during public speaking anxiety, and in response to conditioned stimuli in fear learning. For these different classes of experiments, SNA estimates yield a more precise prediction of the underlying psychological process than raw SCR values. We propose that causal models are a powerful tool to infer psychological processes from peripheral measures.

## Stereoscopic movies and emotional experience in primary school children. A psychophysiological study

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The stunning success of stereoscopic three-dimensional (S3D) movies, both in cinema and TV, promises new captivating emotional experiences. An increasing number of S3D-movies are primarily targeted for children. However, to date there is limited evidence regarding their impact on children's emotional experience and well-being during and after the movie. In order to fill this empirical gap we surveyed fear of children during S3D-movies. 32 children (6-8 years old) watched the child-oriented gothic movie "Monster House" in a balanced 2 x 2 between-design in which the two factors format (S3D, 2D) and situation (cinema, TV) were varied. Psychophysiological data (skin conductance, heart rate, skin temperature) was recorded and compared between conditions. There was no significant difference between 2D and S3D in terms of psychophysiological measures. Startle reflexes in camera settings with negative parallax in S3D were the only reactions which showed differences between 2D and S3D, reflected by skin conductance and heart rate. This primarily happened when objects moved directly towards the audience. In contrast, the situation showed some significant effects, with the cinema situation provoking larger psychophysiological responses. This suggests that S3D itself has no considerable influence on the emotional experience with the exception of motion in negative parallax.

## **Effects of environmental factors on movie perception**

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Despite the fear of the entertainment industry that illegal downloads of films will ruin their business, going to the movies continues to be a popular leisure activity. One reason people enjoy watching movies in cinemas so much may be the physically huge room and screen size. Physical screen size is often confounded with visual angle, but this need not be so. We tested whether the enjoyment of movie theatres is due to screen size, visual angle, or other environmental cues. We built a model cinema that holds all the visual information a real cinema does. In a series of experiments subjects watched movie clips under different conditions, including a real cinema, the model cinema, and an display monitor in isolation. We found that screen size was overestimated by 50% when watched in the context of the model cinema, but not in the other conditions. We further found that people enjoyed the movie more when watching it in the model cinema, as compared to the display monitor condition. Conclusion: whereas the isolated display monitor is inferior, the addition of a contextual model can improve the viewing enjoyment to the extent that it is comparable to the movie theater experience, provided the viewing angle is the same.

## **Physiological and behavioral correlates of emotions and empathy in dogs**

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The dog (*Canis familiaris*) seems to be a very interesting species when it comes to the research of heterospecific empathy. Due to a long domestication process, it developed specific abilities to read human emotions. However, so far there is no conclusive evidence for the existence of empathy in dogs. The recent study addresses the question if dogs show emotional contagion for joy, pleasure and pain. The experimental subjects are confronted with emotionally relevant stimuli of humans showing happiness, anger or sadness and of dogs showing excitement or fear response. A state-of-the-art eye-tracker system is used to measure regions of interest and attention patterns while dogs are watching these stimuli. Additionally we investigate physiological responses like heart rate variability (HRV), surface face temperature (SFT), cortisol levels (CL) and pupil size (PZ), as well as behavioral measures like tail wagging (TW) and ear postures (EP). Cross-correlation of first behavioral and physiological data indicates that dogs react in an emotionally contagious way to the presented stimuli. For example, there is suggestive evidence for a lateralization in the TW-response to specific affective stimuli. Furthermore, excitement causes a decrease of HRV and increases of CL, PZ, EP and SFT in dogs.



## Learning a novel foreign accent: The roles of exposure tasks and delay in consolidation and transfer

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Hearing foreign-accented speech is a frequent occurrence in modern life and provides challenges for listeners. Research on native listeners' abilities to understand non-native accents has generally focused on the evidence for rapid adaptation that is accomplished effortlessly by the listener. We investigate further the nature of such adaptation by asking how stable it is over time, how specific to a particular accent it is, and what role the type and extent of exposure has. Our work, testing in a cross-modal priming paradigm, investigates stability by introducing delays of a day and a week between exposure and test phases, thus investigating the extent to which adaptation persists in long-term memory. Furthermore, we present the results of having employed a variety of exposure tasks across conditions, thus yielding the first known systematic study of the influence that different methods of initial exposure might have on learning. Finally, we examine how successfully listeners can transfer knowledge of one accent to another, similar accent. These findings are all compared to previous research on adaptation to foreign-accented speech, leading to a better understanding of the factors involved in adaptation and the subsequent memory of it that leads to effortless listening of a specific foreign accent.

## Perceptual selection and grouping: A common function of parietal cortex

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Bi-stable perception occurs when the brain keeps changing its mind about two possible perceptual interpretations of a single physical stimulus. This allows for insights into mechanisms of perceptual selection, in addition to ones on conscious and unconscious neural stimulus representations.

A tantalizing prior result had shown parietal activity during perceptual reversals, leaving a causal or consequential role open. Using transcranial magnetic stimulation (TMS) we showed that interfering with activity in the anterior human inferior parietal sulcus (aIPS) can change the rate of perceptual reversals during binocular rivalry, indicating an active role of aIPS in perceptual selection.

As selection is thought to be fundamentally related to perceptual grouping, we now used a novel illusion to test this. The illusion allowed for two perceptual states: perception of ungrouped local moving dots, or of grouped large-scale moving squares. fMRI showed that aIPS activity correlated with global, but not local, perception, and that V5+/MT+ was 'blind' with regards to the perceptual state. Disturbing aIPS using transcranial magnetic stimulation (TMS) specifically reduced perceptual durations of the globally grouped, but not of the ungrouped local, percept.

These findings show that aIPS not only mediates perceptual selection, but also perceptual grouping and binding, suggesting a convergence of functions in aIPS.

## **Neural systems underlying distractor inhibition in verbal working memory and their contribution to individual differences in working memory capacity**

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Recent work has shown that ventrolateral prefrontal cortex (VLPFC) is involved in shielding the contents of working memory (WM) against distraction. While it has been suggested that the individual ability to inhibit distractors critically contributes to individual differences in WM capacity, an association between inhibition-related brain activity and WM capacity was observed in dorsolateral prefrontal cortex (DLPFC) but not in VLPFC. These insights rely primarily on studies of visual and visuo-spatial WM. We used functional magnetic resonance imaging to investigate the neural bases underlying distractor inhibition in verbal WM and their contribution to individual differences in WM capacity. In a sample of 52 participants, we observed robust activity in VLPFC and DLPFC, elicited by distractor letters during the delay period of a letter WM task, but suppressed activation in occipital cortex. Functional coupling of VLPFC and DLPFC with visual regions was increased during distractor inhibition and individual WM capacity was negatively correlated with the strength of functional coupling between right VLPFC and higher visual areas. We conclude that the capacity of WM is determined – at least partly – by the degree to which VLPFC can implement top-down control over visual areas when task-irrelevant information must be ignored.

## **The analysis of ‘risk perception attitudes’ for evidence-based segmentation of health communication**

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The development of public health campaigns should not only focus on the target group members’ *objective* risk status but especially on the individuals’ problem constellations, health-related dispositions, and informational needs. This raises the question regarding to motivational factors which increase or inhibit the individual’s involvement in health topics. Subjective risk perception is known to be one of the key factors for health-related information seeking. However, as a single determinant risk perception does not sufficiently explain how people deal with health information. Based on the “risk perception attitude framework” we anticipated that only if people perceive that they are vulnerable to a severe disease (risk perception) *and* if they assume that they can influence this risk by their own behavior (self-efficacy), they should be motivated to deal with health information intensively. In a current survey representative for a federal state in Northern Germany, we assessed the dispositions and health behaviors regarding oral cancer of 500 individuals aged 50 or higher. The different patterns of risk perception and perceived self-efficacy regarding to oral cancer was correlated to interest in information, information seeking and avoiding, and knowledge. Additional risk group segmentation provides a solid empirical foundation for targeting strategies in public health promotion.

## The neuronal representation of the interaction between contextually guided visual search and memory

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Behavioral evidence suggests that the use of implicitly learned spatial contexts for improved visual search may depend on memory resources. In two fMRI studies we investigated the neuronal representation of implicit and explicit memory, and working-memory during visual search. To investigate this linkage we used the contextual cueing paradigm in which visual search performance is modulated by implicit memory representation of the spatial context.

The aim of the first study was to clarify the contribution of medial temporal lobe (MTL) to explicit and implicit learning in visual search. Former studies have suggested a role of MTL in both explicit and, importantly, implicit learning of repeated search displays. Our data show a differential activation in MTL dependent on the type of learning. Explicitly memorized repeated displays seems to elicit an enhanced level of activity in MTL, while implicitly represented displays suppresses activity in MTL.

In the second study we identified cortical areas which are involved in the interaction of working-memory and contextually guided search. We could show that BOLD-signal in the intraparietal sulcus is modulated by working memory capacity as well as contextual cueing performance. This common activation pattern demonstrates the importance of the dorsal attentional system in the attentional guidance by implicit memory.

## Diminishing parochialism in intergroup conflict by disrupting the right temporo-parietal junction

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Individuals react to violation of social norms by outgroup members differently than to transgressions of those same norms by ingroup members: namely outgroup perpetrators are punished much more harshly than ingroup perpetrators. This parochial punishment pattern has been observed and extensively studied in social psychology and behavioral economics. Despite progress in recent years, however, little is known about the neural underpinnings of this socially highly relevant phenomenon. In this talk, I will show that the transient disruption of the right, but not the left temporoparietal junction (TPJ) by means of transcranial magnetic stimulation (TMS) reduces parochial punishment in a third-party punishment paradigm with real social groups. Moreover, I will demonstrate that this observed TMS effect on parochial punishment is mediated by a classical punishment motive, i.e., retaliation. These findings provide the first causal evidence that the right TPJ plays a pivotal role in the implementation of parochial behaviors.

## **Nicotine facilitates memory consolidation in perceptual learning**

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Previous research has shown that memory consolidation in declarative learning requires low levels of the neurotransmitter acetylcholine (ACh). However, little is known about the role of the cholinergic system for memory consolidation in perceptual learning. Here, non-smoking men were trained in a visual texture discrimination task (TDT). Following the perceptual training, they were randomly assigned to two groups. One group received chewing tobacco containing nicotine for one hour. The other group received a control substance without nicotine. Electroencephalographic (EEG) recordings during substance consumption showed a reduced alpha activity and P300 latency in the nicotine group compared to the control group. When tested in the TDT the next day, both groups responded more accurately and more rapidly than during training. These improvements were specific to the retinal location and orientation of the texture elements of the TDT suggesting that learning involved early visual cortex. A group comparison showed that learning effects were significantly more pronounced in the nicotine group than in the control group. The EEG findings suggest that oral consumption of nicotine enhances the efficacy of nicotinic ACh receptors. Moreover, enhanced (rather than reduced) efficacy of ACh receptors facilitates the consolidation processes involved in perceptual learning that follow task completion.

## **Situation awareness in relation to the initial information about adaptive cruise control. A matched sample longitudinal driving simulator study**

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Adaptive cruise control (ACC) aims to support car drivers by automating speed and distance control. Due to sensor limitations, not every situation can be handled by the system. Therefore drivers need to be aware of potentially critical situations. The present study investigated the effects of different initial information about ACC (i.e., varying according to correctness) on Situation Awareness. A performance-based measurement approach for Situation Awareness was developed, using a continuously presented secondary task. The experiment was conducted in a two-way ( $3 \times 3$ ) repeated measures mixed design with three system descriptions as between-subjects factor (correct, incomplete, incorrect) and three consecutive trials in a period of six weeks as within-subjects factor. A matched sample of 51 participants was allocated to one of the three experimental conditions and drove the same 56-km highway track in a fixed-base driving simulator. Results show that informed groups were aware of potentially dangerous situations in the first trip. They reduced the engagement in the secondary task earlier than the incomplete group. The experience of ACC limitations enhanced Situation Awareness over time in the incomplete group. ACC limitations that were expected, but did not occur in the first trip, tended to be forgotten and Situation Awareness diminished over time.

## Der „Indianer“ als „Punk“ – Dyadentranszendente Priming-Effekte

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In der Kommunikationsforschung liegt der Fokus zumeist auf Dyaden, d.h. auf Situationen mit zwei Gesprächsbeteiligten. Ein Aspekt hiervon ist die Angleichung der Gesprächspartner aneinander (*Alignment*), wobei nach wie vor ungeklärt ist, ob dies automatischen oder eher strategischen Verarbeitungsprozessen zuzuschreiben ist. Den engeren Rahmen dyadischer Kommunikation überschreitend, erweitern wir den Fokus auf unbeteiligte Zeugen des Dialog-Geschehens, sogenannte *Overhearer*.

In einem 3x2-Experiment verfolgten die Versuchsteilnehmer zunächst in der Rolle eines Overhearers ein simuliertes Gespräch zweier Konfidenten über eine Reihe von Karten mit stilisierten Objekten. Ein Konfident verwendete dabei bestimmte kritische Objektbezeichnungen. Im folgenden Experimentteil übernahmen die Versuchsteilnehmer nunmehr eine Sprecherrolle im Dialog über dieselben Karten. Wir variierten die Involviertheit des Overhearers während des ersten Experimentteils (Referenz-Nachvollzug vs. Phonem-Monitoring vs. rollenbewusstes Zuhören) sowie den Status des Gesprächspartners im zweiten Teil (bereits beteiligt vs. neu im Spiel). Analysiert wurden die relativen Häufigkeiten, mit denen die Versuchsteilnehmer die kritischen Objektbezeichnungen, die sie im ersten Teil hörten, im Gespräch selbst verwendeten. Die Analyse zeigte, dass die Verwendung bekannter Objektbezeichnungen von der Involviertheit abhängt: Konnten die Versuchsteilnehmer das Gespräch nachvollziehen, verwendeten sie die Objektbezeichnungen wesentlich häufiger als bei passivem Zuhören oder Phonem-Monitoring. Diese Befundlage spricht für ein Überwiegen strategischer Momente bei Alignment.

## Enhanced memory for the wolf in sheep's clothing: How general is the memory advantage for expectancy-incongruent social information?

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A popular hypothesis in Evolutionary Psychology is that the human brain contains a highly specialized cognitive module for remembering faces of cheaters. Inconsistent with this assumption, it has been shown that memory is enhanced for social information that is unexpected in a given context. For instance, memory for cheaters and cooperators is influenced by the a-priori trustworthiness of the faces. People are better at remembering that a highly trustworthy face was paired with cheating than they are at remembering that a highly trustworthy face was paired with cooperative behavior. However, this memory advantage for cheaters over cooperators is reversed when faces with low a-priori facial trustworthiness are used. Suzuki and Suga (2010) proposed that this incongruity effect may be due to a highly specific cognitive module protecting against the exploitation by trustworthy-looking cheaters, but the effect may be better explained by more general mechanisms supporting the encoding of unexpected emotional information.

## **Knowing when and where (not) to attend facilitates auditory stream segregation**

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A major challenge for the auditory system is to disentangle signals emitted by concurrently active sound sources, such as listening to a speaker while music is playing in the background. Besides characteristics of the individual signals (e.g., perceived location, pitch, timbre), one important cue for distinguishing the sound sources is how their emitted signals unfold over time. This was investigated by means of behavioral data in three target detection experiments. Targets were embedded in one stream while one or two other streams masking these targets were simultaneously presented. For successful task performance, it was necessary to segregate the relevant stream from the distractor stream(s). Experiment 1 shows that a predictable temporal arrangement of the tones in the to-be-attended stream facilitates task performance. This can be interpreted as an effect of directing attention to the “right moments” in time. Experiment 2 shows a similar benefit when the distractor stream has a predictable temporal structure. This implies that knowing when “not to attend” is also beneficial for performing a difficult listening task. Finally, Experiment 3 shows that not only temporal but also spatial predictability is beneficial for task performance. The results underline the importance of attentional allocation in multi-stream listening scenarios.

## **Being watched by someone or something – Different forms of surveillance in public places and their influence on perception and acceptance**

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Surveillance is still a controversially discussed issue. There has been no systematic research on different types of surveillance as well as different personality factors influencing acceptance. In an online-study we compared 3 scenarios: surveillance via security personnel on location, classical CCTV with human observers in a control center and smart CCTV without any interaction by humans. The latter being the most interesting, as there is a growing amount of research in the technical fields, working on automatic detection of prescribed events. Does perception change, when there is no human observer anymore? In the experiment participants reported differences in their preferences and acceptance. The perceived importance of specific aspects like privacy, reliability and financing varies with scenario, indicating that they have different weights for the judgement of each scenario as a whole. There have been no significant effects for the perception of security, but for those items concentrating on behavior like avoidance of the surveilled area and adaptation of own behavior. Additionally we checked for connections between acceptance and participants' scores in the Big Five Inventory (BFI-K) as well as the degree of personal involvement. Results are linked to construal level theory and hints for quantitative oriented acceptance research are made.

## **Inviting free-riders or appealing to prosocial behavior? Game-theoretical reflections on communicating herd immunity in vaccine advocacy**

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Vaccination yields a direct effect by reducing infection but also has an indirect effect, herd immunity: If many individuals are vaccinated, the immune population will protect unvaccinated individuals (social benefit). However, due to a vaccination's individual costs and risks, individual incentives to free-ride on others' protection also increases with the number of individuals who are already vaccinated (individual benefit). This study assesses the consequences of communicating the social and/or individual benefits of herd immunity on vaccination intentions. In an online-experiment the definition of herd immunity was provided. One sentence made either the individual or social benefit salient or both. A control group received no such information. As a moderator we tested the costs of vaccination. Dependent measure was intention to vaccinate. The results show that when a message emphasized individual benefit, vaccination intentions decreased (free-riding). Communication of social benefit reduced free-riding and increased vaccination intentions when costs to vaccinate were low. Communicating the social benefit of vaccination may prevent free-riding and should thus be explicitly communicated if individual decisions are meant to consider public health benefits. Especially when vaccination is not the individually (but collectively) optimal solution, vaccinations should be easily accessible in order to reach high coverage.

## **Parsing rooms – Making sense of spatial and functional relations with the Parahippocampal Place Area (PPA)**

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Parahippocampal Place Area (PPA) is active during encoding of visual scenes, usually multi-object pictures that are typical for places and scenes. According to the predominant view, instead of encoding objects and single aspects in a scene, the function of the PPA is to encode spatial layout that is marked by large fixed surfaces. This PPA function is not unchallenged as evidenced by empirical and theoretical views that link the PPA with functional relations and context in general. Here I investigated the role of the PPA in scene-like stimuli, rooms, where objects were normally and randomly arranged. Randomly arranged objects within a room contain similar spatial layout to normal ones, but disturb functional and spatial relations between objects. The randomisation is, thus, an ideal paradigm to disentangle the competing views about the PPA function. Between 12 and 18 participants participated in a series of three fMRI experiments that featured passive and active viewing of room stimuli (1-back task and visual search), as well as an adaptation paradigm. The results indicate the PPA is indeed sensitive to spatial and functional manipulation and thus not solely encode spatial layout.

## **Imitation, prosociality....and contingency**

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A close and bi-directional relationship between prosociality (including trust, rapport and liking) and automatic imitation / mimicry is now well-established. The degree to which one is imitated influences how we perceive the imitator, and when one desires to make another like us we tend to imitate more.

We recently introduced a procedure to investigate this effect in the lab using an automatic imitation task and a social priming procedure. Using this task we have shown the same relationship between prosociality and imitation observed in naturalistic situations. Interestingly, not all populations modulate their degree of automatic imitation – our recent work has shown that typical adolescents, and adults with autism, do not modulate their degree of imitation after social priming.

We have also examined why this effect should matter – is it the case that the degree of automatic imitation is related to theory of mind, perspective-taking and other socio-emotional abilities? We suggest that in fact inhibition of imitation is linked to these capacities and that therefore mimicry is not as important as contingent action. This prediction was recently tested and supported – suggesting that contingency is sufficient to developing prosocial feeling and that temporo-parietal junction is key.

## **Structural brain alterations in olfactory disorders**

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Many olfactory disorders are associated with structural brain alterations. Especially, the involvement of the olfactory bulb (OB) is well documented. Numerous human magnetic resonance imaging studies showed OB volume reduction in quantitative olfactory disorders or qualitative olfactory disorders irrespective of its etiology. Objective of our study was the evaluation of brain volume alterations in higher-order olfactory areas using voxel-based morphometry (VBM). A quantitative (hyposmia) and a qualitative olfactory disorder (parosmia) were investigated. Hypothesis was a common volume decrease in olfactory areas beyond the OB. 24 hyposmic subjects, 22 parosmic subjects and age- and sex-matched control subjects were included. The whole brain analysis revealed significant gray matter volume decreases for hyposmic subjects e.g. in the insular cortex, anterior cingulate cortex, orbitofrontal cortex and piriform cortex. For parosmic patients a volume loss in the left anterior insula was observed. In an additional volume of interest analysis for parosmic subjects we also found volume loss in the right anterior insula, the anterior cingulate cortex, the hippocampus bilaterally and the left medial orbitofrontal cortex. Therefore, both studied olfactory diseases were characterized by a volume loss in olfactory areas – especially an overlap in the left anterior insular cortex was seen.



## Distortion of meta-analytic findings in experimental psychology through multi-item measurement

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The analysis of moderator effects in meta-analysis can be seriously distorted through a methodological contamination of standard effect sizes (Cohen's *ds*) when used to measure binary outcome variables (such as remembering items or not; generally success or failure). Using a theoretically and empirically well-supported moderator effect (larger retention intervals increase the eyewitness misinformation effect) as an example, I demonstrate that (a) effect sizes become inflated when memory performance is averaged across multiple items used in the measurement, and as a consequence (b) confounds between number of items and levels of the moderator variable can create *any* pattern of effect sizes, compromising the chances of identifying the true moderator effect. This cannot be compensated for through measurement-related increases in reliability. The problem applies to a broad range of phenomena in experimental psychology (and likely beyond). Fortunately, it is possible to correct for the distorting influence of multi-item measurement and preserve the validity of moderator analyses by using *anchored* effect sizes. A practical advantage of the latter is that they are easier to calculate, making meta-analysis more economical.

## How the human brain uses cross-modal predictions to improve person recognition from voice and face

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Previous studies showed that familiar voices activate face-sensitive areas without actually seeing a face. Until now, it was unclear what kind of information these activations represent. With functional magnetic resonance imaging (fMRI) we tested whether voices activate representations of facial features or identity or both. We used a cross-modal priming paradigm in which familiar voices preceded morphed faces that could either match or mismatch the voice in identity. The fMRI results revealed that during mismatch of voice and face cross-modal activity in face-sensitive regions correlated with reaction times in voice recognition. In face-sensitive anterior temporal lobe (aTL) this correlation was stronger for mismatch of identity than of facial features. The specificity of this identity-mismatch effect decreased from aTL to fusiform face area (FFA) and occipital face area (OFA). During mismatch conditions, there was increased functional connectivity between FFA, OFA and voice-sensitive regions in superior temporal sulcus. As behavioral result face recognition was facilitated during match compared to mismatch conditions. These results suggest that the brain uses face representations during cross-modal person-identity recognition to optimize performance.

## Psychological chocolate deprivation increases the eye blink startle response

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The human eye blink startle response (startle) is sensitive to affective valence of images, it increases for negative and decreases for positive images. Food images are generally associated with a decreased startle, however, caloric deprivation, however, reverses this effect. The mechanisms underlying this aversive processing of appetizing food images under deprivation is unclear. We used a psychological instead of a caloric deprivation by having participants abstain from chocolate consumption for 10 days while consuming other foods as usual. Chocolate image related startle was measured after such chocolate deprivation relative to chocolate satiety. Startle was comparable during images but enhanced during inter-trial intervals under chocolate deprivation. Thus, psychological factors might account from some aspects of caloric deprivation, most likely by rendering the background affective state more negative, possibly due to frustrative non-reward.

## The influence of a product's perceived social function on aesthetic pleasure for visual product designs

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Evolutionary argued, product designs can provide aesthetic pleasure, because they help direct beneficial behavior for people's survival (Tooby & Cosmides, 2001). The two needs for social connection and autonomy benefit survival (Brewer, 1991). People use products to visually express their connection and autonomy to others (Belk, 1988). We investigated the effect of products' perceived potential to fulfill these social needs on aesthetic appreciation. We find (Study 1) that designs' perceived expressed connection and autonomy are positively correlated and both positively influence appreciation ( $r_{connection\ autonomy} = .404$ ;  $R^2 = .409$ ,  $F(9, 278) = 17.164$ ,  $\beta_{connection} = .214$ ,  $\beta_{autonomy} = .178$ , all  $p$ 's  $< .001$ ). Congruently, social-psychological research argues that both needs are simultaneously optimized when someone identifies with a unique group of people (Bettencourt & Sheldon, 2001). Contradicting, optimal distinctiveness theory proposes that optimizing one need automatically diminishes the other (Brewer, 1991). Both situations can occur (Study 2): the correlation between connection and autonomy was negative for designs that are extremes on these needs ( $r = -.329$ ,  $p < .001$ ), but positive for designs that are moderates on these needs ( $r = 0.373$ ,  $p < .001$ ). Including extremes leads to finding curvilinear relationships of both needs with appreciation ( $R^2 = .323$ ,  $F(15, 644) = 18.778$ ,  $\beta_{connection} = .207$ ,  $\beta_{connection \times connection} = .149$ ,  $\beta_{autonomy} = -.034$ ,  $\beta_{autonomy \times autonomy} = -.061$ , all  $p$ 's  $< .05$ ). Concluding, product designs that express an optimal combination of connection and autonomy are the most aesthetically pleasing.

## **Ambiguous health information, treatment choice, and choice strategies**

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Ambiguity is inherent in information about benefits and harms of medical treatments, but it is rarely included in health risk communication. When presented with ambiguous information in monetary gambles, people tend to be ambiguity averse and prefer certain over ambiguous options in the domain of gains, but ambiguity seeking in the domain of losses where they tend to prefer ambiguous over certain options. We aimed at mapping whether the concepts of ambiguity aversion and seeking can be transferred to medical treatment choice. Participants had to choose between two treatments differing in the degree of ambiguity (presented as range) and their average rate of benefits or harms. Results show that participants (1) were able to identify superior options, even when ambiguity was present, and (2) did not tend to be ambiguity averse in the benefits condition or ambiguity seeking in the harms condition. Participants' choice strategies could neither be explained sufficiently by ambiguity aversion nor ambiguity seeking. Large proportions of participants focused primarily on either the lower or upper bounds of the provided ranges, or compared average rates of treatments by focusing on the range's midpoint. Ambiguity in health risk communication might help people better evaluating medical evidence and its limitation.

## **The face of schadenfreude**

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The aim of the present study was to compare facial expressions of joy and schadenfreude, a pleasant feeling to another's misfortune. Schadenfreude was induced by presenting videos showing the Dutch national soccer team messing up penalty kicks and joy was elicited by watching successful penalty kicks of the German team. 32 male subjects, favoring the German team, watched videos while their facial muscle activity was recorded electromyographically and their expressions were videotaped. Participants judged each stimulus according to valence, arousal, experienced joy, schadenfreude and sadness. As expected, schadenfreude videos received the highest schadenfreude ratings and joy videos the highest joy ratings. Subjects further judged joy videos as more arousing and more positive. EMG results revealed that schadenfreude expressions did not differ from joy according to involved muscles (increase of *M. zygomaticus major* and *M. orbicularis oculi*, decrease of *M. corrugator supercilii*, no activity of *M. frontalis medialis*). Amplitudes of each muscular reaction, however, were stronger in the schadenfreude compared to the joy condition. Interestingly, schadenfreude expressions did not occur slower than joy expressions. Results of the video analyses will be presented at the TeaP to clarify whether schadenfreude and joy expressions differ according to facial asymmetries and other facial actions.

## Predicting between-trial fluctuations in response caution from EEG data using the LBA model

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Recent theories of decision-making under time constraints assume that the pre-supplementary motor area (pre-SMA) can facilitate quick responding by decreasing the basal ganglia's tonic inhibition on evolving action plans on the cortex (Forstmann et al., 2008, 2010).

EEG studies have linked the contingent negative variation (CNV), a well-studied slow potential, to the ease with which participants can trigger a response (Elbert, 1990). Source localisation studies have suggested that the CNV originates from brain regions in close proximity to the pre-SMA (Leuthold & Jentzsch, 2001).

To test whether the CNV reflects the same adjustments of response caution implemented by the pre-SMA, we conducted an EEG experiment in which participants had to decide whether a cloud of pseudo-randomly moving dots was drifting to the left or right. Before each trial, participants were prompted to either respond as quickly or as accurately as possible. We obtained estimates of participants' response caution for every trial by fitting a version of the linear ballistic accumulation model (Brown & Heathcote, 2008) to their reaction time data. Our results show increased CNV amplitudes to be related to decreased response caution under speed but not under accuracy instructions, implying that the CNV reflects pre-SMA's mediation of action planning.

## The inter-group comparison – intra-group cooperation hypothesis

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Structural inter-group conflicts have been shown to increase group members' propensity to cooperate within their own group. As inter-group conflicts typically pose zero-sum games or may even destroy resources, however, intra-group cooperation is not collectively efficient in this case. We propose that even in a non-competitive setting the mere comparison to another structurally independent group may increase the level of intra-group cooperation and thus overall efficiency. In repeated public goods provision we experimentally manipulated the participants' level of contribution feedback (intra-group only vs. both intra- and inter-group) as well as the provision environment (smaller groups with higher individual benefits from cooperation vs. larger groups with lower individual benefits from cooperation). Irrespective of the provision environment groups with an inter-group comparison opportunity exhibited a significantly stronger cooperation than groups without this opportunity. Participants conditionally cooperated within their group and additionally acted to advance their group to not fall behind the other group. The individual efforts to advance the own group cushion the downward trend in the above average contributors and thus render contributions on a higher level. We discuss areas of practical application and propose some aspects for future investigation.

## Familiar and beautiful? – How the brain processes familiar and defamiliarized sentences

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While the investigation of aesthetic judgments with neuroscientific methods has become more popular during recent years, the focus on experimental neuroscience of aesthetics is in the domain of art perception, facial attractiveness, and music. Experiments on the neural coding of aesthetic judgments of literature and/or poetry have been missing so far. Here we present data from an fMRI experiment in which the familiarity of proverbial sentences was manipulated to investigate effects of fluency and defamiliarization during silent reading. Defamiliarized versions of familiar proverbs put the readers in a mode of affective evaluation by activating medial prefrontal cortex, and the bilateral temporal poles. However, a positive correlation between familiarity and post-scan beauty ratings was observed. The highly familiar original proverbs were preferred over all other conditions. With a second analysis of the fMRI data, parametric responses to beauty ratings were detected in the caudate part of the ventral striatum. These results suggest that spontaneous beauty evaluation takes place during silent reading and that sentences that activate parts of the reward system are later judged as being especially beautiful.

## Motivation to succeed / avoid failure connection with team role among economists and engineers of production enterprise

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The *objective* of this research is to find connections between motivation to succeed / avoid failure and management team roles. The research was conducted among management teams of engineers and economists at "DniproAzot" plant in 2011. Orientation to main team roles was revealed by Belbin's method. Motivation to succeed / avoid failure was revealed by Ehlers' tests. 80 managers participated in the research among them 38 were economists and 42 – engineers. *Results* showed statistically significant differences in motivation to succeed between engineers and economists ( $p \leq 0.05$ ). Economists strive for success more. There were no statistically significant differences between engineers and economists in motivation to avoid failure and team roles. In the group of economists-managers a positive correlation ( $p \leq 0.01$ ) was found between the role of completer and motivation to avoid failure. Also in this group a negative correlation ( $p \leq 0.05$ ) between the role of resource investigator and motivation to avoid failure was revealed. In the group of engineers-managers a positive correlation ( $p \leq 0.05$ ) was found between the role of shaper and motivation to succeed. Also in this group a negative correlation ( $p \leq 0.05$ ) between the role of shaper and motivation to avoid failure was revealed.

## How female rats differ between hormonal states in conspecifics

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Rats emit 50kHz ultrasonic calls in social encounters like mating. These short high frequency vocalisations represent pleasure and positive affect, but are also emitted in neutral or aggressive situations. To explore differences of calling behaviour between sexual and non-sexual social encounters, as well as to improve the internal differentiation of 50kHz calls, the vocalisations of female rats were recorded in same-sex and opposite-sex situations. Females were exposed to individuals of both sexes that were in different hormonal conditions. Our results showed that female rats vocalised more frequently in reproductive encounters. In contrast, they emitted the same amount of 50kHz calls towards other females. Thus, higher rates of 50kHz vocalisation seem to be associated with sexual arousal, interest and pleasure. Considering the huge contextual differences in 50kHz calls, the subdivision into frequency modulated (FM) and constant calls offers a more detailed view of the expressive meaning of rat vocalisations. Our findings suggest a functional differentiation of 50kHz calls: While FM calls signal reward and positive affect, constant calls seem to indicate neutral, ambivalent or aggressive states of the female rat. Generally, 50kHz ultrasonic vocalisations in rats might not be a clear measure of positive activation but have emotional and communicative functions.

## The effects of a combined GABA-B/GHB receptor stimulation on social cognition and oxytocin secretion

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Gamma-aminobutyric acid (GABA) is an important inhibiting neurotransmitter in the human brain and stimulation of GABA<sub>A</sub> and GABA<sub>B</sub> receptors leads to a variety of effects on cognition, mood, anxiety, and neuroendocrine functions. The GABA metabolite  $\gamma$ -hydroxybutyrate (GHB) is found in high concentrations in the central nervous system and acts itself also as a neurotransmitter. Despite its high affinity to specific GHB receptors, most of the neuronal and behavioral effects of GHB are mediated by agonist action at GABA<sub>B</sub> receptors. Additionally, GHB is an illegal drug ("*liquid ecstasy*") that is recreationally used to enhance sex and sociability or to achieve altered states of consciousness. Animal studies suggest that oxytocin release might be responsible for prosocial and prosexual effects of GHB but studies in humans are lacking so far. We therefore investigated the effects of GHB on empathy, emotion recognition, mental perspective taking, social gaze behavior, sexual arousal, as well as social decision-making and altruism in 32 healthy volunteers with a placebo-controlled, cross-over, double-blind study design including two doses (n=16: 20mg/kg and n=16: 35mg/kg). Moreover, we determined plasma level profiles of oxytocin and testosterone, which were related to cognitive function. Results of the study will be presented and discussed at the conference.

## **Emotional arousal and episodic memory: A model-based approach**

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Episodic remembering entails the retrieval of contextual information from the encoding episode, such as perceptual features or impressions associated with the event and at the same time such memories are often experienced vividly. Theorists have invoked the role of emotional arousal in order to explain why some events are later remembered in an episodic fashion while others are merely familiar. In the present research the effects of emotional arousal on memory was investigated experimentally using neutral words and taboo words in a combined remember-know/source-memory paradigm. Results suggests that emotional arousal due to taboo words lead to increased rates of conscious recollection but to lower levels of context memory than for neutral words. Model-based results, however, indicate that in addition to increases in the probability of conscious recollection, taboo words also led to a more liberal response criterion than neutral words. Furthermore, the degree of stochastic dependency in context memory was comparable for neutral and taboo words, a result which directly contradicts predictions of prominent accounts of emotion and memory.

## **Interacting systems? Role of implicit learning, emotional interference and executive functions in decision making**

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Decisions under ambiguity are frequently assessed with the Iowa Gambling Task (IGT) and were found to be related to the intuitive system (Turnbull et al., 2005). By contrast, decisions under explicit risk conditions, e.g., measured with the Game of Dice Task (GDT) are supposed to more strongly depend upon the deliberative system (Starcke et al., 2011). These results match with functional imaging (Labudda et al., 2008) and behavioral data (Brand et al., 2008). Now, we investigated in two experiments the role of implicit learning, emotional interference and executive functions in decision making. The first study (two samples, n=82) showed that including task-irrelevant emotional pictures in the IGT decreases the probability that the choices' contingencies are implicitly learned, which emphasizes the role of intuition in IGT performance. In the second study (n=192), we found that the learning phase of the IGT (first 40 trials) could not predict GDT performance, but executive functions did. By contrast, the "deliberate" phase of the IGT (last 60 trials) predicted GDT performance, moderated by the subjects' level of executive functioning. The studies' results indicate that intuition and deliberation act in concert in predicting decision making depending upon the decision situation and characteristics of the decider.

## **Predicting drivers' speed choice using the Components of Speed Behavior (CSB) model**

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To date, inappropriately adjusted driving speed is still one of the main causes for traffic accidents (e.g. Aarts et al., 2011). Recent theoretical approaches of modelling speed behaviour assume that the choice of speed is determined by environmental characteristics and drivers' capabilities (e.g. TCI, Fuller, 2005; CSB Brandenburg & Thüning, 2012). However, only the Components of Speed Behavior (CSB) model of Brandenburg & Thüning (2012) is of sufficient detail to predict numerical values for choice of speed in a certain driving situation. Hence the present work introduces the results of two experiments. The first experiment was used to estimate the impact of environmental characteristics on choice of speed. Using these estimates, the CSB model was fitted to the data. Moreover, the fitted model was used to predict values for the choice of speed of the second experiment. Results show, that the CSB was able to a priori predict empirical data from the second experiment very well. Mean correlations of predicted and empirical data were  $r=0.51$  and  $r=0.71$  for driving performance and acceleration. Hence it can be concluded that the Components of Speed Behavior Model is a good approximation of drivers' speed choice.

## **Consequences of being imitated**

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Imitation leads to positive social consequences for the person who imitates. In the first part of my talk I will report an fMRI study investigating the neural basis of being imitated. In the second part, I will outline a series of experiments testing whether being imitated increases empathy for pain. In particular, we investigated whether a videotaped hand that imitates the participant and afterwards receives painful stimulation elicits a stronger emotional response than a hand that does not imitate. The results show increased empathy for pain when being imitated as indicated by an increased startle reflex, ratings of pain intensity and motor evoked potentials. The effects of being-imitated seem to result from self-other confusion.



## Contextual effects on time estimation in dual-task performance

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In the psychological refractory period (PRP) paradigm, participants are asked to provide separate speeded responses to two stimuli (S1 and S2) which are presented with varying stimulus onset asynchrony (SOA). Response time to the second stimulus (RT2) typically increases with decreasing SOA (i.e., the PRP effect). Previous studies have demonstrated that participants are largely unaware of this PRP effect. Specifically, subjective estimates of RT2 have been shown to be independent of SOA. In the present study, after each PRP trial participants had to indicate whether a comparison interval was shorter or longer than their RT2. Psychometric functions were then fitted to the resulting data. The point of subjective equality (PSE) was independent of SOA when SOA varied within blocks of trials (Experiment 1). However, when SOA was constant within blocks, the PSE showed a clear PRP effect (Experiment 2). The results suggest that subjective estimates of RT2 are based on an internal reference that represents a mixture of previously experienced RT2s.

## Discrete emotions affect visual word recognition

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Research about affective visual word processing mainly focuses on valence and arousal effects, i.e. testing a two-dimensional affective space model. Alternative approaches are surprisingly rare, despite the heterogeneity of previous results concerning the effects of negative valence and the neuroanatomical localization of the involved structures (Citron, 2012). Discrete emotion theories, in contrast, differentiate at least between four negatively valenced emotions – sadness, anger, fear, and disgust and were considered as a promising alternative to account for this heterogeneity in the present study. An automatic backward elimination procedure on 14 variables important for visual word recognition was used to identify the best predictors for lexical decision response speed. Three out of five discrete emotions but neither valence nor arousal survived. A multiple regression model including five discrete emotion variables confirmed this result, performing considerably better than published dimensional models. Two additional experiments manipulating discrete emotions but controlling for valence and arousal showed comparable results in a different language. In summary, the results suggest that discrete emotions can account for response speed and accuracy variance that is not explained by valence and arousal models – a promising basis for further neurocognitive testing using neuroimaging methods or even TMS.

## **Perception of abstract art – homogeneous or totally different? An empirical study of an art-historical problem**

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The slogan “Abstraction as world language” (Werner Haftmann) was propagated by many artists and art historians of the postwar era, who considered abstract art as universally comprehensible, without presuppositions, independent of cultural, political or historical contexts. Artists had accordingly the ambition to allow the unprejudiced and unbiased act of seeing through abstract paintings. In order to provide an empirical test of these strong assumptions we recorded the eye-movements of 40 participants. Information on their cognitive and emotional response behavior was collected in partly-standardized questionnaires. If the stated assumptions are correct, there should be much smaller interindividual differences in the perception of abstract paintings compared to representational art. Participants saw five abstract and five representational paintings for 2 minutes each. To ensure that differences in the perception cannot be traced back to formal criteria of the artwork, all abstract paintings were matched to representational counterparts, according to dynamics, color and composition. Analyses will also consider expert status and sociodemographic data collected for each participant. Preliminary results show significant intersubjective differences as well in representational art as in abstract art, that are not in accordance with Haftmann’s assumption.

## **(Micro-) State dependent perceptual awareness**

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Multi-stable stimuli and stimuli at the perceptual threshold are powerful vehicles to discern perceptual awareness from sensory processing since identical stimuli undergo different perceptual fates. Those differences cannot arise from differences in physical stimulus properties but they are more likely to arise from differences in the momentary state of the brain. EEG microstates represented by the scalp topography reflect all concurrently active neuronal sources and are a momentary measure of overall brain activity. We assessed changes perceptual awareness with multi-stable stimuli (Necker cube & binocular rivalry) and the emergence of awareness with threshold stimuli. Multi-stable stimuli were presented intermittently, and in both cases, we identified two microstates that doubly dissociated perceptual reversals from stability. Statistical parametric mapping of their intracranial generator differences revealed that perceptual reversals were initiated in right inferior parietal cortex in both conditions. Percept stabilization occurred in the ventral stream, but only for binocular rivalry. We assessed differences in the emergence of perceptual awareness with a 2AFC task in a backward masking paradigm and compared correct target identification with and without awareness. Two states doubly dissociated these two conditions, and their concomitant source difference revealed increased current density in primary visual cortex before correct but unaware identification.

## Stock-Flow-Systeme verstehen: Wie hilfreich ist eine Veränderung der Darstellung von Flussgrößen?

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Stock-Flow-Systeme sind einfache dynamische Systeme. Sie bestehen aus einem Zufluss und einem Abfluss, in deren Abhängigkeit sich der Inhalt des Systems ändert. Relevante Beispiele sind der CO<sub>2</sub>-Gehalt in der Atmosphäre (Inhalt), der sich in Abhängigkeit des CO<sub>2</sub>-Ausstoßes (Zufluss) und CO<sub>2</sub>-Abbaus (Abfluss) ändert oder die Staatsverschuldung, die von Neuverschuldung und vom Schuldenabbau abhängt. Personen, denen die Zu- und Abflussgrößen gezeigt werden, haben große Probleme den entsprechenden Inhalt einzuschätzen (Sweeney & Sterman, 2000, Ossimitz, 2002). Versuche zur Verbesserung der Lösungsgüte wie Erhöhung der Motivation, oder eine Rückmeldung über die Lösungsgüte waren kaum wirksam (Cronin et al., 2008). Unser Ziel war, intuitives Verstehen der Aufgaben zu fördern. Unsere Grundlage waren Befunde zur Rolle des Darstellungsformats auf Verstehens- und Lernprozesse (Krämer, 2001; Sedlmeier & Hilton, 2012). Wir untersuchten in zwei Experimenten, ob Änderungen der externen Repräsentation der Stock-Flow-Aufgaben das Lösen erleichtern. Eine derartige Änderung war beispielsweise eine diskrete Abbildung der Flussgrößen, die für die einzelnen Zeitpunkte dargeboten wurde. Weiterhin untersuchten wir, ob ein Transfer auf Aufgaben im ursprünglichen Format stattfindet. Die vereinfachte Darstellung der Aufgaben erleichtert das Lösen, es findet jedoch kaum Transfer statt.

## Validating a discrete memory-states measurement model for confidence rating data in recognition

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Signal detection models (SDT) as well as the Two-high-threshold model (2HTM) have been used successfully as measurement models in recognition tasks to disentangle memory performance and response biases. A popular method in recognition memory is to elicit confidence judgments about the presumed old-new status of an item, allowing for the easy construction of ROCs. Since the 2HTM assumes fewer latent memory states than response options are available in confidence ratings, the 2HTM has to be extended by a mapping function which models individual rating scale usage. Unpublished data from 2 experiments in Bröder & Schütz (2009) validate the core memory parameters of the model, and 3 new experiments show that the response mapping parameters are selectively affected by manipulations intended to affect rating scale use, and this is independent of overall old-new-bias. Comparisons with SDT show a better fit of the 2HTM to aggregated data, a slightly worse fit to individual data, and similar strengths and weaknesses of both measurement models in terms of parameter validity.

## **Compounds revisited: Do pragmatics win over logic in the processing of complex words?**

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There is growing evidence that morphologically complex words in Germanic languages are parsed into their constituents as they are processed. Yet, it is hotly debated under which circumstances lexical access to complex words proceeds via whole-word forms. One factor that might influence the existence of whole-word forms is word frequency: Complex words that are frequently encountered might possess a whole-word form. We tested this hypothesis in two visual lexical-decision studies in German and Finnish. Compounds of either high or low whole-word frequency were matched in frequency and length with morphologically simple words. Whereas the German compounds showed strong signs of decompositional processing, all Finnish compounds seem to possess whole-word form representations, even the low-frequency ones. The implication of these findings from different languages for models of morphological processing will be discussed.

## **Early electrophysiological correlates of metacontrast masking reflect spatio-temporal stimulus properties, not subjective visibility**

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Several studies have measured electro- or magnetoencephalographic correlates of metacontrast masking trying to identify neural signatures of subjective visibility. Typically, these studies compare conditions under which identical targets are sometimes well visible and sometimes not. Two approaches are common: (A) identical targets are followed by either effective or ineffective masks, where mask effectiveness is manipulated by changing its spatial and/or temporal properties; (B) by exploiting trial-by-trial fluctuations of visibility to split the data of physically identical trials post-hoc into high versus low visibility conditions. We present two EEG experiments where we compared both approaches. In Experiment I, we compared ERPs to Gabor gratings masked by collinear or orthogonal grating annuli, knowing from previous experiments that only at intermediate SOAs visibility was reduced stronger by collinear than orthogonal masks. The results show that early ERP correlates of masking were purely stimulus dependent, not percept dependent. In Experiment II we varied again the orientation contrast but also the spatial frequency contrast between target and mask. The results demonstrate that the stimulus dependence was caused by interactions within spatial frequency-selective channels. The results help to clarify when neural correlates of metacontrast can be attributed to subjective visibility and when to physical stimulus properties.

## **A field experiment on enhancing payment morale in an honesty-based sales system**

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In this experimental field study we tested the effectiveness of cues such as eye images and descriptive social norms on payment morale. Our setting involved the “silent sale” of quality newspapers in Vienna – an honesty-based sales concept commonly applied in Austria despite average payments of readers being rather low. To investigate the impact of the cues, we collected data for three experimental groups and one control group in an alternating scheme of control and intervention periods for a total of 24 weeks, giving a total of 60 observations per group and period. Results of our study only partly confirm prior findings on the effectiveness of eye images as subtle, cooperation-fostering cues. The presence of eye images increased payment morale only below significant level. The presence of a message containing a descriptive social norm did not show any effect, while the combination of an eye image with a descriptive social norm had a positive effect on payment morale. This effect was significant in one of the three intervention periods. Our outcomes raise important further questions, e.g. regarding possible habituation effects as well as the efficacy of eye images as visual cues in settings different from those already known from literature.

## **Effects of plausibility and imageability on relational belief revision**

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Belief revision occurs if a person realizes that newly acquired evidence contradicts an existing belief. We present experiments on relational belief revision in which participants had to change their mind about the spatial and non-spatial relations between objects. The participants received information about relations from which they drew conclusions, which were subsequently contradicted by irrefutable evidence. The task of participants was to decide which of the initial relations to retain and which to give up. Previous experiments showed that these decisions are guided by the linguistic asymmetry between reference objects (RO) and located objects (LO). Reasoners have a strong preference to relocate the LO of the relational expression. We conducted experiments to explore the robustness of this LO-preference. We investigated whether the LO-preference can be overwritten by the plausibility of the revised beliefs and how the ease of mentally visualizing these relations affects revision. We found that the LO-preference is a robust effect even if the resulting representation is implausible. Moreover, the process of relational belief revision is impeded if the described situation is easy to visualize. The results shed new light on how humans mentally revise their beliefs about spatial and non-spatial relations between objects.

## Neural changes in depressed patients during psychodynamic psychotherapy: An fMRI study

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Neuroimaging studies of depression have demonstrated treatment-specific changes involving the limbic system and regulatory regions in the prefrontal cortex. While these studies have examined the effect of short-term, interpersonal or cognitive-behavioural psychotherapy, the effect of long-term, psychodynamic intervention has not been assessed. We investigated recurrently depressed (DSM-IV) unmedicated outpatients (N=16) and control participants matched for sex, age, and education (N=17) before and after 15 months of psychodynamic psychotherapy. Participants were scanned at two time points, during which presentations of attachment-related scenes with neutral descriptions alternated with descriptions containing personal core sentences previously extracted from an attachment interview. Outcome measure was the interaction of the signal difference between personal and neutral presentations with group and time, and its association with symptom improvement during therapy. Signal associated with processing personalized attachment material varied in patients from baseline to endpoint, but not in healthy controls. Patients showed a higher activation in the left anterior hippocampus/amygdala, subgenual cingulate, and medial prefrontal cortex before treatment and a reduction in these areas after 15 months. This reduction was associated with improvement in depressiveness specifically, and in the medial prefrontal cortex with symptom improvement more generally. This is the first study documenting neurobiological changes in circuits implicated in emotional reactivity and control after long-term psychodynamic psychotherapy.

## The COMT Val158Met polymorphism modulates working memory performance under acute stress

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One of the most widely studied genetic polymorphisms regarding cognitive and emotional phenotypes is the COMT Val158Met polymorphism that influences dopamine availability in the prefrontal cortex (PFC). The PFC is the key brain structure for higher cognitive functions such as working memory, as well as an important regulatory site and target of the psychoendocrine stress response. Dopamine is thought to influence PFC functions in an inverted u-shaped manner. Thus, a stress-related increase in prefrontal dopamine is hypothesized to exert differential effects on working memory performance depending on the genetically determined baseline dopamine level in the PFC. We present data of thirty-three healthy young subjects homozygous for the COMT Val158Met polymorphism who performed an n-back working memory task after exposure to a laboratory psychosocial stress induction paradigm. Under stress, working memory performance of Met homozygotes was significantly worse than working memory performance in Val homozygotes. Importantly, this genotype effect was restricted to the medium difficulty level of the n-back task. Our results demonstrate that working memory performance under stress is influenced by genetic variation in prefrontal dopamine levels. More generally, our results point to the importance of considering the complex interaction of genes, environment, and task variables.

## Valence asymmetries in evaluative priming are based on similarity differences

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Evaluative Priming is a widely used paradigm to study cognitive processes, especially the automaticity of attitude activation, primacy of affect, or general context influences on evaluations. In most cases, it relies on response latency comparisons of evaluatively congruent and incongruent trials; that is, when primes and targets have the same or different valence, respectively. Valence asymmetries were repeatedly found in the literature. We claim that these valence asymmetries are not caused by valence per se, but by differences in prime-target similarity. We define prime-target similarity as the average distance of primes to their respective evaluative congruent and incongruent targets in a multidimensional space. As positive stimuli are more similar to each other than negative stimuli (i.e., more densely clustered), valence and density are confounded. Eight experiments show that prime-target similarity predicts congruency effects in evaluative as well as semantic priming: High density prime-target pairs show response facilitation, whereas low density prime-target pairs show no facilitation irrespective of valence. The results stand in contrast to general inhibition models of responses towards negative stimuli.

## **Prestimulus alpha oscillations affect visual perception via response gain modulation**

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It has long been known that ongoing alpha oscillations, as observed with electroencephalography (EEG), impair detection of sensory stimuli, but little is known about the mechanisms subtending this effect. Studying these mechanisms requires a better understanding of the psychophysical effects of alpha oscillations from a modeling perspective. To this end, we studied performance in a simple visual detection task using stimuli of different contrast intensities with concomitant EEG recordings. We used independent component clustering to isolate alpha activity originating specifically from posterior cortices and to dissociate it from the more anterior sensory-motor mu rhythm that occurs in the same frequency band. We then compared the effect of prestimulus alpha and mu oscillations on detection performance using information theoretic measures to assess the fit of several different models of psychophysical performance. The results indicate that, whereas prestimulus mu rhythm has no effect on performance, ongoing occipital alpha oscillations affect psychometric functions with a multiplicative response gain. This experiment is, to our knowledge, the first attempt to model the psychophysical effects of ongoing brain oscillations. We discuss the implications of these results for the role of alpha oscillations in sensory computations, and discuss their relation to previously observed effects of attention.

## **Truth and context effects in multiple-choice items with positive and negative stem orientation**

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Due to a truth effect that enhances the plausibility of information that is presented repeatedly, multiple choice testing may inadvertently enhance the confidence in wrong knowledge. For example, the plausibility of the many incorrect distractors that are presented in an item with a positive stem orientation may be enhanced. A potential way to reduce this problem is to present items with a negative stem orientation (“Which of the following options is wrong?”) instead of a positive stem orientation (“Which of the following options is correct?”). Items with a negative stem orientation may actually lead to a positive learning effect if the truth effect enhances the credibility of the correct distractor information. However, if examinees metacognitively take the stem orientation into account, they may discount the plausibility of the mostly wrong options that are presented in items with a positive stem, and they may enhance the plausibility of the mostly correct options that are presented in items with a negative stem. Depending on an item’s stem orientation, such strategic context effects will either enhance or reduce a potential truth effect. We report an experiment that determined the relative magnitude of these two effects in a test of spelling ability.



## Serial position effects in preference construction

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In a recent study, Mantonakis, Rodero, Lesschaeve, and Hastie (2009) found that items presented in the beginning and at the end of a sequence were preferred over items presented in the middle, even though the items were of identical quality. To account for these primacy and recency effects, the authors proposed a model according to which people start by preferring the first encountered item and tend to stick with this preference when encountering new items in the sequence. We implemented this model in a computer simulation and extended it to a situation in which the items differ in quality. How robust are primacy and recency effects when preference is also a function of the objective quality of the items? Assigning certain qualities to the different items led to increased recency and decreased primacy effects. Overall, however, the serial position effects were robust, even with large quality differences between the items, suggesting that they might have substantial implications in real-world settings.

## The role of knowledge in the use of the recognition heuristic

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The recognition heuristic (RH; Goldstein & Gigerenzer, 1999) states that when deciding between two objects, with one being recognized by the decision-maker and the other not, choice will lie on the recognized one. According to its initial formulation, the RH relies upon a binary recognition process and ignores further information. Therefore, further information about a recognized object and the underlying memory states should be inconsequential. However, further studies suggest that the availability of additional knowledge inhibits the adoption of the RH. Furthermore, according to the memory state heuristic (MSH; Erdfelder, Küpper-Tetzel, & Mattern, 2011) framework, the underlying memory state should affect the decision: recognition certainty should increase the probability of using the RH. The present work attempts to assess these three approaches by means of the  $r^*$ model, a multinomial processing tree model that is an extension of the  $r$ -model (Hilbig, Erdfelder, & Pohl, 2010). Several data sets were re-analysed under the  $r^*$ model, showing that when participants have additional knowledge about the recognized object they use the RH more often than when the recognized object is merely recognized. This result is consistent with the MSH framework. Implications for the role of memory processes in the use of the RH are discussed.

## **When awareness of those we cannot help demotivates us from helping those we can help: An agent-based simulation study of pseudoinefficacy**

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Using a virtual simulation Agent Based Model (ABM) we explore the consequences of the pseudo-inefficacy effect found in the laboratory by Västfjäll & Slovic (2011). The pseudo-inefficacy effect describes how the anticipated warm glow of satisfaction associated with helping and the resultant motivation to help decreases when we learn that there are some people who cannot receive help. This is a non-rational response.

In ABM simulation we programmed two types of agents that help: Pseudo-inefficacy helping agents (PI) and rational helping agents (R) not affected by pseudoinefficacy, and two types of agents that need help: agents that can be helped (H), and agents that cannot be helped (NH). The presence of NH agents influences negatively the warm-glow level and the motivation to help of the PI agents.

We manipulated the ratios between H vs. NH agents in the population in order to explore the changes in the simulation in three situations: same proportion of H vs. NH agents and different proportion of agents [1:5] and [5:1]. The study demonstrates the value of ABM modeling by replicating previous laboratory results and then illustrating how these results might be affected when PI agents learn the base-rates of NH agents in the populations.

## **Neural mechanisms underlying the learning and exploitation of unconscious contextual memory**

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What brain mechanisms subtend learning and utilization of unconscious memory in contextual cueing? We suggest that learning in this task occurs through a process of selection of the most reliably activated neural connections – also called sharpening – in response to the contextual cueing displays. A sharpened neural representation could be activated extremely rapidly and lead to a more efficient attentional deployment. Here we highlight the critical role of high frequency oscillations in this process. In a contextual cueing experiment performed under magnetoencephalography (MEG), we showed that a specific type of high frequency (gamma-band) oscillations occurs selectively during the early part of the experiment, while displays are being learned, and disappears as soon as the behavioural effect (shortened reaction times) onsets. Following a wide literature showing that gamma-band oscillations are involved in learning and plasticity, we propose that these oscillations correspond to the sharpening of a more efficient neural representation of the contextual cueing displays. In line with this idea, in the later part of the experiment, the gamma-band oscillations disappear and give way to a rapid activation of higher order areas. Together, these findings may reveal a general principle of sensory information processing optimization in the brain.

## How to connect sales with donations: The effect of numeracy on cause-related marketing

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Cause related marketing (CRM) is a selling strategy to improve the success of a product by including a donation to a charitable cause into the product price. Research has shown that CRM is more successful when the amount of the charitable contribution is provided in absolute (vs. percentage) terms. For example, if a product costs 100 Euro and includes a 10 Euro charitable gift, describing it as “10 Euro” donation would work better than as a donation of “10%”. In the current experiment, we examine whether this effect is moderated by individual differences in numerical comprehension (i.e., numeracy). Numeracy is defined as the ability to comprehend and apply numerical information and focuses on frequencies, proportions and percentages. We tested the effect of CRM in absolute vs. percentage presentation modes on product evaluations in 102 participants. The results show that for product ratings, the presentation mode is irrelevant for people with higher numeracy, while people with lower numeracy rated products better if the presentation mode of the donation was absolute. The present study suggests that CRM should be tailored towards the individual differences in numerical perception.

## Stimulus complexity does not explain differences in auditory processing of speech and non-speech stimuli as revealed by MMN

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In most studies comparing the processing of speech versus non-speech stimuli the complexity of both stimulus types was not matched. One elegant solution to circumvent this potential confounding factor is to use spectrally rotated speech stimuli, as already done in a series of earlier fMRI and PET studies. In our study we investigated whether speech and spectrally rotated speech stimuli are processed differently in healthy adults, using the Mismatch Negativity (MMN) as index of auditory processing. The aim was to compare the characteristics of the MMN evoked by vowels with those evoked by their spectrally rotated counterparts. In order to investigate the impact of stimulus complexity, a second non-speech condition was included, with two bands of sinusoidal waves representing the first two formants of the vowels, respectively. Deviants within a modified multi-feature design differed either in duration or spectral information. Vowels resulted in higher MMN amplitudes when compared to spectrally rotated vowels and bands of sinusoidal tones. No effect of complexity was observed. These results show that speech stimuli are processed distinctively from non-speech stimuli, independent from stimulus complexity.

## **Hot temperature affects perceived interpersonal warmth differently depending on social context**

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According to conceptual metaphor theory, people think about abstract concepts partially in terms of more concrete vehicles. It has been found that holding a hot cup of coffee makes people perceive a hypothetical person as "warmer" than holding a cup of iced coffee (Bargh & Williams, 2008). Yet HEAT in English can be associated with ANGER as well as HEAT. The aim of the present study was to investigate whether the manipulation of social context leads to the activation of one metaphor over another. We expected that the metaphor PERSONAL WARMTH as HEAT would be more relevant and therefore activated when a hypothetical person represents an ally; whereas ANGER as HEAT would be activated when the person represents an adversary. In 3 experiments, we found no evidence that the metaphor ANGER as HEAT was activated. Nevertheless, a significant modulation of PERSONAL WARMTH as HEAT by the social context was found: adversaries were judged as "warmer" when participants had experienced heat, whereas no effect emerged for allies. These results suggest that modulation of metaphorical mappings is possible, with out-group members being more strongly affected by the perception of physical heat.

## **The genetic impact (C957T-DRD2) on inhibitory control is magnified by aging**

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Healthy aging beyond the age of 65 is characterized by a general decrease in cognitive control over actions: old adults have more difficulty than young adults in stopping overt responses. Responsible for this cognitive decrement is the continuous decline of striatal and extrastriatal dopamine (DA). The resource modulation hypothesis assumes that genetic variability is more likely to result in performance differences when brain resources move away from close-to-optimal levels, as in aging. To test this hypothesis we investigated, first, whether individual differences in the C957T polymorphism at DRD2 gene contribute to individual differences in the proficiency to inhibit behavioral responses in a stop-signal task. Second, we assessed whether this genetic effect is magnified in older adults, due to the considerable decline in dopamine function. Our findings show that individuals carrying genotype associated with higher density of extrastriatal D2 receptors (C957T CC) were more efficient in inhibiting unwanted action tendencies. This effect was stronger in older than in younger adults. Our findings support the idea that aging-related decline in dopamine availability alters the balance between genotypes and cognitive functions.

## Object-based segmentation limits implicit contextual learning in visual search

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In visual search, detection of a target is faster when it is presented within a spatial layout of repeatedly encountered nontarget items, indicating that contextual invariances can guide selective attention (contextual cueing; Chun & Jiang, 1998). However, perceptual regularities may interfere with contextual learning; for instance, no contextual facilitation occurs when four nontargets form a square-shaped grouping, even though the square location predicts the target location (Conci & von Mühlenen, 2009). Here, we further investigated potential causes for this interference-effect: We show that contextual cueing can reliably occur for targets located within the region of a segmented object, but not for targets presented outside of the object's boundaries. Our results demonstrate an object-based facilitation in contextual cueing, with a modulation of context-based learning by relatively subtle grouping cues including closure, symmetry, and spatial regularity. Moreover, the lack of contextual cueing for targets located outside the segmented region was due to an absence of (latent) learning of contextual layouts, rather than due to an attentional bias towards the grouped region. Taken together, these results indicate that perceptual segmentation provides a basic structure within which contextual scene regularities are acquired. This in turn argues that contextual learning is constrained by object-based selection.

## Objective versus subjective: Trusting a cognitive workload measurement

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One of the prevalent issues modern ergonomists face is how to optimize in-vehicle activity so that the driver is not distracted from the driving task. In order to estimate distraction, methods of measuring in-vehicle distraction must be developed, tested, and validated. Methodologies involving eye-tracking and occlusion, to name a few, have already been established in response to the need to measure visual and manual distraction. However, the next big challenge regards a less overt distraction—namely, cognitive distraction. In assessing cognitive distraction, it has been proposed that if we find a way to measure the cognitive workload induced by a task, so too can we infer the level of distraction caused by this task. At the moment, detection response tasks (DRTs) are the measurement being used to quantify cognitive workload. The current article presents an experiment where cognitive workload was manipulated. Here, a comparison of the subjective and objective data are made. The aim is to evaluate how compatible the object and subjective data are. Results show that the two measurements are sometimes similar, however do not identically reflect each other's values. Implications are discussed.

## **Reactive cognitive control and conflict detection: ERPs reveal life-span differences during a cued task-switch paradigm**

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Up-regulating cognitive control is closely associated with detecting response conflict. While older adults frequently experience increased response conflict, they typically maintain high accuracy by sacrificing speed. By contrast, children commit many errors despite long reaction times, due to a deficit in conflict detection or up-regulation of control or both. Here, children in grade two (7-8 years) and grade five (10-11) as well as young (20-25) and older (65-74) adults were instructed to emphasize either accuracy or speed during a cued task-switch paradigm. Event-related potentials (ERPs) were recorded to determine age differences in the neural correlate for reactive control (pre-response negativity, PRN) and post-response conflict detection (medio-frontal negativity, MFN). Behavioral data indicate adjustments in response criteria in young adults, but scarcely for children and older adults. Starting 200 ms pre-response, ERPs revealed a (left-) frontal PRN for adult participants. In young adults, it was observed under accuracy instructions, but across task-conditions for older adults. Both groups of children appeared unable to up-regulate cognitive control. Post-response MFN amplitudes revealed a deficit in detecting conflict for young children only, suggesting older children detect response conflict, but cannot efficiently counteract it. By contrast, both conflict and reactive control were elevated for older adults

## **The impact of Aha! Experiences on solution memory**

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We investigated a possible memory advantage for solutions that were reached through insightful problem solving, expecting that insight solutions (with Aha! experience) would be recalled better than noninsight solutions (without Aha! experience). We used magic tricks as a novel problem solving paradigm. 50 participants were presented with 34 video clips of magic tricks and had to find out the secret method of the trick. Upon discovering the solution, participants had to indicate whether they had experienced insight during the solving process. After a delay of 14 days, a recall of solutions was conducted. Overall, 55% of previously solved tricks were recalled correctly. Comparing insight and noninsight solutions, 64.4% of all insight solutions were recalled correctly, whereas only 52.4% of all noninsight solutions were recalled correctly. We interpret this finding as a facilitating effect of previous Aha! experiences on the recall of solutions.

## Thermografische Erfassung mentaler Beanspruchung im realen Straßenverkehr

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Das kontinuierliche Monitoring von mentaler Beanspruchung kann helfen komfort- und sicherheitskritische Überforderungssituationen zu erkennen, die z.B. im Straßenverkehr auftauchen und so einen Unterstützungsbedarf des Fahrers indizieren können. Ein Ansatzpunkt für die Entwicklung von Monitoring Systemen lässt sich aus der thermografischen Analyse der Gesichtstemperatur ableiten. Insbesondere Veränderungen der Oberflächentemperatur der regio frontalis, regio buccalis/infraorbitalis sowie der Glabella Region sind vielversprechende Indikatoren für mentale Beanspruchung. Die periphere Vasodilatation der Haut beruht auf einer Ausschüttung von Adrenalin und Noradrenalin aus dem Nebennierenmark. Gestützt auf diese Hypothesen wurde im Rahmen einer realen 20 minütigen Autofahrt im Stadtverkehr (N=10) die mentale Beanspruchung alle 5 Minuten über eine Kopfrechenaufgabe in 2 Stufen variiert. Die jeweils auch alle 5 Minuten abgefragte selbstberichtete mentale Beanspruchung zeigte in unterschiedlichen Gesichtsregionen deutliche Zusammenhänge zu Oberflächentemperaturveränderungen im Gesicht des Fahrers.

## Complementary neural systems for language learning and adaptation

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The human language system achieves unmatched success in speech comprehension despite the perceptual and linguistic challenges that abound in every day communication. One mechanism that may be central to this success is that the language system continually learns from and adapts to novel or ambiguous speech input. I will review evidence for complementary neural systems that support these processes of learning and adaptation. We build on evidence for distinct contributions of hippocampal and neocortical systems for initial lexical learning and subsequent overnight consolidation respectively (cf. Davis & Gaskell, 2009). Neural and behavioural dissociations of these systems have been shown for spoken word learning, and recent behavioural evidence would suggest that similar mechanisms also operate in the acquisition of other linguistic representations (morphemes or meanings). In contrast, more rapid learning processes are apparent when the language system adapts and adjusts to transient ambiguities presented in perceptually or linguistically constrained contexts. These processes are apparent for disambiguating words with multiple meanings, hearing ambiguous speech sounds, and perceptual learning of degraded speech. These findings motivate neural separation of rapid tuning, and slower consolidation-based acquisition. Both mechanisms combine to explain the successes and failures of adult language learning.

## **Dissociating the what and how components of cognitive control in task preparation**

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Cognitive control processes refer to the ability to flexibly adapt one's thoughts and actions in the pursuit of an internal goal. Task preparation is a central aspect of cognitive control and requires the specification of two types of information. One needs to specify "what to do next" by setting the task goal and "how to do it" by activating the relevant stimulus-response (S-R) mappings necessary to execute the task. Since these what and how components are generally confounded using conventional fMRI task-switching procedures, it is difficult to determine the precise representational content of the cognitive control brain areas involved in task set preparation. We tried to differentiate the brain areas selectively representing the what and the how component, circumventing this confounding problem in two separate experiments by applying an adaptation approach and a multivariate pattern classification approach. In the first experiment, adaptation to selectively repeating the task goal and the SR mapping was studied whereas in the second experiment, we examined from which areas we were able to decode which of two task goals or which of two S-R mappings a subject was preparing. Results of both experiments will be discussed.

## **A sentence to remember: Language switching in sentences**

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Whereas prior language-switching studies have mainly investigated the production of single words, the present study set out to investigate language control within sentence production. The task required German-English bilingual participants to produce a sequence of five words either in a sentence or in a non-sentence sequence. Additionally, participants had to use an alternating language sequence, in which the language was switched after every second word (L1-L1-L2-L2 etc.). Both the concept and the language sequence were memory-based and each response was instigated by an auditory response-signal, since no visual stimuli or language-cues were used. The results revealed that responses in both the sentence and non-sentence sequences were more demanding to produce when the previous response was produced in the other language, than if it was produced in the same language (i.e., language-switch costs). Interestingly, these switch costs were smaller in the sentence sequence than in the non-sentence sequence, which indicates that a smaller amount of language control is needed in sentences. These results are in line with bilingual syntax models that assume syntax to be shared across languages.



## What is learning? On the nature and merits of a functional definition of learning

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Learning has been defined functionally as changes in behavior that result from experience or mechanistically as changes in the organism that result from experience. Both types of definitions are problematic. We define learning as ontogenetic adaptation, that is, as changes in the behavior of an organism that result from regularities in the environment of the organism. This functional definition not only solves the problems of other definitions but also has important advantages for cognitive learning research.

## Processing of complex emotional expressions

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A well-known phenomenon in psychological research is the connection between the approach / avoidance motivational systems and emotionally connoted stimuli, which is reflected in a compatibility effect for approach reactions and positive words, and avoidance reactions and negative words (Chen & Bargh, 1999). However, it has been rarely investigated whether compatibility effects emerge on larger syntactic units, that is, on phrasal or sentential level. One exception is the investigation of negated emotionally connoted nouns (Deutsch, Gawronski, & Strack, 2006), which found automatically activated compatibility effects on the noun level only. We replicated this finding in a Stroop-like color naming task. In a second experiment, we investigated whether a deeper processing of the negated phrases leads to a compatibility effect on phrasal level. Participants responded again with an approach vs. avoidance reaction to the font color of the noun phrase, but only when this phrase was grammatically correct (*das Glück* vs. *die Glück*). Interestingly, no compatibility effect emerged at all. Several further studies are aimed at clarifying whether and under which conditions automatic evaluations can be found on the phrasal or sentential level, and the role of more demanding tasks entailing a deeper processing on automatic evaluations.

## **Movement-related cortical potentials reflect perception of effort during physical tasks**

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It is thought that perception of effort during physical tasks represents the conscious awareness of the central motor command sent to the active muscles. The aim was to directly test this hypothesis by experimentally varying perception of effort and measuring movement-related cortical potential (MRCP). In the first study, 16 healthy recreationally active men made unilateral dynamic elbow flexions to lift a light (20% one repetition maximum (1RM)) and a heavier (35% 1RM) weight with a fatigued arm and a non-fatigued arm while rating of perceived effort (RPE), biceps brachii electromyogram (EMG), and MRCP were recorded. RPE, EMG amplitude, and MRCP amplitude at Cz during movement increased with weight and with muscle fatigue. In the second study, 12 healthy recreationally active women performed 100 isometric leg extensions at  $61 \pm 5\%$  of their maximal voluntary contraction torque 1.5 h after either caffeine (6 mg•kg<sup>-1</sup>) or expectancy-enhanced placebo ingestion, while RPE, vastus lateralis EMG, and MRCP were recorded. Caffeine significantly reduced RPE and MRCP amplitude at Cz during movement, and both variables were significantly increased by exercise duration. Vastus lateralis EMG amplitude was not affected. These two studies provide direct neurophysiological evidence that perception of effort during movement reflects central motor command.

## **Phasic fluctuations of affect influence semantic priming**

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Abundant evidence suggests that moods influence cognitive processes. Importantly, moods were shown to have diverging effects depending on their valence. One well-established effect is that positive moods facilitate access to remote associations, thereby boosting creative problem solving (Isen et al., 1984; 1985; 1987). The present research investigates whether the same pattern of affective modulation occurs for very brief fluctuations in affect, lasting no longer than a few seconds. In a series of five experiments, we induced brief fluctuations of affect by presenting sounds, facial expressions, and by requiring muscle-contractions related to affect. We assessed the degree of semantic priming in two different priming tasks. We observed that brief positive affect compared to brief negative affect increases semantic priming. Further analyses (based on systematic manipulations of the relatedness proportion and the non-word ratio) suggest that affect mainly influenced semantic activation and less so strategic processes that are part of semantic priming. This provides support for theories suggesting the existence of fast and context-dependent adaptations of cognitive processing-parameters. In addition, these observations suggest that semantic priming-effects may be moderated by the affective qualities of priming stimuli. Possible problems resulting from the latter observation will be discussed.

## Choosing charities by effectiveness considerations

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Humanitarian aid organizations are often dependent on private donations. However, budgetary constraints cause donors to be selective in their charitable gifts. In the current paper we investigated the role of effectiveness as one cue in the selection of recipients. Effectiveness was manipulated as the chance of acquiring enough food for a needy child for one month (Study 1) and the proportion of people helped through aid projects (Study 2). In Study 1, results showed that effectiveness was only a concern for participants when the baseline chance of providing food was sufficiently high. When the baseline chance was minimal, most participants preferred to ensure children receiving help at the expense of maximizing the effectiveness of a donation. In Study 2, participants preferred to support humanitarian aid projects with higher absolute vs. higher proportional help when repeatedly confronted with selection choices. These results suggest that effectiveness is an important cue in donors' selection of humanitarian aid projects, however this depends on the baseline chance of help provided and the type of recipient (individual vs. group).

## Empirical option weighting increases the reliability and validity of multiple choice tests

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In multiple-choice tests, the number of items in which the correct option was chosen is typically used as the sole basis for the computation of total test scores. Empirical option weighting is an alternative scoring procedure aiming to increase the information gained by each item. Instead of scoring each answer dichotomously as either correct or wrong, examinees receive a score for each item that is proportional to the point-biserial correlation between the chosen answer option and the total test score. Thus, examinees choosing an option that is popular among low (high) scorers in a knowledge test receive a low (high) item score, respectively. This procedure allows to punish the choice of tellingly wrong distractors more strongly, and to give enhanced credit for the choice of options that are chosen by the very best examinees only. We found empirical option weighting to significantly improve both, the internal-consistency reliability and the validity of a knowledge test. This improvement generalized across internal and external criteria for the computation of option weights. Option weights determined in one sample were also found to generalize to other samples, thus rendering the computation of fixed option weights for published test manuals feasible.

## Memory reactivation during sleep

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In an active process of system consolidation sleep reorganizes new memory representations and integrates them to the network of long-term memory. This process is assumed to rely on covert reactivations of new memories that occur spontaneously after learning mainly during slow-wave sleep (SWS) but can also be externally triggered by associated memory cues. We show that the application of associated odor cues during SWS leads to an immediate stabilization of new memories making these memories resistant against subsequent interference. Similar odor reactivations during the wake state resulted in a destabilization of memories making these memories susceptible to subsequent interference. Functional magnetic resonance imaging revealed that odor reactivation during SWS mainly activated hippocampal regions and the retrosplenial cortex, whereas during wakefulness reactivation was primarily associated with activations in prefrontal areas. Furthermore, we found that reactivation during sleep can accelerate sleep-dependent consolidation processes. Reactivation during a short sleep period induced memory benefits that are normally seen only after longer sleep periods, an effect that depended on SWS rather than rapid eye movement (REM) sleep. Together, these findings suggest that reactivations during sleep and the wake state are distinct processes presumably serving different functions.

## Something in the way she moves – The dynamics of self-control in action execution

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Everyday life is full of situations where we have to choose the lesser of two evils and at the same time are led into temptation by momentarily attractive options. Such situations are typically experienced as a self-control conflict between two antagonistic tendencies of behavior. The aim of the current talk is to explore the course of self-control in action execution. We reasoned that the tug-of-war between antagonistic response options is not conclusively solved before movement initiation but leaks into action execution. To quantify the dynamic competition between high priority long-term goals and momentarily salient yet lower priority temptations, we analyzed continuous movement trajectories. Participants had to move the mouse cursor from a start location to one of two target alternatives. Each alternative represented gains or losses of points. Although participants earned points in the majority of the trials (*no-conflict condition*), we instructed them to accept a loss of points in some trials, in order to prevent an even higher loss (*conflict condition*). The results suggest that self-control conflict is still ongoing during movement execution. Particularly, we found that movement trajectories in the *conflict condition* deviated away from the high priority long-term goal towards the tempting stimulus.

## Do automatic and self-report indices of motivational ambivalence predict relapse to heavy drinking following alcoholism treatment?

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Alcohol-dependent patients report motivational ambivalence: the desire to drink combined with the desire to limit drinking. Measures of automatic motivational tendencies also suggest the presence of simultaneous approach and avoidance elicited by alcohol cues in this population. Our aim was to investigate if automatic and self-report measures of approach and avoidance motivation for alcohol would predict unique variance in relapse to heavy drinking following treatment. Participants (N = 120) completed the Approach and Avoidance of Alcohol Questionnaire (AAAQ) and a modified version of the alcohol-related stimulus response compatibility (SRC) task when they were nearing the end of inpatient detoxification. Quantity / frequency indices of alcohol consumption will be obtained at two, four and six months after discharge from the clinic via telephone interview. Preliminary data from the first (two month) follow-up period have been obtained from the first 35 participants, and these data indicate that half of the participants had relapsed to drinking. Preliminary analyses show that participants who went on to relapse had stronger approach *and* avoidance motivational tendencies than those who successfully abstained, and this pattern of ambivalence was seen in both self-report and automatic measures.

## Specialized-load effects in auditory selective attention: Evidence from auditory Stroop variants

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Load theory predicts that concurrent cognitive load impairs selective attention. For visual stimuli, it has been shown that this impairment can be selective: Distraction was specifically increased when the to-be-memorized material used in the cognitive load task matched the target material in the selective attention task whereas distraction decreased when the to-be-memorized material matched distractor processing (e.g., Park, Kim, & Chun, 2007). In a series of experiments, these so-called *specialized-load effects* were examined in auditory selective attention applying different auditory Stroop variants. In a first set of experiments, target-load overlap was examined: Interference in a nonverbal-auditory Stroop task was increased under concurrent nonverbal-auditory cognitive load (compared with a no-load condition), but not under concurrent verbal-auditory cognitive load. By contrast, interference in a verbal-auditory Stroop task was increased under concurrent verbal-auditory cognitive load but not under nonverbal-auditory cognitive load. In a second set of experiments, distractor-load overlap was examined in two versions of a nonverbal-auditory Stroop task. Reduced interference was found in conditions with distractor-load overlap; however, effects were smaller in comparison to effects found for target-load overlap. These findings are discussed with respect to the notion of materialspecific attentional resources and an alternative similarity account.

## The role of sleep in long-term face adaptation

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Adaptation is an automatic neural mechanism supporting the optimization of visual processing on the basis of previous experiences. While the short-term effects of adaptation on behavior and physiology have been studied extensively, perceptual long-term changes associated with adaptation are still poorly understood. Here I will show that adaptation is affected by sleep. Adaptation to a distorted image of famous persons biased participants' perception of the original face. These shifts were larger in a group of participants who had slept during the interval between adaptation and test (Experiment 1: 12 hours; Experiment 2: 90 minutes) compared to another group of participants who stayed awake. In the light of the well-established link between sleep and memory consolidation, our findings put sensory adaptation in the vicinity of learning and memory and at the same time reveal a new, yet potentially fundamental, function of sleep in cognition.

## Differences in human recognition of biological motion

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In this research, we investigated differences in human recognition of biological motion. The research consisted of two experiments. The first experiment included point-light biological motion stimuli. Stimuli were separately showed to each respondent, and the respondent, after watching the footage, had to decide which walk belonged to whom. The aim of this research was to determine if there is a difference between the accuracy of recognition of acquaintances and completely unknown persons in point-light simulation of biological motion. The result shows us that humans are able to determine what a moving object is by looking at point-light stimuli, but after that it becomes irrelevant if the person is our acquaintance or an unknown person. The second experiment included biological motion stimuli that represented the movement of throwing a ball. After viewing each stimulus, respondents had to recognize the gender of the person who threw the ball. The aim of the experiment was to determine whether genders differ in their success of recognition of genders in point-light simulation of biological motion. The results of the second experiment showed that male respondents are more successful in recognizing persons of both the male and the female gender. This result could be explained by differences in spatial abilities between genders.

## **Modulating the processing of emotional words by brain stimulation**

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There is a large body of evidence that the prefrontal cortex (pfc) exerts an inhibitory function on the amygdala. Consequently it is considered a crucial region for the regulation of emotion. Using functional brain imaging (fmri) as well as electro-, and magnetoencephalography (EEG, MEG), we were able to confirm the importance of this region for emotional word processing, especially for processing valence. Based on these findings we performed an inhibitory repetitive transcranial magnetic stimulation (rTMS) on the left or right dorsolateral pfc. Analysing the EEG data in sensor space and MEG data in source space revealed that left hemispheric stimulation resulted in more enhanced processing of negative words compared to positive words and vice versa for the right hemisphere. These effects were most strongly seen during the time interval of the late positive complex, but also earlier. The neurophysiological results were corroborated by valence ratings performed after EEG/MEG recording. Taken together, we take our study as strong evidence for hemispheric specialization for emotional valence.

## **Olfactory conditioning as a powerful method to investigate emotional processing – cognitive and neurophysiological mechanisms**

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We performed three experiments in which we investigated the conditioning of faces in the context of odours. Odours were either of negative valence (hydrosulfide), were pheromones (androstadienone) or anxiety-related (gained from subjects under high stress). Conditioning was done with 100 faces or more half of which were presented in the context of one of the above scents or control odours. Learning was kept shallow with only two or three learning instances per face. Before and after learning magnetoencephalographic (MEG) correlates and behavioural measures were taken. Analysing the MEG data in source space indicated that conditioning faces with odours evoked changes in face processing as early as 50 ms in right frontal regions, but also later changes related (130- 290 ms) over occipito-temporal regions related to motivated or emotional attention. Importantly, participants did not show explicit contingency awareness and displayed behavioural changes only in rather implicit measures such as valence ratings. Given the very small number of learning trials, olfactory conditioning seems a powerful mechanism for emotional and social learning in humans.

## **Monitoring speech development in children and adolescents after cochlear implantation**

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Cochlear implants constitute to date the most successful neuroprosthesis. Even though hearing after implantation improves to a very large degree, there are still a relatively large number of persons who develop poorly. We used the mismatch negativity as a means to investigate and monitor brain responses to syllables in persons with cochlear implants (CI). We compared children and adults with prelingual implantations that developed either good or bad speech performance. On a behavioral level, phoneme discrimination allowed to predict group membership with very high accuracy. For phonemes that could be well discriminated, the mismatch negativity was more strongly expressed in good performers over frontal regions. Frontal activity correlated positively with measures of working memory. For phonemes that were hard to distinguish, we found higher activity in occipital regions in persons with bad language performance and stronger right temporal activity in good performers. Occipital activity was reported in CI users before and was interpreted as a consequence of lip reading. We show here that it seems more prominent in CI users who developed poorly. It thus seems a strategy that might be helpful after implantation, but with only limited use for high speech performance.

## **The two faces of selective memory retrieval: Recall-specificity of the detrimental but not the beneficial effect**

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Selective retrieval of some memories can impair subsequent retrieval of other memories. Research on this self-limiting property of memory retrieval indicates that this detrimental effect is recall-specific and is typically not found when preceding practice occurs via restudy opportunities. Results from recent work, however, suggest that selective memory retrieval is not always detrimental but can also improve recall of other memories, for instance, when memories were subject to directed forgetting. Here we examined whether this self-propagating effect of memory retrieval is also recall-specific. Subjects studied a list of target and nontarget items, received a cue to either forget or remember the list, and then studied another list of items. Before being tested on the (first-list) target items, subjects attended a practice phase, in which they either restudied or selectively retrieved the (first-list) nontarget items, or completed an unrelated distractor task. As expected, for to-be-remembered targets, detrimental effects of prior retrieval on the nontargets arose which were recall-specific and did not generalize to restudy trials. In contrast, for to-be-forgotten targets, beneficial effects of prior practice on the nontargets emerged, both after retrieval and restudy trials. These results indicate that the self-limiting but not the self-propagating property of memory retrieval is recall-specific.



## Skilled reading in two languages: Applying the psycholinguistic grain size theory to bilingual visual word recognition

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Several cross-linguistic monolingual studies have shown that German readers demonstrate a preference for units of small grain size (graphemes, phonemes) while English readers prefer larger units (bodies, rhymes). We investigated whether skilled bilingual readers transfer their reading strategies from L1 to L2. 24 German-English and 20 English-German bilinguals completed a naming task with both German and English stimuli that differed in terms of word length and body neighbourhood (body-N), i.e. words that share the same orthographic rhyme. In L1 naming, we replicated the results by Ziegler et al. (2001) showing that both groups demonstrated a word length effect whereas English participants demonstrated a stronger body-N effect than German participants. In L2 naming, both groups showed a word length effect as well as a body-N effect, which is characteristic of a reading strategy with small and large grain sizes. The results of the German participants suggest that they adapted their L1 reading strategy to the inconsistent English orthography. Therefore we argue that language-specific units of small and larger grain sizes co-exist within a bilingual reader's mind.

Ziegler, J. C., Perry, C., Jacobs, A. M., Braun, M. (2001). Identical words are processed differently in different languages. *Psychological Science*, 12 (5), 279-384.

## Race for power in Public Good games

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In two studies, we investigated the influence of personality on contribution and punishment behavior in repeated Public Good Games with different implementations of punishment mechanisms. In the stable treatment we used a standard punishment mechanism. In a second treatment we introduced an unstable hierarchy in that the player with the highest income at the beginning of each round gained additional punishment power. For this player costs for punishment were reduced inducing an unstable hierarchy. This instability led to a race for (punishment-) power indicated by increased punishment and decreased efficiency. Personality influences on behavior were stronger in this treatment as compared to the stable treatment. The race-for-power effect was particularly strong for highly competitive and machiavellianistic individuals empirically supporting the predicted persons x situation interaction.

## **Take a break – on the design of system feedback in driver state recognition**

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Drowsy drivers run a higher risk of committing errors due to deficient attention or microsleep episodes. In response to this problem, systems for driver state recognition have been developed. Our study examines the efficacy of in-car drowsiness warnings to elicit a sensible reaction on the part of the driver, in terms of intentional and behavioural measures. An experiment was conducted with partially sleep-deprived participants, using a simulated driving scenario and a paradigm with performance-dependent rewards in order to create a realistic motivational situation. Questionnaire measures of cognitive mediating processes were based on Protection Motivation Theory (Maddux & Rogers, 1983). Participants who received a drowsiness warning showed a tendentially higher probability of taking a break than participants who merely got feedback on the remaining distance to go. Subjective efficacy of a break in order to counteract drowsiness was the most important predictor of self-assessed probability to take a rest. The results contribute to an understanding of how to design effective drowsiness feedback as well as other warning messages with a persuasive rather than merely informative function.

## **Situation representation and spatial information processing applied to intersection situations**

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Existing cognitive architectures provide dedicated structures to account for human perception, working as well as long-term memory phenomena and motoric processes. However, the structures of processing and representing spatial information are not catered for by these architectures. This deficiency raises an issue central to the development of cognitive models of driver behavior. The primary driving task explicitly requires the driver to process and represent situations in terms of space. Hence, to support the development of a structure for processing spatial information within a cognitive model of driver behavior, we set up an experiment that specifically addresses the demands of situation assessment when approaching intersections. Videos of such approach situations were presented to participants who were required to perform an auditive spatial vs. an auditive non-spatial reaction time task at varying distances from the intersection. An effect of the spatial dual task on the dependent measures is expected due to the assumed demands upon the driver posed by assessing the driving situation in terms of space. Eye tracking, pupil dilation and reaction time data will be presented. The empirical results will be discussed with respect to their level of support for or against spatial processing.

## Is there a cue-processing bottleneck in cued task switching?

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The identification of bottlenecks in cognitive processing provides a useful tool when developing models of cognition as they point to important limitations within the cognitive system. In this study the striking procedural similarity between the cued task switch paradigm and the psychological refractory period (PRP) paradigm was used to investigate the assumption of a bottleneck arising in cue processing of cued task switch experiments. The assumption of a bottleneck in cue processing is grounded on previous suggestions that the cue in this kind of task is used to select, retrieve and reconfigure the task set for the current trial – processes supposed to be carried out in strict serial order. In order to test the hypothesis that cue processing involves a bottleneck the locus-of-slack logic was applied within a standard task switch context. In three experiments, the effects of target degradation (Exp. 1), cue degradation (Exp. 2 and 3) and an additional primary task (Exp. 3) were examined. The results of these experiments clearly show that cue processing indeed involves a bottleneck. The possible mechanisms inducing this bottleneck are discussed in relation to a recent working memory model (Oberauer, 2009).

## What is up? Emotion-specific activation of vertical space during language processing

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Evaluations of word valence typically interact with vertical space: Positive words have been related to upper space, and negative words to lower space. In the current series of experiment, we investigate the automaticity and the mechanisms underlying this “positive is up” relation. First, we show that evaluations of word valence (“positive” vs. “negative”) interact with motor responses with positive evaluations facilitating upward and negative evaluations facilitating downwards responses, respectively. However, in a second experiment requiring no valence evaluations, valence words did not automatically interact with vertical motor responses. Interestingly, in a third experiment, using words referring to emotions associated with bodily postures (e.g., proud -> upright; sad -> slouched), these emotional words did automatically interact with vertical responding. Together, these results suggest that the vertical spatial dimension is not automatically activated by word valence. However, the vertical spatial dimension does play a crucial role for the processing and understanding of abstract concepts (i.e. “positive” vs. “negative”) activated during valence evaluations. These results provide strong evidence that the activation of spatial experiential traces during language processing is specific in nature, and does not generalize to all words transferring positive or negative valence.

## **Sex differences in neural efficiency when working on visuo-spatial tasks: Are they caused by the stereotype threat effect?**

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The neural efficiency hypothesis postulates a more efficient use of brain resources in more intelligent people as compared to less intelligent ones (negative IQ-brain activation relationship). However, the more efficient use of brain resources differs between the sexes depending on task content. The neural efficiency phenomenon was previously supported for men but not for women during the performance of visuo-spatial tasks. One possible explanation for this finding could be provided by the well-studied phenomenon called stereotype threat. Stereotype threat arises when a negative stereotype of one's own group is made salient and can result in behavior that confirms the stereotype. Overall, 32 boys and 31 girls of varying intellectual ability were tested with a mental rotation task, either under a stereotype exposure or a no-stereotype exposure condition while measuring their EEG. The behavioral results confirm that an activated negative stereotype can hamper the performance of girls. Physiologically, a confirmation of the neural efficiency phenomenon was only obtained for boys working under a no-stereotype exposure condition. This result pattern replicates previous findings without threat and thus suggests that sex differences in neural efficiency during visuo-spatial tasks may not be due to the stereotype threat effect.

## **Orienting attention to the variable comparison stimulus attenuates the detrimental effect of stimulus order on discrimination performance**

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When participants are asked to discriminate between a constant standard stimulus and a variable comparison stimulus, discrimination performance is typically better when the standard precedes rather than follows the comparison (Type B effect). To date it is unclear whether this theoretically important phenomenon occurs automatically or whether it is under participants' control. In a series of experiments, participants compared the duration of two successively presented intervals. At the beginning of each trial, a symbolic cue either indicated the temporal position of the comparison validly or it was neutral with respect to comparison position. With neutral cues, a strong Type B effect was observed. With valid cues, however, this effect was considerably reduced. Specifically, discrimination performance improved selectively for trials on which the comparison preceded the standard. This pattern of results suggests that the Type B effect is, at least in part, under participants' control. Recently, we showed that the Type B effect might be due to the formation of an internal reference that is dynamically updated from trial to trial. Within this framework, the attention-based reduction of the Type B effect might be explained by a flexible weighting mechanism that regulates the updating process of the internal reference.

## **Implicit spatial learning is enhanced by the predictability of visual object identity**

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Whereas motor and visual implicit learning are now widely accepted, findings about spatial implicit learning are rare and ambiguous. While some have found spatial implicit learning to be independent of stimulus or response characteristics (Remillard, 2005), Deroost & Soetens (2006) found spatial implicit learning to be dependent on a concurrent and uncorrelated motor sequence. The authors interpreted this by means of a reduction of attentional load due to the motor sequence, facilitating spatial implicit learning. What is not discussed by the authors is that the motor sequence in this task was correlated with a third visual sequence. Thus, it remains unclear whether the spatial learning relied on the concurrent motor sequence or whether the visual sequence or the combination of both facilitated spatial learning. In our study, we therefore combined a spatial sequence with a motor or visual sequence only. Spatial learning was more pronounced when combined with a visual than with a motor sequence. These results suggest that spatial learning is not facilitated by a general reduction of attentional load. Rather, it seems that spatial information is more integrated and thus better learned when it becomes part of a visual object whose identity can be anticipated.

## **I like to get nothing: Explicit and implicit evaluations of approach- and avoidance-related outcomes**

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Catching a fleeting stimulus with a rapid key press secured a money reward or avoided money loss. Outcomes of (omitted) rewards and punishments were then evaluated explicitly (evaluative rating) and implicitly (affective priming), and compared with evaluations in a yoked-control condition in which the outcome was controlled by the computer. Achieving nothing was judged positive in explicit ratings when a punishment was omitted but negatively when a reward was omitted, irrespective of the experimental condition. In the implicit evaluation scores, however, the outcomes were evaluated differently only when they were self-generated. This finding shows that approach- and avoidance-related outcomes are evaluated differently on an implicit level only when a person has control over the outcome.

## **Task rules prevent binding between irrelevant auditory stimulus features and response**

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The aim of the study was to investigate whether binding processes between task-irrelevant auditory information and the response would be modulated by the specific task representation. 40 participants had to react with two response keys to the recordings of 8 different words spoken by a male or a female voice. There were two different instruction conditions: 20 participants learned the eight stimulus-response mappings (SR condition) by heart, and 20 participants applied a binary task rule (TR). In the SR condition, participants showed typical response repetition effects (significant interaction of voice repetition  $\times$  response repetition), indicating binding between task-irrelevant auditory information and the response. In the TR condition, however, participants did not show these repetition effects, indicating that the task rule prevents such binding processes. In sum, the results support the assumption of a shielding function of task rules that prevents binding between task-irrelevant auditory stimulus features and response.

## **The influence of music on empathy and prosocial behavior**

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The current study examined the effect of music as an indicator of mood on self-reported empathy and prosocial behavior. The sample consisted of  $n = 102$  students in an age range from 19 to 27 years (males = 51). The participants were randomly assigned to one of three groups: an experimental group which listened to music inducing negative emotions, an experimental group which listened to music inducing positive emotions, and a control group without music. The experimental groups heard self-selected songs before answering questions on empathy and prosocial behavior. The impact of music on experienced mood was tested before and after hearing music.

The results showed that positive music had a positive effect and negative music had a negative effect on mood. Gender differences were found for empathy and prosocial behavior. Females showed significantly higher scores than males. Furthermore, hearing music increased the level of agreement in empathy and prosocial behavior. Males in the negative music condition had significant higher scores in prosocial behavior and in the emotional dimension of empathy than males in the control group and converged to the level of agreement of females.

## Predicting errors from reconfiguration patterns in human brain networks

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Task preparation is a complex cognitive process that implements anticipatory adjustments to facilitate future task performance. Little is known about quantitative network parameters governing this process in humans. Depending on a letter cue, subjects (N=11) prepared a demanding color or motion discrimination task, consisting of a random dot animation. In the color condition, subjects indicated via button press whether the dominant color was either red or blue, in the motion condition whether the dominant movement direction was inwards or outwards. Using functional magnetic resonance imaging (fMRI) and functional connectivity measurements, we show that the large-scale topology of the brain network involved in task preparation shows a pattern of dynamic reconfigurations that guides optimal behavior. Functional brain networks could be decomposed into two distinct topological structures, an error-resilient core acting as a major hub that integrates most of the network's communication and a predominantly sensory periphery showing more flexible network adaptations. During task preparation, core-periphery interactions were dynamically adjusted. Task-relevant visual areas showed a higher topological proximity to the network core and an enhancement in their local centrality and interconnectivity. Failure to reconfigure the network topology was predictive for errors, indicating that anticipatory network reconfigurations are crucial for successful task performance.

## Facial expressions, emotion, and sign language

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Facial expressions of emotions are perceived semiotically by humans and are commonly categorized as being either affective or communicative, that is indicating a current emotional state or depicting an emotion not currently being felt. For speakers of sign languages, facial expressions also play a role in grammar and these expressions can look very similar to affective and communicative ones. For signers then, a tripartite distinction is made between affective, communicative, and linguistic facial expressions. The possibility that the same facial configuration can be used by three functionally distinct systems has been studied in order to understand the development of these systems and their interactions. I will present some corpus data on the usage of facial expressions during production of German Sign Language and highlight some problems with the tripartite affect-communication-language distinction.

## Age differences in exploratory and goal-directed decision-making

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In this study we examined age differences in habitual and goal-directed mechanisms of learning. We used a two-state Markov decision task in which participants have to constantly update reward predictions (cf. model-free learning) and use this information in order to make goal-directed (cf. model-based) decisions (Daw et al., 2011).

Preliminary data ( $N = 30$  per group) suggest that when the utility of choice options is difficult to differentiate older adults show model-free behavior. In contrast, when they are better able to differentiate the expected value of options they start making goal-directed decisions to maximize reward. In younger adults we found that greater working memory capacity is associated with a higher degree of model-based behavior. This is consistent with the general idea of a positive relationship between fluid intelligence and foresighted choice behavior.

Besides these findings we will present data on exploratory decision-making as well as decision-making under uncertainty in the same participants. The aim of this age-comparative approach across multiple tasks will be to relate age and individual differences in the interplay of model-free and model-based behavior to differences in decision-making under different types of uncertainty.

## When letting go is difficult: Dysfunctional effects of counterfactual thoughts

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Research on the self-regulative functions of counterfactual thoughts often paints a very rosy picture of how people are able to respond to failure. Considering alternative actions and behaviors is supposed to lead to a correction of one's own behavior. However, sometimes the best solution would not be to choose a different means of goal pursuit. Rather the most functional solution would be to give up and disengage from a goal. The present set of studies shows how counterfactual thoughts can hinder disengagement from a goal. The differential effects of thoughts about things that should versus should not have happened (additive versus subtractive counterfactuals) will be outlined. Using both response time evidence as well as behavioral indicators of goal engagement/disengagement it will be demonstrated that counterfactuals can indeed have detrimental consequences in some situations. The results will be discussed in relation to functional approaches of counterfactual thoughts, and self-regulation theories in general.



## The time saving bias in static-cognitive and dynamic-driving judgements

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The time saving bias was first found when studied from a cognitive perspective in the context of car driving. Participants overestimated the time saved by speeding from a high speed (e.g. 100 kph) and underestimated the time saved by increasing speed from a slow speed (e.g. 30 kph). The present study aimed to test the time saving bias in an active driving task.

The task was to first drive a distance at a given speed that was either high or low in an interactive fixed-base driving simulator. Then, they drove the same distance again at the speed they thought necessary to gain exactly three minutes in travel time compared to the previous trip. The initial high speed was 100 kph and the low speed was 30 kph.

The results showed that participants saved less time than the target time saving of three minutes when the speed of the previous trip was high and more than three minutes when the speed of the previous trip was low. Actual time saved and post-trip judgments of time saved showed that drivers' active driving and time perception could not correct the cognitive bias. The time saving bias also occurs in active driving.

## Feedback novelty affects the feedback-related negativity and the feedback-P300

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It has been suggested that stimulus novelty itself can be rewarding and recent evidence suggests that novelty processing and reward processing share common neural mechanisms. With respect to feedback processing, this can be both beneficial and detrimental: If its novelty makes a feedback stimulus rewarding, then this should increase the effect of positive feedback but decrease the effect of negative feedback. The present study investigated whether this predicted effect of feedback novelty is reflected in electrophysiological markers of reinforcement learning (FRN, feedback-related negativity) and controlled feedback processing (feedback-P300). In a simple decision-making task, participants had to guess which one of two Chinese characters was correct, and each guess was followed by a novel or a familiar feedback stimulus. As predicted, we found the difference between FRN amplitudes after negative feedback and those after positive feedback to be smaller for novel feedback stimuli as compared to familiar feedback stimuli. In addition, the amplitude of the feedback-P300 was decreased by feedback novelty indicating impaired controlled feedback processing. Together, these results demonstrate that feedback novelty can affect feedback processing as reflected by event-related potentials.

## The impact of stimulus properties on the horizontal SPARC effect in nonmusicians

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Magnitude information within experimental stimuli can cause a stimulus-response-compatibility (SRC) effect in speeded bimanual choice reaction tasks, even when the magnitude is task-irrelevant. The spatial pitch association of response codes (SPARC) effect refers to a decrease of reaction times when pitch (low vs. high) and response side (left vs. right or lower vs. upper) are compatible, based on a spatial internal mapping of pitch height. While these pitch-to-space associations have been shown to be stronger in musicians, the functionality of musical expertise is not entirely clear. The present experiments investigated the role of presentation modality and pitch differences for musically naïve participants by varying timbre and distance from implicit reference of the stimuli in a horizontal timbre classification task. The SPARC effect was evident in smaller pitch distances for piano sounds only, while for larger distances it showed for both piano and vocal sounds. The results indicate a crucial role of stimulus properties in the evocation of the horizontal SPARC effect in non-musicians.

## Effects of ketamine and risperidone on oculomotor control

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The non-competitive NMDA receptor antagonist ketamine leads to psychosis-like symptoms and impairments in oculomotor performance in healthy volunteers. This study examined whether detrimental effects of ketamine on oculomotor performance can be reversed by the atypical antipsychotic risperidone, which in schizophrenia patients is effective in alleviating oculomotor deficits. In this randomized double-blind, placebo-controlled study 72 healthy participants performed smooth pursuit eye movements (SPEM), prosaccade and antisaccade tasks while being randomly assigned to one of four drug groups (ketamine, placebo, risperidone, ketamine plus risperidone). Ketamine increased saccadic frequency and decreased velocity gain of SPEM (all  $p < 0.01$ ). An effect of risperidone was also observed for amplitude gain and peak velocity on the prosaccade and antisaccade tasks, indicating hypometric gain and slower velocities compared to placebo (both  $p < 0.05$ ). No interactions between ketamine and risperidone were found (all  $p > 0.25$ ). The results confirm that the administration of ketamine produces oculomotor performance deficits similar to those seen in schizophrenia. The atypical antipsychotic risperidone however did not show modulating effects on ketamine induced deteriorations. These findings do not support the cognitive enhancing potential of risperidone in this particular model system of schizophrenia and point towards the importance to develop alternative performance-enhancing compounds to optimize pharmacological treatment.

## Does perceptual grouping influence the selection of decision strategies?

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A number of different situational factors such as time pressure or information costs are known to influence the strategy people apply in multi-attribute decisions. But what are the consequences of factors that merely change the perceptual structure of the task? We conducted two studies to investigate how the perceptual grouping of cue-information in a closed information-board influences decision behavior in a multi-cue inference task. To this end, we applied the Gestalt principles of similarity and proximity to the information-board. The main focus lies on information search behavior, which is hypothesized to follow the grouping pattern. For a horizontal versus vertical grouping of matrix cells we expect a cue-wise and option-wise search pattern, respectively. In a further study we used an open information-board in combination with eye tracking to investigate whether the influence of perceptual grouping on the selection of decision strategies is higher if the search costs induced by a manual motor action needed to click on the information in order to reveal it, are eliminated. The investigation of the influence of task-irrelevant factors like perceptual grouping of information may reveal boundary conditions of adaptive decision-making.

## Benevolent is as bevolent does? The role of benevolent sexism in predicting helping behavior toward female subtypes

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Ambivalent sexism constitutes a form of sexism that comprises both hostile and benevolent sexist attitudes toward women. Benevolent sexists appreciate women who adhere to traditional gender roles. However, this subjectively positive attitude toward traditional women is also associated with maintenance of clear status differences. In two experiments we addressed the question whether benevolent sexists would display more paternalistic help and less empowering help toward traditional women as a way to maintain the status quo. Experiment 1 showed that benevolent sexists suggested more paternalistic help (but not more empowering help) for traditional women than for career women in a scenario in which these women had neglected their child. In Experiment 2, benevolent sexists showed less empowering help during an actual interaction with a traditional woman compared to a career woman, who required help while solving a cognitive task. Results indicate that benevolent sexists contribute to the maintenance of gender roles and the status quo between the sexes through their behavior – behavior which is rather marked by sexism than by ‘true’ benevolence.

## **Mädchen + Mathematik = Minderbemittelt? Priming von Geschlechtsstereotypen beeinflusst Leistungsbeurteilungen durch Lehramtsstudenten**

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Welche Rolle spielen Geschlechtsstereotype im Schulkontext? Beeinflusst die Aktivierung von Geschlechtsstereotypen die Leistungsbewertung und die diagnostische Kompetenz von Lehramtsstudenten? Diese Forschungsfragen wurden in einem zweiphasigen Experiment mit 28 Lehramtsstudenten untersucht. Nach Aktivierung von Geschlechtsstereotypen bzw. Präsentation von neutralen Inhalten wurden Lehramtsstudenten gebeten, die Lösungen von drei Mathematikaufgaben zu bewerten, die angeblich von einer Schülerin vorgelegt worden waren.

Männliche Lehramtsstudenten, bei denen Geschlechtsstereotype zugänglich gemacht wurden, beurteilten die Lösungen der Schülerin bei zwei von drei Aufgaben signifikant schlechter als die Kontrollgruppe. Diagnostische Kompetenz umfasste die Einschätzung der Schülerin hinsichtlich Interesse, Begabung, und Schulnote im Fach Mathematik. Nach Priming mit geschlechtsstereotypen Inhalten fiel die Beurteilung der Schülerin jeweils signifikant negativer aus als in der Kontrollgruppe. Implikationen der Befunde für den Schulkontext werden diskutiert.

## **Are freckles still a blemish? On the impact of ecological adaptation and beauty ideal on facial attractiveness**

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In the Victorian era women considered freckles a blemish while a pale taint was desirable. Although, up to now a variety of products for treating freckles exist, it is unclear whether freckles are still considered as unattractive, since these days persons prefer an increased level of melanin (Stephen, Coetsee, & Perrett, 2011). Apart from such a beauty ideal towards a sun tan a further factor influencing the attractiveness of freckles might be the ecological adaptation to a freckled skin complexion. Varying the amount and intensity of freckles on female faces we found that both factors decreased attractiveness ratings independently, but only for a high level of these factors. Interestingly, preferences for amount and intensity of freckles were both varied by the beauty ideal (regarding having a tan) and the ecological adaptation (time spent in the United Kingdom—a country where many people with freckles live). Thereby, the ecological adaptation to freckles lead to a contrast effect with highest attractiveness ratings for faces without freckles and decreasing ratings for medium and high level of freckles. Thus, the preference regarding freckled faces is determined by perceptual dynamics due to changes in beauty ideals and ecological adaptation.

## **Heterogeneity in episodic memory control processes among older adults: Structural and functional findings**

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Aging is associated with decline in memory for associative information. However, there is substantial interindividual variability in memory performance and decline among older individuals. We investigated to what degree maintenance of task-related brain activity and structural integrity in older adults is associated with successful memory performance. The network of brain regions activated during correct rejection of novel word-pair configurations in younger adults was used as a template to assess deviation in task-related functional activation in older adults. Among older adults, lower deviation scores were associated with higher memory performance and less high-confidence errors on novel configurations. Low deviation scores were also associated with higher overall performance in the California Verbal Learning Task due to higher strategic clustering at recall in older adults with low deviation scores. Analysis of structural integrity data is currently under way to follow up on these findings by investigating how interindividual variability in recall and clustering are related to differences in volume and cortical thickness of the underlying brain circuitry. These findings indicate that maintenance of functional activity and structural integrity in old age is associated with more flexible use of strategic control mechanisms, resulting in better adaptation to changing environmental demands.

## **When body appearance doesn't count: The effect of masculinity threat on reactions toward sexualized and non-sexualized women**

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Would masculinity threat affect judgments of and behavioral intentions toward women? We tested this research question in an experiment with male participants who were (or were not) put under masculinity threat. To induce masculinity threat, participants received fake feedback regarding their performance on a computerized alleged personality test. Specifically, a female experimenter informed participants in the control condition that their final score would be in the "typically male" range, whereas in the experimental condition she told participants that they had obtained a score that would be prototypical of women. Subsequently, they had to report mind attribution and willingness to interact with a woman who was either presented in a sexualized versus non-sexualized way. In line with previous research, participants perceived the sexualized woman as more attractive and less mindful than the non-sexualized woman. When participants were under masculinity threat, however, they evaluated the target woman as less attractive, less mindful, and reported less willingness to interact with her than in the control condition. This pattern emerged independent of type of woman. Our findings suggest that participants under masculinity threat tended to devalue and to avoid women. Implications of these findings will be discussed.

## **Neonatal imitation in macaques. Implications to understand the role of early experiences on brain, social and cognitive development**

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The capacity of neonates to imitate facial gestures has been demonstrated in humans, chimpanzees, and macaques. Understanding the developmental trajectory of this phenomenon might be useful from a comparative perspective, as it would provide important information on the basic mechanisms involved as well as the possible effects of early experiences in regulating this response. Here I will review the research on newborn macaques showing that 1) the postnatal period is characterized by intense affective communication between newborn and mothers. Such communication involves a constellation of specific caretaking features, such as neonatal imitation, that are critical for optimal infant cognitive and socio-emotional development; 2) neonatal imitation predicts the development of later social skills; 3) at the core of these social competencies, lies an action-perception mechanism that is capable of activating shared motor representations; 4) postnatal social experiences affects this mechanism suggesting that early environmental perturbations may well be of fundamental importance to the developing brain. The results of this work indicate that behavioural synchrony, imitation, and behavioural contingencies in mother-infant behaviours are the building blocks that support the development of this action-perception mechanism and are responsible for the development of positive emotional engagements and prosocial behaviors.

## **Is this funny? How women and men process verbal jokes**

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According to the classical model of pragmatics, the comprehension of non-literal meanings, such as indirect requests, irony, idioms, etc., requires additional processing. After the literal meaning has been derived, an inconsistency is noted, leading to a costly reinterpretation. Similarly, the incongruity theory accounts for positive affect as a consequence of the surprise effect – and subsequent reinterpretation – elicited by the inconsistency of the punch line in jokes.

We have shown that this model does not provide an adequate account of humour processing (Hunger, Siebörger & Ferstl, 2009/2012). Reading times for punch lines of jokes are not longer, sometimes even faster than those for comparable sentences in coherent, non-funny texts. Interestingly, there are gender asymmetries (Putzar & Ferstl, 2012). Male participants tend to be sensitive to the instructions. Asked to provide funniness ratings, their reading times are as fast as the women's. However, when asked to judge a complex linguistic property, men have considerably more difficulties.

Here we investigate whether these findings are due to differences in language skills, humour appreciation, or reading strategies. Thus, the data are further differentiated: Individual profiles and item analyses (e.g., correlations with funniness ratings) are used to shed light on the observed gender differences.

## **Ecological origins of a unitary dimension of psychological distance**

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Construal-level theory's basic assumption of a unitary dimension of psychological distance implies positive relationships between temporal, spatial, social and probabilistic distance. Systematic evidence from a series of experiments (Fiedler, Jung, Alexopoulos & Wänke, 2012), in which an extended set of imagined future events and actually experienced past episodes had to be rated for all four aspects, indeed reveals substantial positive correlations. High (low) distance in any aspect covaries with high (low) distance in all other aspects, and there is no sign of discounting effects (e.g., high temporal distance rendering high personal distance obsolete). An analysis of objective distance coordinates of memorized episodes elicited by different action and state verbs suggests that actually existing ecological correlations can account for the existence of a unitary distance dimension. Events that are remote in time are also more likely to be spatially and socially distant and to involve unlikely events than events experienced here and now. Verbal primes that vary in valence, affect, and social power solicit highly regular ecological differences in all distance aspects (Fiedler & DeMolière, 2013; Fiedler, Jung & Wänke, 2013).

## **Investigating factors influencing risky decision making**

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In the last years, research on risky choice has moved beyond analyzing choices only. Models have been suggested that aim to describe the underlying cognitive processes and some studies have tested process predictions of these models. Prominent approaches are evidence accumulation models such as decision field theory (DFT), simple serial heuristic models such as the adaptive toolbox, and connectionist approaches such as the parallel constraint satisfaction (PCS) model. Recent studies investigating effects of presentation format, positive and negative outcomes and risky choice framing will be presented. Results concerning choices, attention, arousal, and decision time will be discussed with respect to these models.

## **Implicit measures in addiction research: Stability, reliability, and context-dependence**

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It is important to carefully consider the stability, reliability and context dependence of implicit measures, if one is using such measures to predict and change behaviour in dependent individuals. For example, measures of automatic alcohol-approach associations have good internal reliability, they are stable over time, and they are insensitive to manipulations of environmental context. Therefore, they may be suitable for measuring dispositional addiction-related implicit cognitions in the clinic in order to predict addictive behaviour or treatment outcome at a later point in time. By contrast, measures of attentional bias for alcohol cues have poor internal reliability, are unstable, and are easily influenced by the environmental context. Given this, it is unsurprising that attentional bias measured in the clinic is a poor predictor of addictive behaviour several months later. However, recent research demonstrates that attentional bias measured in the 'real world' using ecological momentary assessment may be a reliable predictor of addictive behaviour moments later. In summary, different implicit measures appear to have different strengths and weaknesses, and it is crucial to select a suitable and appropriate measure that takes account of these issues.

## **Eliciting and measuring access to magnitude information in embodied comparisons**

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Embodied numerical representations have recently gained increasing research interest. In the present study, we investigated whether systematic bodily-sensory left/right responses increase the activation of spatial-numerical representations (i.e. the mental number line) in fourth-grade children. To this aim, we varied the response format (verbal response vs. full-body movement on a digital dance mat) in a number magnitude comparison task. Mental number line activation was evaluated by the presence of either the SNARC (Spatial Numerical Association of Response Codes) effect and/or a new effect of spatial-numerical congruity. In line with our expectations we observed an influence of the type of response format that was, however, limited to the congruity effect. Embodied response conditions elicited a more pronounced congruity effect, indicating that systematic embodied response formats corresponding to mental number line orientation support the processing of number magnitude information. Importantly, this effect was independent from variations in presentation format. These data lend further support to the claim that bodily response formats that correspond systematically to characteristics of underlying mental representations may be suitable for interventions that address rather abstract cognitive constructs such as numbers.



## Did I tell you or did you tell me? An ecologically valid experiment on source and destination memory

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Arguing that people often are in doubt whether they have told someone something, or not, Gopie and McLeod (2009) introduced a new memory component: Destination memory, the discrimination of the destination of output information, for example, the person it was directed to. Whereas we consider the investigation of source versus destination memory interesting, their experimental approach appeared highly artificial. In a replication experiment (N=146), we studied source and destination memory within subject, using an ecologically valid approach similar to speed dating. In dyads, participants completed phrase fragments (e.g. “My last holiday was . . .”) with personal information. Each person was the speaker for half of the fragments, and the listener for the other half. In a recognition test, participants had to decide whether fragments were new or old, and if old, whether they were heard or spoken, and which depicted person was the source or the destination of the information. A multinomial model, based on models used in source monitoring research, was used to estimate separate parameters of source and destination memory. Results indicated that source memory significantly exceeds destination memory, replicating the finding of Gopie and McLeod. Moreover, person memory was rather good.

## On person judgment bias caused by phoneme perception

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A word’s sound can influence the perception and evaluation of the word itself and of the object it refers to. So, meaning can be conveyed by single phonemes, e.g. /i/ and /ε/ evoking the perception of rather *small* and *light* (in color) vs. /ɔ/ or /a/ directing individuals to deliver a judgment towards *big* and *dark* (Shrum & Lowrey, 2007). Sapir (1929), for example, has shown that individuals allocated the non-word *mal* more often to a large table (vs. *mil*); and Klink (2000) has reported that *Dotil* better matched a dark beer’s brand mark than *Detil*. We wanted to extend this effect on *real* first names instead of non-words (Experiment 1), and, as a second step, to dissociate the affecting phonemes from the target object itself (Experiment 2). We hypothesized that a target person will be judged in accordance to the phonemes’ evaluation, independent of the phonetic priming procedure (within the target’s name or presented in an ostensibly unrelated linguistic task). Target persons were judged as significantly different as a function of the phonetic priming (e.g. *large* vs. *small*). Results give support to the relevance of phonemes’ features as a means of semantic transportation in the context of person judgment.

## **Pseudocontingency effects on decision making under risk**

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A pseudocontingency is an erroneously perceived contingency between two variables that is inferred from inadequate information about the joint distribution of these variables, that is, from information other than bivariate observations. So far, pseudocontingency effects have been demonstrated in various social judgment situations and on decision making under risk. In a series of experiments, we found that participants learning a trivariate stimulus distribution by observation did not only infer a pseudocontingency despite conflicting evidence (a true contingency of the opposite sign), but also relied on this pseudocontingency to maximize their monetary outcome in a subsequent gambling task. Participants' decision behavior reflected the pseudocontingency even under uncertainty, that is, in a decision environment about which participants had received no information at all during the learning phase. Furthermore, we examined the role of context variables (e.g. of self-paced vs. fixed reading times) for pseudocontingency effects on actual behavior with immediate personally relevant consequences.

## **Moral judgments under uncertainty**

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How do people make moral judgments in dilemmas under uncertainty, as opposed to commonly investigated dilemmas where the course of all future events is certain?

We asked people for moral judgments in two types of epistemic situations that are representative for real cases: situations under uncertainty where no probability information is available (foresight condition), or situations under certainty in which information is given whether negative side-effects actually occurred (hindsight condition). Participants additionally estimated the probability of side-effects to examine how moral judgments are influenced by what is foreseen. Our results showed that participants in foresight judged actions to be more or less permissible than participants in hindsight, depending on whether negative side-effects did or did not occur. Likewise, side-effects were estimated to be more or less probable depending on whether side-effects occurred. Yet the effect of hindsight information was smaller and less homogeneous across dilemmas for moral judgments than for probability estimates. Moreover, judgments and estimates were only moderately correlated. Overall, the results suggest that moral judgments are influenced by the uncertainty of the decision situation, yet outcomes and further features of the action sometimes play a larger role than the perceived likelihood of consequences

## Measuring cognitive biases

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A large number of studies have been presented on the topic of cognitive biases and fallacies. Researchers have used numerous different techniques to measure cognitive biases, with several kinds of questions addressing each bias. In some cases researchers have used between-subjects designs to demonstrate biases, but there are only a few studies that have taken individual differences between decision-makers into account. In this study, we illustrate some methodological problems of measuring cognitive biases, and potential solutions to the problems. We developed a test, called the Intuitive Decisions Questionnaire, which can measure individual differences in 15 biases adapted to real business situations and tested on professional and non-professional decision-makers. A Cognitive Reflection Test was also administered. The results enable us to compare the degree of susceptibility to the assessed biases on both individual and population levels. This advanced methodology should help us understand the underlying pattern of individual variation in decision biases.

## The effects of actors' and raters' age on recognizing spontaneous, dynamic facial expressions

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Recent studies found an age-related decline in the ability to decode emotional facial expressions and a less accurate recognition of older, compared with younger adults' facial expressions. In addition, there is evidence for an own-age bias in emotion recognition. As previous studies mostly used static pictures of posed expressions, our research extends those findings by using spontaneous, dynamic expressions. In the present study, video clips of emotional facial expressions (fear, disgust, anger, sadness, happiness) of younger and older adults were created and presented to a total of 69 younger (18-30 years) and 67 older (65-85 years) adults who rated the displayed emotion. The study comprised two experiments, in experiment 1, ratings were given on a forced-choice scale; in experiment 2, ratings were given on a multi-dimensional scale. In both experiments, the age-related decline in empathic accuracy was confirmed. Opposing to previous results, expressions of the elderly were not generally judged less accurately. Instead, some emotions were more accurately recognized in older actors, whereas other emotions were more accurately recognized in younger actors. We did not find a general own-age bias. Some contradictions to previous results may be due to attributes of the stimuli (spontaneous, dynamic expressions).

## **Evidence for auditory attentional capture: Positive and negative valence of tones affects very early auditory event-related potentials**

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Compared to the large body of research investigating links between affect and visual attention, the interplay between affective factors and auditory processing is scarcely reported so far. The present study was designed to answer the question as to how early the specific impact of positive and negative valence of a sound occurs during auditory processing. We applied event-related potential (ERP) approach leveraging its excellent temporal resolution to identify the 'attack-point' of affect in the timeline of auditory processing. Affective research typically relies on perceptually complex stimuli with strong, 'intrinsic' valences (e.g., human emotional expressions) that, however, allow only for quasi-experimental comparisons. Contrary to this approach, we stressed strict control over physical stimulus attributes by assigning positive, negative, and neutral valence to simple sinusoid tones in a learning phase. Thereafter, ERPs were recorded while these tones were presented in the unattended channel. Results indicate enhanced attention to valenced tones (in comparison to neutral ones) at the level of early stimulus encoding (i.e., in the time window of the auditory N1 ERP). This enhancement did not show selectivity for positive or negative valence.

## **The influence of US-revaluation on conditioning attributes to neutral CSs**

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CSs attributes change due to repeated co-occurrence with USs representing these attributes; we termed this phenomenon attribute conditioning (AC), which is a generalized form of evaluative conditioning. The present research investigates the associative link structure underlying AC: Either direct CS-attribute links emerge from CS-US pairings or indirect links emerge via newly learned CS-US links and established US-attribute links. In two experiments, we conditioned athleticism to neutral men (CSs) using (non-)athletic comic characters (USs). Afterwards USs were reevaluated in comic strips. After conditioning and before US-revaluation, participants rated CSs in line with paired USs athleticism. After US-revaluation, however, CSs athleticism returned to neutral, although CSs and USs did not co-occur again. Experiment 2 delineated influences of AC procedures and demand awareness on AC effects. These findings indicate that AC-effects are due to an indirect CS-attribute link via CS-US and US-attribute links.

## Subjective feeling of fluency and affective response

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According to the fluency hypothesis, the objective fluency of a perceptual process is accompanied by a subjective experience. This experience, or subjective feeling, is said to be hedonically positive and can be a source for later judgments, such as judgments of liking. According to psychobiological approaches, the affective response (arousal or valence) towards an object should also influence object preference. Interestingly, it has not yet been thoroughly studied whether fluency may also play at least a mediating role in our affective responses. Therefore, in a series of behavioral and psychophysiological experiments we addressed measurement of the feeling of fluency and its relation to affective core dimensions of arousal and valence. Varying objective fluency through differences in presentation duration influenced felt fluency and arousal ratings—but not valence ratings. This finding challenges the notion that fluency per se is hedonically positive and that it therefore leads to higher positive evaluations of objects. However, a higher subjective feeling of fluency led to higher ratings in both dimensions (arousal and valence). This indicates that the feeling of fluency may be an important source for explaining the interplay of affective responses and evaluations.

## Modeling aging in decisions from experience

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Decisions from experience (DFE) require exploration and learning of the available decision options. Personal factors such as age (and relatedly, emotions that may covary with aging) were found to shape exploration. However, typical DFE studies did not involve sufficient trials to investigate how these factors influence learning on an individual level. To overcome this shortcoming, participants in the current study completed 84 DFE problems on tablet-computers in their homes, over the course of a week. Using cognitive modeling, we show that older adults perform surprisingly similar compared to younger adults. However, while younger adults tend to be more risk-averse in gains, older adults tend to be more risk-averse in losses.

## Evaluation & Validierung des MoSAIC-Fahrsimulators

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Die „Modular and Scalable Application Platform for ITS Components“ (MoSAIC) ermöglicht es, kooperatives Fahrverhalten zu untersuchen. MoSAIC verfügt über drei Fahrsimulatoren, die in einer Simulation miteinander gekoppelt sind. So können, im Gegensatz zu herkömmlichen Simulatoren, mehrere Versuchspersonen an derselben Simulation teilnehmen. Das Ziel der Untersuchung war es, zu untersuchen, ob das Wissen um diese weiteren, realen Fahrer sich auf das kooperative Fahrverhalten während der Simulation auswirkt. Es wurden 20 Probanden in einem Überholparadigma getestet. Die Kontrollgruppe bekam dabei die Information, das jeweils andere Auto in der Simulation würde von einem Computer gesteuert. Der Experimentalgruppe wurde mitgeteilt, dass eine andere Versuchsperson das zweite Auto steuern würde. Dieses zweite Fahrzeug wurde jedoch in beiden Fällen von einem der Versuchsleiter gesteuert. Um Kooperationsverhalten zu untersuchen, wurden die Häufigkeit und die *Time Headway* beim Zeigen der kooperativen Verhaltensweisen herangezogen. Zudem wurden Kooperations- und Risikoempfinden sowie die Intentionen der Probanden erfasst. Es fanden sich keine signifikanten Unterschiede in den objektiven Fahrdaten. Probanden der Experimentalgruppe zeigten jedoch stärker ausgeprägte kooperative Intentionen, ein höheres Kooperationsempfinden und schätzten die Situationen als weniger risikoreich ein. Implikationen für die weitere Praxis, eventuelle Gründe für die nicht signifikanten objektiven Daten und Anregungen für zukünftige Studien werden diskutiert.

## From hands to feet: Response representations in distractor-based SR retrieval

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In selection situations in which target stimuli are accompanied by distractor stimuli, the response to the target can also be integrated with and subsequently retrieved by the distractor stimulus, that is, a distractor can retrieve responses given to previous targets, a phenomenon called *distractor-response binding*. The present experiment investigated whether muscle-specific or goal-specific representations of the response become part of such distractor-response bindings. In a prime-probe design, participants always gave a left or right response according to a target color, simultaneously ignoring a distractor color. Distractor-response binding effects were found even if the prime response was executed with the hands and the probe response was executed with the feet (or vice versa). These results indicate that rather abstract response codes are integrated with and can be retrieved by distractor stimuli. We conclude that the repeated encounter of an ignored stimulus can influence performance in a relatively wide range of movements

## **Experimental evidence on the interplay of social support and social identity**

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Previous research shows that social support in threatening situations can be a mixed blessing since it is not always perceived as supportive or may even impair well-being. Building on the social identity approach, we proposed that social support buffers neuroendocrine stress reactions only if a sense of shared social identity is evoked. To test this hypothesis 40 participants (20 female; study under progress) went through the Tier Social Stress Test (TSST) experiencing either (a) a supportive or (b) an unsupportive audience. Beforehand the salience of (a) a shared social identity among the participant and the audience or (b) a personal identity was manipulated. As dependent variables salivary cortisol and self-reported stress were measured. Preliminary results confirmed our hypothesis and suggest that a supportive TSST audience buffers the neuroendocrinological stress reaction only if a shared social identity among the participants and the TSST audience is established. No effects for self-reported stress were found. Building on these preliminary experimental results we argue that the social identity needs to be taken into account to explain the positive and negative effects of social support.

## **Conflicts as aversive signals: Conflict priming increases negative judgments for neutral stimuli**

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Botvinick (2007) recently suggested that competing theories of the monitoring function of anterior cingulate cortex (ACC) for cognitive control might converge on the detection of aversive signals in general, implying that response conflicts, a known trigger of ACC activation, are aversive, too. Recent evidence showing conflict priming (i.e., faster responses to negative targets after conflict primes) directly supports this notion but remains inconclusive with regard to possible confounds with processing fluency (Dreisbach & Fischer, 2012). To this end, two experiments were conducted to offer more compelling evidence for the negative valence of conflicts. Participants were primed by (conflict and non-conflict) Stroop stimuli and subsequently had to judge the valence of neutral German words (Experiment 1a; N = 21) or Chinese pictographs (Experiment 1b; N = 24). Results show that conflict as compared to non-conflict primes led to more negative judgments of subsequently presented neutral target stimuli. The findings will be discussed in the light of existing theories of action control highlighting the role of aversive signals for sequential processing adjustments.

## **Stereotype threat for Turkish migrants leads to lift effects for Germans**

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Stereotype threat research has shown that the activation of a negative stereotype can lead to a decrease in performance for the negatively stereotyped group and an increase in performance for the reference group. In the present work we argue that stereotype threat can partly explain group differences in academic performance between students with and without migration background found in the German educational system. Negative stereotypes about migrants' intellectual abilities are spread in German society, especially negative stereotypes about students with Turkish migration background. Ninth grade high school students worked on math problems from PISA (2003) after stereotype threat was experimentally manipulated. Germans in the stereotype threat condition significantly outperformed Turkish-origin migrants in the stereotype threat condition and Germans in the control condition. Thus, we did not find a classical stereotype threat effect. However, we found a stereotype lift effect for Germans. This study showed for the first time that the activation of achievement-related ethnic stereotypes can influence students' performance in the German educational system. Implications for teaching and testing are discussed.

## **Counteracting task inhibition – On the influence of prolonged preparation time on n-2 task repetition costs**

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Successful performance of task sequences has been shown to rely on activation as well as inhibition processes. Using cued task switching with three tasks, task inhibition can be assessed as n-2 task repetition costs, which is the finding that performance in n-2 task repetitions (sequences such as ABA, with letters referring to different tasks) is worse than in n-2 switches (e.g., CBA), suggesting interference based on persisting task inhibition when returning to a previously abandoned task (Koch, Gade, Schuch & Philipp, 2010). Importantly, previous studies did not find reliable evidence that n-2 task repetition costs decrease with longer cue-target intervals (CTI), suggesting that task inhibition is rather insensitive to the influence of advance preparation. The present set of experiments demonstrates a significant preparatory reduction of n-2 repetition costs with prolonged CTI. However, substantial statistical power was required to obtain this effect, suggesting a small effect size and high interindividual variability in the preparatory influence. Based on these findings, we conclude that task-set inhibition is not immutable but can be influenced by preparation, even though the effects are weak.



## **Parafoveal preprocessing in reading revisited: Evidence from a novel preview manipulation**

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The present sentence reading study investigated parafoveal preprocessing by means of the classical invisible boundary paradigm and a novel manipulation of the parafoveal preview. The manipulation, that is, visual degradation, did not interfere with word recognition processes of the target. Thus, we had a proper baseline to which we could relate our findings which were as follows: (i) The final letters of an upcoming target words are preprocessed, when the preceding fixation was in close proximity of the target word. (ii) The preview of the initial letters of an upcoming target word yielded similar preview benefits as previewing the whole word when the initial letters imposed high constraints on the set of potential target words.

## **Using SVM pattern detection algorithms to detect material-specific activation in human sleep EEG related to previous learning**

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Sleep is a period of memory consolidation. Several mechanisms have been proposed to underlie this function. One of the main theories assumes that neuronal traces of recent experiences are reactivated during sleep, which leads to strengthening or modification of the memory. Several functional imaging studies have shown that brain areas active during learning are also active during following sleep periods. It is an open question whether this activity is specific to the learned material. In the present study, we use multivariate pattern classification (support vector machine) on sleep EEG data to determine which sleep periods were preceded by learning pictures of faces and which were preceded by learning pictures of houses. The algorithm was able to determine with significantly above chance probability which condition an EEG recording was coming from, i.e. it was possible to determine from sleep EEG whether a subject had been trained on face or house stimuli previously. Thus, EEG activity during sleep contains activity related to the content of a previous learning episode. This finding supports the idea that the brain reactivates previously learned material during specific periods of sleep. It also demonstrates the applicability of pattern classification methods for the analysis of EEG data.

## **Numbers can be worth a thousand pictures: The importance of individual differences in understanding graphical and numerical representations of health information**

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In recent years, an effort has been made to involve patients more strongly in medical decisions, which requires that both patients and their physicians understand the benefits and harms of treatment options. However, many people, including experts, are often confused by the respective health statistics. It is therefore an important question how statistical information can be communicated more effectively, and graphical representations are considered to be particularly promising in this regard. Contrary to popular belief, however, a series of experiments will be presented that show that graphs are not universally better understood. A first study revealed that some people actually understand mere numbers better than graphs such as bar charts or icon arrays. Yet, in a second study, even individuals who would likely be better off with numbers often preferred graphical representations when given a choice, because they choose what looks attractive rather than what is comprehensible for them. Finally, a third study demonstrated that graphs can be particularly confusing for elderly people, which is significant as they face most health decisions. These results highlight the need to consider individual differences in processing different representations of health information, which has important implications both for theory and practice of risk communication.

## **The effect of psychological profiles on emotional interference in a working memory task**

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Studies investigating the effects of emotional distraction on working memory performance have been inconclusive. We suggest that in order to explain these inconsistencies, it is critical to understand how interindividual personality differences influence emotion-cognition interactions. In particular, it would be constructive to answer the question whether specific psychological profiles differentially modulate the effect of emotional distractors. Here we used a delayed-match-to-sample task where the participants had to encode an abstract shape followed by a distracting positive, negative, or neutral vocalization. The effects of emotional distraction on performance were analysed in terms of D-prime and diffusion model parameters. A cluster analysis based on psychological questionnaires revealed three personality profiles. Subjects characterized by high positive mood and high BAS reward-responsiveness (Cluster 1) showed higher D-prime values and higher drift rates after positive distraction as compared to subjects with low positive mood and low BAS reward-responsiveness (Cluster 2) or with depressive symptoms (Cluster 3). These findings suggest that the emotional influence on working memory strongly depends on individual personality traits.

## The impact of communication and motivation strategies on tax compliance

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Tax authorities can communicate tax issues either to individual taxpayers or to taxpayers in general via mass communication. They can also motivate taxpayers to comply either by exerting coercive power or legitimate power. The aim of the present experiment is to analyze the effects of different communication and motivation strategies on tax compliance. In a 2 by 2 scenario based experiment, about 160 participants imagined to get a personalized letter or a brochure addressed to the public in general containing information about coercive or legitimate strategies of tax authorities to ensure tax honesty. Results show an interaction effect between individual and mass communication and power: legitimate power leads to higher intended tax compliance than coercive power in the personalized communication condition. Results also indicate that mass communication strengthens social norms to comply. In comparison to coercive power, legitimate power seems to increase trust in tax authorities, to lead to perceptions of low antagonistic and high synergistic tax climate, to less enforced compliance, and more voluntary cooperation. It is advisable to personalize communication about legitimate power to increase tax compliance and positive attitudes towards the tax system.

## Reducing reproduction bias by integrating sensory feedback signal

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Sensory temporal estimates are not only corrupted by noise, but also contain additional biases. Previously it has been shown that the brain can combine multiple sensory inputs with prior knowledge in an optimal way to refine sensory estimates. However, optimal integration is still controversial in the temporal domain. The goal of the present study was to evaluate how the brain incorporates sensory feedback during duration reproduction, given prevalent biases in time perception. Therefore, temporal estimates and variabilities were compared for three tasks: perceptual duration comparison, duration reproduction with and without sensory feedback. For the comparison task, participants had to indicate which of two successive tones was longer, while in the reproduction task, participants had to press a button for the “same” amount of time as they had heard the standard before. Results showed that reproduction with auditory feedback was less biased than pure reproduction due to additional information. Also uncertainty was reduced as indicated by smallest variance in the feedback condition. The reproduction time and variability in the feedback task can be predicted by the MLE model, suggesting that the brain integrates the motor and feedback time. It is possible that both representations are mixed and integrated in the memory.

## Aesthetic judgment of broken symmetries

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There are a number of factors which are known to influence aesthetic evaluation (Leder et al., 2004). Concerning abstract black-and-white patterns, Jacobsen and Höfel (2002) found symmetry to be the most important and complexity the second-most important factor. However, there are claims that small asymmetries can be beautiful as well (McManus, 2005). Here, we investigated the influence of such minor asymmetries on the liking of abstract patterns. We created a new set of abstract black-and-white patterns, containing “broken” symmetric (BS) patterns, which are slightly different from corresponding fully symmetric (FS) ones. Because breaking the symmetry increases the complexity, we additionally included fully symmetric patterns (FS’), matched to the broken patterns by visual complexity ratings obtained in a prestudy. The resulting 240 patterns were then rated by 21 participants on a 7-point scale for liking. The increase of complexity from group FS to FS’ resulted in a higher liking. However, patterns with broken symmetries (BS) were significantly less liked than full symmetric (FS) ones – despite the corresponding increase of complexity. Therefore, we can confirm the result of Jacobsen and Höfel (2002) that symmetry is a stronger and more important factor than complexity, even when the difference in symmetry is very small.

## Is the valence due to evaluative conditioning represented in episodic format?

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Evaluative conditioning is a change in valence of a stimulus (CS) that is due to previous pairings with valent stimuli (USs). We tested whether the new CS valence that is acquired over a range of pairing trials is mentally represented as an overall valence counter or in separable learning episodes, which represent the single trials and can still be accessed separately. To test this, CSs were paired both with positive and with negative USs during the conditioning phase. In a first study, we then measured CS-valence-ambiguity with an adapted affective priming procedure that allowed to assess positivity and negativity independently from each other. We found no evidence for increased valence-ambiguity in mixed-paired as compared to non-paired stimuli. In a second study, after again pairing CSs with USs of mixed valence, we presented only the positive or only the negative USs in order to specifically trigger retrieval of those learning episodes that included these USs. This manipulation did not impact overall valence of a CS. Results of both studies suggest that the valence of a stimulus that results from pairings with a range of valent stimuli is represented as averaged valence counter rather than in a range of individually accessible episodes.

## The effect of moral outrage and perspective on conditional legal reasoning

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Pragmatic influences on the use and interpretation of everyday conditionals are well known. In the light of additional information, such as counterexamples, participants withdraw from making inferences they would normally do. Yet, there is little research on such pragmatic effects on the use of legal conditionals, where particularly moral and emotional pragmatic influences seem very probable. In our experiments we phrase legal rules as conditionals, and present these conditionals together with information about an offense and its circumstances. The task for the participants is to decide whether the conditional legal rule should be applied or not. Previous results from our research group have shown that laypeople adhere more strictly to legal rules than experts, because they ignore possible exculpatory information. We report an experiment, in which we explored possible influencing factors for this effect. Thus, we manipulated the severity of the offense and the perspective the participants should take (own sense of justice vs. prescriptions of the legal system). Our results show that the adherence of laypeople to legal rules depends on the moral outrage evoked by the offense, regardless of which perspective participants had to take. Implications for cognitive psychology and legal reasoning are discussed.

## Surface area of early visual cortex predicts individual speed of traveling waves during binocular rivalry

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Binocular rivalry between competing representations ensues when different images are presented to the two eyes with conscious perception alternating between the possible interpretations every few seconds. Usually, perceptual transitions are often initiated at one location and spread to other parts of the visual field, a phenomenon termed *traveling wave*. Previous studies investigated the characteristics of the traveling wave and the underlying neural mechanisms and surmised that the primary visual cortex might play an important role. Here we used magnetic resonance imaging and behavioral measures in humans to explore how interindividual differences in observers' subjective experience of the wave are related to anatomical characteristics of different cortical regions. We measured wave speed in nineteen participants. For the same participants retinotopic mapping was employed to precisely delineate borders of early visual areas V1-V3 in order to determine surface area and cortical thickness in those regions. Only the surface areas of V1 and V2, but not V3 showed a correlation with wave speed across participants. For individuals with larger V1/V2 area, the traveling wave needed longer to spread across the same distance in visual space. Our results providing further evidence that V1 is an important site for neural processes underlying binocular rivalry.

## **Resource conservation limits automatic effort mobilization**

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Abundant studies have supported the principle of motivational intensity theory (Brehm & Self, 1989) that people mobilize resources proportionally to subjective demand as long as success is possible and justified. On the other hand, research on automaticity has revealed that the implicit activation of general action vs. inaction concepts can directly influence performance (Albarracín et al., 2008). We present a series of experiments that have integrated both perspectives and tested limits of both automaticity and difficulty effects in effort mobilization. The studies exposed participants online during task performance to masked action vs. inaction cues, manipulated task context variables, and assessed effort as response of cardiac pre-ejection period, an index of sympathetic nervous system impact on the heart. We have found (1) that both effort-related cardiac response and performance are directly influenced by implicit action and inaction cues. (2) Action primes override task difficulty information and directly lead to high effort—but only as long as success is possible. (3) The effort and performance-enhancing effect of action primes is limited if only low effort is justified by low success incentive. Implications for the study of the intensity of human motivation are discussed.

## **The power of movement: Context-independent movement imitation affects consumption**

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Research has shown that individuals tend to adjust their drink and food intake to others' consumption (e.g. Herman et al., 2005). A plausible account for such findings are basic imitation processes. While in previous studies the observed and imitated behaviors were always identical, the present research goes one step further and disentangles the imitation of movements from their behavioral contexts. Based on theories that the perception of behavior refers to the same mental representations as the execution (e.g., Prinz, 1997), we found that imitation is not confined to the same class of behaviors but rather to the same class of movements that may be involved in different behaviors. Four studies demonstrated that watching an athlete lifting a barbell leads to an increase in participants' drink intake when drinking involved a similar movement (lifting a cup) but not when drinking did not involve a lifting movement (drinking through a tube). The effects were stronger for individuals high in perspective taking and for situations in which the perspective was manipulated to be similar to the observed actor's. These findings demonstrate the power of movements in imitation processes, suggesting that shared goal representation is not necessary for imitating others' movements.

## Challenging the contrast polarity effect: Should we really recommend 'black on white'?

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The goal of studying luminance polarity is to determine if information for display users should be presented in dark print on a lighter background (positive polarity) or vice versa (negative polarity). The existence of a luminance polarity effect, i.e. the superiority of one of the mentioned alternatives over the other, is controversial in the literature. While some authors report an advantage for dark stimuli (e.g. Greco, Stucchi, Zavagno & Marino, 2008), others claim that there is no effect of polarity (e.g. Buchner, Mayr & Brandt, 2009), and some even find an advantage for light stimuli (e.g. Legge, Pelle, Rubin & Schleske, 1985). We tested a variety of detection and discrimination tasks for the occurrence of a polarity effect, including possible moderators such as stimulus duration that might influence the size/direction of the effect. Our results confirm the general impression that the effect is rather unstable and susceptible to small changes in the experimental setup. This leads us to question the generally recommended usage of dark text/elements for applied settings.

## Cognitive fluency: Titles influence aesthetic evaluations

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There is evidence that titles of paintings influence their aesthetic evaluation (Belke et al., 2010). This can be explained by the processing fluency theory, proposing that fluency of a cognitive process is hedonically positive and leads to more positive aesthetic evaluations. Therefore, we investigated how semantically related (cognitively more fluent) compared to semantically unrelated (cognitively less fluent) titles influence aesthetic evaluations. Participants evaluated paintings of different styles (abstract, cubist, and representational) preceded by either a semantically related, semantically unrelated title, or no title (as control). We assessed aesthetic responses using liking and interestingness ratings as well as recording facial EMG. Preliminary data support predictions from fluency theory. Paintings preceded by semantically related titles were liked more compared to paintings preceded by semantically unrelated titles or no title. This finding was corroborated by facial EMG. Semantically related compared to unrelated titles led to stronger M. zygomaticus major activations, indicating higher positive affect and to weaker M. corrugator supercilii activations, indicating lower negative affect. Ratings of interestingness were affected less by title manipulation. Additionally, style of paintings slightly moderated these effects. Thus, aesthetic evaluations were partly influenced by viewers' processing experience. Experiencing higher cognitive fluency led to more positive aesthetic evaluations.

## **Social conformity and perceptual decision-making: A diffusion model analysis**

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In his seminal experiments, Solomon Asch (1956) investigated social conformity using a simple perceptual decision-making task. He found that participants adopted the clearly wrong response of an unanimous majority, on average, in 37 % of the trials. Since then, social psychologists explained majority influence mainly in terms of informational versus normative influence or in terms of heuristic versus systematic processing. By contrast, the fundamental question whether a unanimous majority can lead to changes in perceptual processes has not been answered clearly so far. To fill this void, we used a diffusion model approach. This allowed us to examine whether social conformity effects on perceptual decision-making are due to (a) a perceptual bias (i.e., a bias in information uptake), (b) asymmetric decision criteria, or (c) both. For this purpose, we used a modified version of the Asch-paradigm. The results of two experiments provide converging evidence for the idea that social conformity effects on perceptual decision-making are due to both changes in perceptual processes and asymmetric decision criteria.

## **Roses are osig, violets are emgu, learning is swift and Stroop is too**

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Participants can easily relate novel words to their assigned semantic concepts, even if correct novel word-to-meaning associations must be derived from the statistics of their co-occurrence. Moreover, such novel words are embedded within existing lexico-semantic networks, as indexed e.g. by semantic priming effects.

Here we present data from an experiment in which associating novel words with meanings and the assessment of their semantic integration took place on a more abstract and implicit level. In a manual Stroop task, participants responded to the print color of a small set of novel words by manual button press. Each novel word could occur in either color, but some of them were presented in a particular color more often, whereas some occurred equally often in each color. This allowed us to test for implicit Stroop effects by checking whether the print color of a novel word can be identified faster (slower) when it is shown in its frequent (infrequent) color, as compared to control non-words. Participants were not informed about the underlying associations, which were irrelevant (albeit informative) for the task at hand. With repeated presentation, Stroop effects indeed developed, indicating that novel words and colors become functionally integrated even with shallow associations.



## Dissociating processes of distractor-response and distractor-target binding

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Irrelevant distractors can become integrated together with relevant target stimuli and simultaneously executed responses into an event file. Subsequently repeating the distractor triggers retrieval processes; however, an unresolved issue concerns the question of *what* is retrieved by the distractor. While recent studies predominantly assume that the distractor retrieves the previous response, it is also possible that distractor repetition triggers retrieval of the previous target stimulus. The present experiment aimed to dissociate distractor-response and distractor-target binding processes, using a sequential priming paradigm. The mapping of targets to responses was not fixed but varied for each prime and probe trial in order to orthogonally manipulate the relation (i.e., repetition/alternation) of responses and targets. Results indicate that both processes are additive, meaning that distractors retrieve both, responses and targets. We conclude that distractor-target and distractor-response binding are independent processes operating in the service of behavior automatization.

## Linking acoustic parameters to arousal and pleasantness in a set of romantic piano trios

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Emotions in music are conveyed by a variety of acoustic cues (Coutinho & Dibben, 2012; Juslin & Timmers, 2010). For instance, the positive association between perceived loudness and arousal has been well documented. However, direct comparisons between emotion spaces consisting of original and amplitude-normalized musical excerpts are rare. We therefore examined the relative importance of relevant acoustic cues in the induction of emotions in a large set of Romantic piano trios presented in their original and amplitude-normalized versions.

30 participants (non-musicians; 15 females) listened to 84 6-second musical excerpts. Participants rated their familiarity, felt arousal, and pleasantness on a seven-point scale. An additional 30 non-musicians (15 females) rated the same excerpts normalized for amplitude. We found that, although the emotional spaces obtained for the amplitude-normalized set and the original set are similar, the perceived arousal decreased or increased in proportion to the amplitude adjustment for each excerpt. In the case of pleasantness, the shift in perceived valence was negatively correlated to the amplitude adjustment. Spectral brightness was significantly correlated with arousal and pleasantness in the amplitude-normalized set, but not in the original set. The relative contribution of other acoustic parameters such as spectral flux and amplitude variability was also analyzed.

## **Decision strategies in social dilemmas and money allocation tasks: A process analysis based on eye-tracking**

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Previous work has demonstrated that Social Value Orientation (SVO) is related to cooperative behavior in social dilemmas. However, little is known concerning the underlying processes. In two eye-tracking studies investigating decisions in money allocation tasks (Experiment 1) and Public Good Dilemmas (Experiment 2), we show that differences in SVO are accompanied by consistent differences in information search. Decision time, number of fixations, the proportion of inspected information, the degree of attention towards the others' payoffs, and the number of transitions from and towards others' payoffs gradually increase with absolute SVO deviation from a pure selfish orientation. Overall these effects seem to be similar for individuals caring positively (i.e., cooperative) or negatively (i.e., competitive) about others. The fact that changes are gradual instead of abrupt indicates that differences in SVO seem to be related to gradual changes in weights given to outcomes for self and others.

## **Number comparison versus number identification: Longitudinal predictors of growth in arithmetic in primary school**

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Recent research on precursors of arithmetic has focused on children's ability to compare non-symbolic and symbolic numerosities. In a longitudinal study 165 British children were tested once every year on a large battery of tests that included symbolic and non-symbolic magnitude comparison. Independent of general cognitive abilities the performance on number comparison tasks as well as the ability to identify the correct Arabic digit upon hearing a number word were significant concurrent predictors of performance on a standardised test of arithmetic at age 5-6, but performance on number comparison tasks at age 5-6 was no significant longitudinal predictor for arithmetic performance at age 6-7 or 7-8. In contrast number identification skill at age 5-6 was a significant predictor of later arithmetic performance at both time points. This suggests that children's knowledge of Arabic digits and their place value understanding at age 5-6 provide an important foundation for later arithmetic skill.

## **Exploring bottom-up priming of control: Transfer of attentional control associations to new task settings**

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The shielding of relevant from irrelevant information processing is a central cognitive control mechanism enabling goal-directed behavior. Recent studies provided evidence for implicit and flexible bottom-up priming of this processing selectivity on the basis of environmental features. The present study investigates such context-specific implementation of the attentional filter by determining the specificity with which the representations of the context-features are linked to settings of cognitive control. We used a version of the context-specific proportion congruence paradigm, in which each context (e.g., location of stimulus presentation) is associated with specific attentional filters (e.g., high vs. low shielding demands). The typical learning phase, in which associations between context and control settings were established, was followed by a transfer block in which either stimuli (Experiment 1) or whole task-sets (Experiment 2) changed. In both experiments, variations in context-specific processing selectivity were also obtained for new stimuli and tasks. These findings point to the existence of domain-general associations between context-features and the attentional control setting that can be transferred and applied despite major changes in the task setting.

## **Coding of self-determined economic plans by amygdala neurons**

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A key requirement of adaptive behavior is the ability to plan ahead. In economic decision-making, for example, choices are often not made in isolation but as part of a larger plan, involving sequences of choices. Here, we explore the neural basis of economic planning in a situation that allowed monkeys to freely make plans about final reward outcomes and pursue these plans over multiple, consecutive trial-by-trial choices. We recorded the activity of single neurons in the amygdala, a principal component of the brain's reward and emotion systems, while monkeys performed the economic planning task. We describe a population of neurons which coded the value of the monkeys' self-chosen economic plans multiple trials in advance. These signals were not observed in a control task involving imperative, forced choices without the possibility to plan ahead. Planning-related activity in some neurons was accompanied by coding of trial-specific value or choice signals. These findings indicate a function for the amygdala in value-guided economic behavior that extend beyond simple reward evaluation to the prospective valuation of economic plans.

## **Mobile brain/body imaging as a new method for neuroergonomics**

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Neuroergonomics aims at investigating the brain and body at work stressing the important link between cognitive processes, the neuronal foundation of these processes, and the human physical structure to interact with the environment. However, imaging the brain dynamics while humans actively interact with their environment proves difficult if not impossible due to technical restrictions of traditional brain imaging approaches. We have recently developed a mobile brain imaging method (MoBI) that allows for simultaneous recording of brain and body dynamics of humans actively behaving in and interacting with their environment. A mobile imaging approach was needed to study cognitive processes that are inherently based on the use of human physical structure to obtain behavioral goals. Here, I will describe the method including soft- and hardware, new data-driven analyses approaches and results from first studies providing examples of the tight coupling between human physical structure with cognitive processing. Finally, I review the feasibility of a MoBI system for use in human factors research.

## **An investigation of driver's visual processes while approaching a level crossing**

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Although the trains' right of way at level crossings is depicted clearly, accidents still happen. Earlier findings indicate that many accidents occurring at level crossings without barriers can be assigned to errors in road users' information admission. In the current study, 24 drivers took part in a test drive, during which a level crossing without any technical protection and one furnished with a yellow-red light signal was passed. An analysis of eye tracking and driving data was conducted. The results reveal that all participants fixated at least parts of the protection layout. The first signs announcing the level crossing at a distance of 240m for example were noticed by a majority of drivers. Nevertheless, two third of all participants did not check the rails for an oncoming train. The speed was significantly decreased at a distance of 80m in front of the level crossing. Participants who checked the tracks for a train had a significant lower speed while passing the level crossings than those who did not. It can be assumed that many accidents do not happen due to simple overlooking of relevant information. Besides the deficient checking for oncoming trains, cognitive effects like inattentive blindness might play a role.

## Die Rolle lexiko-syntaktischer Informationen im Turn-Taking

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Im Dialog nehmen Gesprächsteilnehmer abwechselnd die Sprecher- und die Zuhörerrolle ein. Der Wechsel zwischen den Rollen (*Turn-Taking*) wird mit nur minimalen Pausen und Überlappungen vollzogen. Um diese Exaktheit zu erreichen, müssen die Gesprächsteilnehmer das Ende und den Inhalt der Redebeiträge (*Turns*) des jeweiligen Sprechers antizipieren. Verschiedene Studien zeigten, dass Rezipienten zur Vorhersage des Turn-Endes lexiko-syntaktische Informationen verwenden, wobei unklar ist, welche Informationen in welchem Ausmaß herangezogen werden. Ziel dieser Studie war es herauszufinden, ob Zuhörer im Dialog syntaktische, semantische oder beide Informationsquellen nutzen.

Dazu wurde ein Reaktionszeitexperiment durchgeführt, in dem die Versuchspersonen einzelne Turns aus natürlichen Konversationen zu hören bekamen und durch Knopfdruck das Turn-Ende markieren sollten. Der lexiko-syntaktische Inhalt wurde folgendermaßen manipuliert: *Natürlicher-Turn*: Der Stimulus wurde präsentiert, wie er in den Dialogen vorkam. *Keine-Syntax*: Die syntaktischen Informationen wurden durch Tiefpassfiltern der Funktionswörter entfernt. *Keine-Semantik*: Durch Tiefpassfiltern der Inhaltswörter wurden semantische Informationen entfernt. *Intonation*: Durch Tiefpassfiltern des kompletten Turns blieb lediglich die Intonationskontur des Turns erhalten.

Die Daten weisen darauf hin, dass in der Bedingung *Keine-Semantik* die Versuchspersonen das Turn-Ende später als in der natürlichen Bedingung erkennen, während letztere sich nicht von der Bedingung *Keine-Syntax* unterscheidet. Dies zeigt, dass semantische Informationen zur Antizipation eines Turn-Endes genutzt werden.

## Struktur heißer und kalter exekutiver Funktionen im Grundschulalter

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Die Struktur exekutiver Funktionen (EF) ist bislang noch nicht eindeutig geklärt. Zelazo und Müller (2002) unterscheiden „heiße“ affektive und „kalte“ kognitive Aspekte. Studien hierzu zeigen jedoch widersprüchliche Ergebnisse und es ist fraglich, ob diese zwei Konstrukte bereits im Kindesalter unterscheidbar sind. Insbesondere mangelt es an Daten ab dem Schulalter.

Ziel der Studie war es, die zwei-Faktoren-Struktur heißer und kalter EF an Grundschulkindern zu überprüfen. Darüber hinaus sollten Zusammenhänge zu globaleren Maßen, wie Planungsfähigkeit und Emotionsregulation, betrachtet werden, um Aussagen zur Validität der Konstrukte zu ermöglichen.

Heiße EF wurden über eine Aufgabe zum Belohnungsaufschub und eine kindgerechte Version der *Iowa gambling task* erfasst. Kalte EF wurden mithilfe einer *set shifting* Aufgabe, einem Stroop-Test und Zahlen-nachsprechen-rückwärts gemessen. Die Planungsfähigkeit der Kinder wurde über das Lehrer-, die Emotionsregulation über das Elternurteil ermittelt. Die Ergebnisse von 500 Kindern (6-9 Jahre) zeigen, dass ein Ein-Faktor-Modell besser auf die Daten passt als ein Zwei-Faktoren-Modell. Ausschlaggebend hierfür ist die fehlende Korrelation der heißen EF Maße. Mittelhohe Korrelationen ergeben sich zwischen allen kalten EF und der Planungsfähigkeit. Die Arbeitsgedächtnis- und Inhibitionsleistung der Kinder hängt mit der Emotionskontrolle zusammen. Heiße EF korrelieren hingegen mit keinem der Fremdbeurteilungsmaße. Die Ergebnisse werden im Hinblick auf aktuelle Theorien zur Struktur exekutiver Funktionen diskutiert.

## **Does posting status updates increase or decrease loneliness? An online social networking experiment**

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Online social networking is a pervasive but empirically understudied phenomenon. Strong public opinions on its consequences exist but are backed up by little empirical evidence and almost no causally-conclusive, experimental research. The current study tested the psychological effects of posting status updates on Facebook using an experimental design. For one week, participants in the experimental condition were asked to post more than they usually do, whereas participants in the control condition received no instructions. Participants added a lab “Research Profile” as a Facebook friend allowing for the objective documentation of protocol compliance, participants’ status updates, and friends’ responses. Results revealed (1) that the experimentally-induced increase in status updating activity reduced loneliness, (2) that the decrease in loneliness was due to participants feeling more connected to their friends on a daily basis and (3) that the effect of posting on loneliness was independent of direct social feedback (i.e. responses) by friends.

## **Prospective memory in safety-critical domains**

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In complex socio-technical workplaces such as aviation or healthcare, the ability to remember to execute intentions at the appropriate moment in the future – prospective memory (PM) – can be safety critical. In healthcare, for example, qualitative research and prospective observational studies on medical errors indicate that forgetting of tasks jeopardises patient safety. However, only recently researchers have started to address cognitive and non-cognitive aspects of PM in healthcare empirically.

The first aim of the present contribution is to provide an overview of PM tasks in safety-critical domains which goes beyond the frequently studied laboratory paradigms. The second aim is to provide a demonstration of research on PM influencing factors in safety-critical domains using different methods: (1) An experimental study on the effects of sleep deprivation on PM performance, (2) an observational study using a portable eye tracking system worn by intensive care nurses to investigate the resumption of interrupted tasks, and (3) a full-scale simulation of an intensive care bedside to investigate the effects of external cues on PM performance. In summary, PM research in safety-critical domains enables the testing and extension of current PM theories as well as providing more specific recommendations and design suggestions for praxis.

## Relative preference: How incidental values in the environment impact risky choice

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According to decision-by-sampling theory (Stewart, Chater & Brown, 2006), people construct the subjective value of a given objective value by comparing it to samples of previously encountered values, as stored in memory. If more values have been encountered within a particular range, subjective values reflect a higher sensitivity (or discriminability) within that range. It has been shown that manipulating sensitivity by presenting people with different distributions of values can affect a person's preference for risky options. However, the cognitive processes underlying these effects in choice are not fully understood. For instance, does increased sensitivity within a particular range lead to higher or lower attention to outcomes? To fill this gap, we first presented participants with a memory task in which they encoded either high or low values. After this manipulation of value sensitivity, participants indicated their preferences in a risky choice task. The impact of the manipulation on choices was examined by modeling choices with cumulative prospect theory. Additionally, we collected process data using MouseLabWeb to test how outcome sensitivity in the different experimental conditions affected the relative attention to outcome and probability information in the risky choice task.

## Measuring subjective probability: The role of encoding error in scale performance

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We compared the performance of two different scale formats for the assessment of subjective probability when objective probability information was encoded first and tested whether differences between scales differ as a function of encoding error. Participants encoded probabilities as sets of hypothetical outcomes with each outcome being either the target event or the absence thereof. The relative frequency of the target event within one set conveyed the likelihood information. Participants rated the probability of target events either on a verbally labeled 7-point rating scale or a percent measure. We varied encoding difficulty over 3 levels and compared formats in terms of sensitivity and context dependency. While the percent format showed higher sensitivity than the rating scale, the differences between the two measurement formats became less pronounced with increasing encoding error and disappeared when encoding was hardest. In contrast, the 7-point rating scale remained more context dependent than the percent format in all encoding conditions. We conclude that differences in performance between scales are caused only in part by scale inherent characteristics but also depend on the process of encoding. Thus, researchers should take the source of probability information that informs subjective probability judgments into account when choosing a measure.

## Phobic images show visual prior entry

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It is widely accepted that spider phobics show an early attentional bias towards spiders. Beyond, attended stimuli are perceived as occurring earlier compared to unattended stimuli. The latter effect of prior entry “is usually identified by a shift in the point of subjective simultaneity (PSS) in temporal order judgements (TOJs)” [Weiß and Scharlau, 2011, Quarterly Journal of Experimental Psychology, 64(2), 394-416, p.394]. We wondered if the attentional bias of spider phobics is strong enough to trigger a prior entry impression. In our study with spider-fearful and non-anxious participants, we presented natural images of animals (spiders, snakes, and butterfly) in pairs with neutral natural images (flowers, and mushrooms) on both sides of the fixation cross with a varied time interval between the onset of the two stimuli (SOA: 0ms, 12ms, 24ms, 35ms, 47ms). Our participants had to judge which picture appeared first and indicate the position of the image (left or right). As a result, spider pictures induced a significant difference between the two groups. Spider-fearful participants perceived the spider pictures relative to the neutral images as occurring earlier. Neither snakes nor butterflies led to a prior entry impression.

## Evaluation eines konfrontativen Unfallpräventionsprogramms für junge Menschen

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Aufgrund der hohen Unfallbeteiligung junger Fahrer, wurde ein konfrontativ wirkendes Interventionsprogramm durchgeführt, welches das wesentliche Ziel verfolgte, das sicherheitsgerechte Verhalten der Adressaten zu begünstigen, um schwere Verkehrsunfälle zu reduzieren. Vor diesem Hintergrund wurde erwartet, dass sich das sicherheitsrelevante Wissen sowie entsprechende Einstellungen verbessern sowie Selbstüberschätzungen reduzieren. Das Interventionsprogramm bestand aus zwei Bestandteilen: Zunächst erfolgte die Darstellung des Unfallgeschehens mithilfe von Botschaften, welche in Form von Bildern, Filmen und persönlichen Darstellungen angeboten wurden. Protagonisten dieser “Bühnenshow” waren in der Regel ein Polizeibeamter, ein Notarzt, ein Rettungssanitäter sowie ein Notfallseelsorger. Die Kernzielgruppe bestand aus Personen im Alter von 16 bis 19 Jahren, welche Schulklassen-übergreifend der Vorführung beiwohnten. Dann erfolgte die Nachbereitung der im ersten Teil vermittelten Inhalte. Verantwortlich für diesen Abschnitt waren insbesondere die Lehrkräfte der Schule, in der die Intervention durchgeführt worden war. Zur Evaluation der Wirkungen wurden die 2174 Teilnehmende jeweils zu drei Zeitpunkten befragt: vor der Durchführung der Massnahme, im Anschluss an die Nachbereitung sowie mehrere Monate nach der Intervention. Inhalt des aus 107 Items bestehenden Fragebogens waren Angaben zu sicherheitsrelevanten Einstellungen, zum subjektiven Gefährlichkeitssurteil, zum verkehrssicherheitsrelevanten Wissen sowie zur Akzeptanz des Programms. Zudem wurden potenzielle psychologische Belastungsfolgen erhoben und ausgewertet, um nicht-intendierte Folgen zu erfassen.



## **Can't read it, must eat it: Processing fluency and self-control**

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The ease or difficulty with which people process information or perform a task constitutes important information for self-regulation: Depending on how fluent people experience a task, they put more or less effort into it and like the task more or less. Whereas these immediate behavioral and judgmental consequences of fluency experiences are well studied, less is known about the general effect of such experiences on the self-regulation system. We propose that disfluency generally upregulates self-regulation, thereby depleting attempts of self-control. In three experiments, we subtly manipulated fluency experiences and subsequently assessed participants' capacity for self-control. As hypothesized we found that frowning as compared to smiling increased Stroop-interference (Experiment 1), predominantly in difficult tasks (Experiment 2); and, that participants failed to resist a temptation after filling-in a difficult to read questionnaire (Experiment 3). Taken together, our findings corroborate the idea that (dis)fluency experiences directly and generally draw on self-regulatory resources.

## **Does the number of elements or the position of the element to be completed influence the difficulty of pattern sequencing items?**

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Pattern sequencing items are widely used in intelligence test-batteries to measure one's reasoning ability. The items are usually constructed in such a way that the last element of a pattern sequence has to be completed, and each item consisting of the same number of elements. The pattern sequencing items used in this study consist of geometric figures varying in size, form and colour.

In an experimental design the relation between item difficulty and two hypothesized sources of item complexity using triples of items was investigated. Firstly, the length of the pattern sequence was systematically varied (original length, a third more elements, twice as many elements) and secondly, the position of the element to be completed within the pattern sequence (being the first, middle or last element). 350 examinees aged 9 to 16 years were randomly administered one of six test booklets including one part of an item triple. The Linear Logistic Test Model (LLTM; Fischer, 1973) was used to examine the influence on item difficulty considering the two hypothesized sources of item complexity.

## **Taking control in a confusing world: Adult age differences in the attentional control of representational distinctiveness**

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Aging is associated with problems in resolving conflict, for example in flanker tasks (e.g., Li et al. 2009). Recent evidence suggests that these difficulties reflect an impairment in attentional control when processing conflicting stimulus inputs (Hämmerer et al. 2010). The present study tests this hypothesis by using multivariate pattern analyses (MVPA) to classify fMRI BOLD signal patterns while younger (20-30 years) and older adults (60-75 years) attended to conflicting visual input (overlays of faces and houses). The accuracy of MVPA in classifying trials with different attentional foci is used as an individual difference measure of attentional control. MVPA was less accurate in classifying the attentional focus from older subjects' fMRI patterns than from those of younger adults. Control analysis show that this effect survives correction for age differences in distinctiveness of visual representations (assessed in a localizer task). Furthermore, general age differences in BOLD signal noise cannot account for our result as classification accuracy of left and right responses did not differ between age. Further analyses aim at disentangling the contribution of age differences in attentional control and visual representations on the control of conflicting stimulus inputs.

## **Protecting one's ingroup from a bad reputation? Linguistic abstractness of descriptions of ingroup's behaviors and collective emotions**

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The same behavior can be described at different levels of linguistic abstractness (e.g., low: *Jack broke the window* vs. high: *Jack is a hooligan*). Three studies examined the impact of the level of linguistic abstractness of descriptions of negative behaviors of in-group members on collective emotions such as shame or anger. Based on the Linguistic Category Model, we predicted that the higher the linguistic abstractness, the stronger these emotions would be. The first two studies showed that the strength or even the direction of the influence of abstractness on emotions depended on participants' level of identification with the in-group. More abstract descriptions were associated with stronger feelings of collective emotions, but only for low-identified participants. Highly-identified participants either did not show any effects or showed an opposite effect: They felt less collective emotions when the in-group behavior was described on a more abstract level. The third study showed that the greater the perceived threat to the in-group's positive image, the stronger were the evoked negative emotions. The results will be discussed in the context of different factors that can affect the strength of collective emotions. We will also discuss various methods of manipulating linguistic abstractness in experiments.

## **EEG alpha oscillations reflect the focus of temporal attention: Evidence from the attentional blink paradigm**

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Temporal attention phenomena reveal that identical stimuli are processed differently depending on the attentional focus at a particular time point. This is shown by the attentional blink paradigm, which reveals that only the first of two stimuli reaches awareness unless they are separated by at least half a second. In the attentional blink paradigm, a sequence of stimuli is usually presented at a rate of around 10 Hz, thus matching the most dominant oscillatory signal in the human brain, alpha. In this talk, I will discuss the role of alpha oscillations for temporal attention, focusing on the attentional blink. I will present a theoretical framework, supported by recent empirical data, where alpha oscillations indicate the switching between processing of external vs. internal events, and thereby mediate temporal attention.

## **Osama bin Laden is still alive – An implicit profile of disfavor against faces with stereotypical Muslim attributes**

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The face of al-Qaeda's founder Osama bin Laden was strongly characterized by a turban and a distinctive beard. We hypothesized that negative attributions on four evaluative dimensions, which were derived from the literature on anti-Muslim attitudes (e.g. Unkelbach, Forgas, & Denson, 2008), could basically be triggered by these facial attributes. Using the multidimensional Implicit Association Test (md-IAT, Gattol, Sääksjärvi, & Carbon, 2011) we tested the effect of adding accordant stereotypical paraphernalia to male Caucasian faces ('Muslim-version'): Compared to the original, non-manipulated versions, the 'Muslim-versions' were evaluated as being more irrational, unintelligent, unreliable and, particularly, as being more dangerous. Importantly, non-psychologists' and psychologists' data did not show any significant difference concerning these implicit measures but did so for explicit measures assessed by another test. We argue that visual attributes like a particular kind of beard and a turban are represented in a brand-like fashion – the "brand of al-Qaeda" – associated with the stereotype of conformity to Islamist terrorism. The brand-like representation does not need to be explicitly available. Further, our results are another example clearly demonstrating how differential dimensions of implicit preferences or dis-favors can be assessed by use of the md-IAT.

## The influence of self-motion on the processing of spatially associated words

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Spatial terms such as up, down, forward, and backward are often used in a metaphorical way to describe emotional states (e.g., someone is cheering up vs. feeling down) or to structure events in time (e.g., looking forward to next holidays vs. looking backward to last week). These examples highlight the spatial character of abstract concepts such as good-bad and future-past. The spatial association of these concepts has been found to influence performance in word categorization tasks: positive words are faster processed in the upper than in the lower screen half. In the present study we asked whether the processing of words can be influenced by the direction of self-motion. Participants were asked to categorize positive and negative words while they were passively displaced upward and downward by means of a motion platform. They were also asked to categorize future and past related words while moving forward and backward. We found that future related words were faster categorized during forward when compared to backward motion, suggesting that the sensorimotor system is linked to the mental representation of time. However, we did not find an influence of self-motion for positive and negative words. Possible explanations for these different findings are discussed.

## Transcranial direct current stimulation (tDCS) – a tool to enhance mathematical abilities?

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One of the main aims of today's formal schooling is to teach elaborated skills in number processing and mathematical problem solving. Over the last years, an increasing body of evidence has demonstrated that in adults, the posterior parietal cortex (PPC) is crucially involved in basic number processing as well as in complex arithmetic problem solving. Furthermore, the PPC has been shown to be disturbed in several disorders which are related to arithmetic impairments. The most frequent of these disorders is developmental dyscalculia (DD), which involves impairments in number processing, learning arithmetic facts and solving mathematical problems. Although DD is as frequent as dyslexia with a prevalence of 5%, remediation programs are still scarce.

We were interested whether the modulation of PPC activity could lead to improvements in number processing and arithmetic problem solving. Therefore, we modulated the PPC activity in healthy adults by means of transcranial direct current stimulation (tDCS). We found that anodal stimulation of the left PPC led to performance increases in subtractions, but not in number processing.

Our findings point to a potentially beneficial effect of anodal tDCS, applied at the left PPC. However, these findings might be task-specific.

## The logic behind inconsistent information search behavior

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In decision-making experiments under uncertainty, participants often have to work on a series of comparable trials, and individual information search behavior is assigned to a particular decision-making strategy. In many studies inconsistent behavior has simply been ignored, and individual behavior has ultimately been assigned to one of the testing strategies. In a short decision test online (<http://keto.dah-media.ch/?xt=txeap13>) we measured inconsistent behavior separately with 22 information search trials and checked for abnormalities with several personality questionnaires. How common is inconsistent behavior and how can it be explained?

208 participants participated in the web experiment, and 15% could be classified as inconsistent. Compared with other strategies (e.g., satisficer), inconsistent can be characterised by a significantly higher degree of uncertainty and higher negative perfectionism. These personality aspects probably result in the demand for optimizing single trials, in frequent strategy changes and negative emotions (e.g., irritation). Our conclusions: 1) inconsistent behavior should be regarded as a frequent, serious phenomenon during decision-making tasks; 2) inconsistent behavior should be classified as an independent strategy and 3) inconsistent behavior can be explained by various motives and personality. Thus, inconsistent behavior can be compelling.

## Repetitive tasks, mental strain and performance

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Previous research provides inconsistent findings about the effects of task repetitiveness on mental strain and well-being. In particular, since there is no clear-cut evidence regarding causal relationships we conducted two experimental tests of the effects of task repetitiveness on mental strain and work performance in two different workplace simulations. In Experiment 1, participants worked at a computer workstation and completed customer requests. In Experiment 2, participants worked at an assembly line, piecing together equipment sets for furniture. Repetitiveness of tasks was manipulated without varying related adverse work characteristics (e.g., skill discretion), thereby avoiding the typical confounds of earlier research. In line with our hypotheses results from both experiments consistently show that high task repetitiveness negatively impacts on mental strain. In contrast, quantitative performance increased under conditions of high repetitiveness, pointing to larger learning effects.

## **Uncertainty feedback as component in the interaction design for highly automated vehicles**

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The automobile industry is working on concepts to make so called highly automated driving possible. That means that the vehicle automation takes over longitudinal and lateral control of the vehicle, and the driver must no longer permanently monitor the system. A prerequisite for this is that in situations in which the automated system might reach its limits or shows non adequate behaviour the driver can be brought back in the loop within a certain time buffer.

A concept to shift the driver's attention to the driving task is to give him information about the automations uncertainty in the adequateness of its environment interpretation.

In a between subjects driving simulator study with 50 participants we investigated which effects information of automation uncertainty has on the behavioural level of the driver, on drivers trust in the system and on the mental model the driver has about the system.

Results indicate that uncertainty information while driving leads to more adequate mental models of the system and adjusted trust in automation, when compared to conventional alarm strategies.

## **Theta synchronization during retrieval indicates overnight memory consolidation**

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In this study we tested in which way EEG theta event-related synchronization (ERS) during memory retrieval before sleep relates to subsequent overnight memory consolidation.

24 subjects learned 160 word pair associates in the evening before sleep. Recall performance was tested twice: immediately after learning (R1) and after 8 hours of sleep (R2). Based on their overnight changes in memory performance subjects were divided into overnight enhancers (E+) and non-enhancers (E-).

In R1, theta-ERS was stronger for E+ than E-. Interestingly, theta-ERS during R1 was positively correlated with the overnight performance change and an increase in fast spindle activity during SWS. Moreover, we found that high theta-ERS during R1 is related to a strong decrease in theta-ERS from R1 to R2 and that such decline is correlated to the activity of fast spindles in N2. Theta-ERS during R1 reflects the effort to access new memory traces. Such effort seem to modify new memories in a way that they become more likely reactivated during subsequent sleep and hence enhance memories' accessibility the next morning. Better gated memory access during morning recall might in turn give rise to less retrieval effort and therefore to a relative decrease in theta-ERS from R1 to R2

## Task misapplication as a mechanism to explain automatic activation of propositional knowledge in sequential priming tasks

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Sequential priming studies have demonstrated that target responding is typically faster after the presentation of a related prime stimulus than after the presentation of an unrelated prime stimulus. Two processes contribute to this effect: the activation of information in memory by the primes and a translation of this activation into an observable priming effect. Concerning the first process, it is typically argued that the mere presentation of a prime stimulus is sufficient to automatically activate all its stimulus attributes. We propose, however, that prime activation arises as the result of an automatic misapplication of the target task to the prime. Therefore, if a target task requires the activation of propositional knowledge, the prime activation is also expected to reflect this type of propositional knowledge. To test this hypothesis, we conducted a priming experiment in which participants categorized objects as larger or smaller than a reference object. In different blocks of trials, this object was either large or small. Critical primes depicted objects that were larger than the small but smaller than the large reference object. In line with our hypothesis, we found that the size information activated by the primes was contingent upon the size of the reference object.

## Dissociating brain systems for gaze orienting during reading from those for lexicon, syntax, and orthography: fMRI investigation of the Landolt paradigm

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The Landolt reading paradigm was created in order to dissociate effects of eye movements and attention from lexical, syntactic, and sub-lexical processing. While previous eye-tracking and behavioural findings support the usefulness of the paradigm, it remains to be shown that the paradigm actually taps the corresponding brain networks but not systems for lexical/syntactic/orthographic processing. Here, 20 healthy volunteers underwent fMRI scanning while reading sentences (+syntax) or word lists (-syntax) consisting of words (+semantics) or pseudowords (-semantics). In a fifth condition, all letters were replaced by closed circles, which should be scanned for targets (open circles) in a reading-like fashion from left to right. A conjunction analysis of all five conditions revealed the visual scanning network, which did not include regions for semantics, syntax, or orthography. Contrasting the Landolt reading condition with all other regions revealed additional involvement of the right superior parietal cortex (areas 7A/7P/7PC) and postcentral gyrus (area 2) involved in deliberate attention shifting. These neuroimaging findings corroborate earlier data from other domains, demonstrating that the Landolt paradigm does indeed allow the investigation of gaze orientation during reading without linguistic or sub-lexical influences.

## **Does the retro-cue benefit in visual working memory survive distraction of the focus of attention?**

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Performance in short-term visual recognition tasks can be significantly improved by providing predictive cues during the retention interval (retro-cues), which indicate the to-be-tested location. This retro-cue benefit is reflected in better accuracy as well as in faster reaction times compared to a control-condition, in which no cue has been presented. The mechanisms underlying this benefit remain unclear. One possible explanation is that the benefit arises as a consequence of persistent focal attention allocated to the cued representation: By holding the target representation in the focus of attention in working memory (WM), this representation gains an especially accessible status and might be protected from interference. We experimentally investigated whether the retro-cue benefit depends on persistent focal attention to the target representation by distracting the focus of attention between the retro-cue and the recognition probe, for instance by a binary choice classification task on perceptual stimuli (colors and shapes) and by retrieving other WM contents between cue and probe. If continuous focusing of the cued item in WM is necessary for the retro-cue benefit, distracting the focus should eliminate the benefit. Our results show that the retro-cue benefit is not diminished by perceptual interruption tasks.

## **Top-down contingent attentional capture by color-variegated stimuli**

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Highly-controlled monochromatic stimuli lead to robust top-down contingent capture (CC) of attention by color (e.g. Folk & Remington, 1998). Can these findings be confirmed with color-variegated stimuli? In color-variegated stimuli, the overlap of color spectra between targets and distractors might compromise contingent capture by color. Here, we demonstrate that contingent capture extends to color-variegated stimuli.



## Revenge is sweet, but not cute: Priming with pictures of sweets induces metaphor-consistent social judgments

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Inducing social judgments that are consistent with an idiomatic metaphor requires the concurrent activation of both of the metaphor's parts, namely, source and target concept (see Hellmann, Thoben, & Echterhoff, in press). With the present experiment, we tested whether supraliminal, non-gustatory priming of a specific taste yields judgments that are consistent with the idiomatic metaphor "Revenge tastes sweet". Participants saw pictures of sweet foods *vs.* sweet, that is, cute puppies. Then, they read a story about a vengeful *vs.* otherwise motivated, aggressive act. Only when the source concept (sweet taste) and the target concept (revenge) were conjointly activated, the aggressive act was evaluated more positively. Thus, the concept activation of "sweet taste" in combination with "revenge" as a motive was sufficient to lead to social judgments consistent with the metaphor, whereas the mere linguistic activation of a different semantic concept of sweetness (here, cuteness) did not have such an effect. Potential differences between idiomatic metaphors and mere conceptual language and implications for theories of embodied simulation are discussed.

## Neurobiological underpinnings of cognition-emotion interaction in schizophrenia

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Emotion theorists have long time posited the critical role for affect in the modulation of behavior and cognition. When considering the adaptive function of emotion and cognition and their interaction both can be posited to function as control systems to regulate behavior. Patients with schizophrenia often demonstrate profound functional dysregulation compared to healthy subjects especially in fronto-temporal-limbic brain areas. These functional anomalies are related to the clinical symptomatology of the patients.

In the present fMRI study 3 experiments on affective attachment, affective perspective taking and affective regulation were conducted in patients with schizophrenia. In accordance to our hypotheses oxytocin level and behavioral socio-emotional functions in schizophrenia were reduced. When analysing conjunctive brain activation of all 3 experimental paradigms a fronto-temporal-occipital network was found to be dysfunctional in patients including brain areas that are critical for episodic autobiographical memory, mirroring other's emotions, self-reflection, affective risky decision-making and painful information processing. The findings are presented in relation to oxytocin levels in patients with schizophrenia (ICD-10: F20; PANSS<78) and healthy subjects (each group: males, n= 20, IQ<85). Our findings can explain the difficulties in self-other distinction and the psychopathological self-relevance of social and affective stimuli in schizophrenia.

## **The development of the end-state comfort effect in 3- to 8-year-old children: Exploring the role of action effects and type of task**

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Three- to 8-year-old children's propensity to show end-state comfort (ESC) planning was compared between the bar-transport task and the overturned-glass task (within-subjects). Half of the participants in each age group experienced action effects (lights). There was no difference between groups with and without action effects. ESC performance increased significantly in the bar-transport task from 13% in the 3-year-olds to 94% in the 8-year-olds, with the number of children doubling from 3 to 4 years and from 4 to 5 years of age. In the overturned-glass task, an increase in ESC performance from 63% in the 3-year-olds to 100% in the 8-year-olds was also significant. Three- and 4-year-olds were better at manipulating the glass as compared to manipulating the bar, most probably, because children are more familiar with manipulating glasses. These results suggest that preschool years are an important period for the development of motor planning in which the familiarity with the object involved in the task plays a significant role in children's ability to plan their movements according to end-state comfort.

## **Parallel constraint satisfaction as a process model of risky choice**

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Recent investigations of risky choice have found process data in line with qualitative predictions derived from the class of parallel constraint satisfaction (PCS) models. These findings suggest that this framework may provide a promising foundation for a process model of risky choice. However, while this qualitative evidence is favorable, candidate models have not yet been fully specified, and quantitative investigations of these models are lacking. We extend earlier model sketches by fully specifying a process model of risky choice based on PCS, and examine its quantitative predictions. In particular, we show that the model can approximate choices prescribed by expected value and predicted by cumulative prospect theory, thereby extending a normative and a successful paramorphic model by a process component that can be examined with regard to process predictions (e.g. reaction times). Our simulations show that the model's predictions correspond to commonly found data patterns, and that the model can be extended to account for the stochastic nature of risky choice. Based on these results, we argue that PCS offers a promising model of the processes underlying risky choices, and is worthy of further empirical investigation.

## **Effects of short-term food deprivation on interoceptive sensitivity, feelings and autonomic activity: Results in healthy young women**

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Perceiving one's internal bodily signals (interoception) is important for emotion processing, feelings and behavior regulation. Interoceptive sensitivity has been suggested to be relevant in disordered eating and weight regulation, and dieting is discussed to represent a relevant factor in the genesis and maintenance of eating disorders. It is an open question if food deprivation affects interoception associated with fasting-induced psychophysiological changes in healthy persons. This study investigated effects of 24-h food deprivation on interoceptive sensitivity over different internal modalities (hunger perception and perception of cardiac signals as measured by a heartbeat perception task) in interaction with changes of autonomic-nervous activity in 20 healthy young women. Short-term fasting intensified cardiac interoceptive sensitivity via changes of autonomic and cardiodynamic activity. Changes of interoceptive sensitivity in the cardiac modality were positively related to interoception in the gastric modality, i.e. felt hunger intensity. Additionally, the role of vagal cardiac activity as potential index of emotion related self-regulation, for felt hunger, mood and the affective appraisal of interoceptive signals during acute fasting was shown. Together with further findings showing the relevance of interoceptive sensitivity for intuitive eating behavior and body weight, implications of the results are discussed with regard to eating disorders.

## **Goal-directed and habitual factors in object handling**

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Many tools and objects can only be used successfully if they are grasped adequately. However, surprisingly little is known about how these grasps are selected. By now, most accounts emphasized the goal-directedness of the grasp selection process. Here, we examined the interplay between goal-directed and habitual variables for grasp selection. Participants were asked to manipulate a cup. We varied the participants' goals (moving vs. rotating the cup) and the habitual grasp afforded by the cup (thumb-up vs. thumb-down). It was found, that both factors strongly affect grasp selection. Further experiments revealed that the grasp selections did not depend on whether actions were executed with the dominant or non-dominant hand. Moreover, the influence of the habitual grasp could only be found for objects for which a habitual grasp could be clearly defined. In sum, the results show that goal-directed models of grasp selection have to be extended. Moreover, the results show that the automatic activation of object semantics may affect action choices.

## The influence of flicker frequency on perceived duration

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We assessed how the rate of changes of a given stimulus influences its perceived duration using flickering visual stimuli. We included visible and non-visible flicker (frequencies below and above the flicker fusion threshold, respectively). In order to assess how conscious perception and early visual processing of the flicker affect perceived duration, we measured a neural correlate of flicker processing in the visual system, concurrently with the perceived duration of the flickering stimuli.

We distinguished three frequency ranges: 1) Slow frequencies (below 50Hz), perceived as flickering and eliciting a neural correlate of flicker processing; 2) Intermediate frequencies (50-70Hz), not perceived as flickering, but eliciting a frequency-specific neural correlate, indicating that the flicker was processed in the visual system, but not consciously perceived; 3) Fast frequencies (above 70Hz), not perceived by the participant, and not eliciting a neuronal response.

Our results show that the flicker influenced perceived duration only when it was consciously perceived. Thereby slower frequencies had the biggest effect on perceived duration. This result shows that not the physical rate of changes per se, but the perceived change has an effect on perceived duration and that automatic, but unconscious, processing of temporal frequency does not elicit such an effect.

## Effort increases sensitivity to reward and loss magnitude in the human brain

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It is ecologically adaptive that the amount of effort invested to achieve a reward increases the relevance of the resulting outcome. Here, we investigated the effect of effort on activity in reward and loss processing brain areas by using functional magnetic resonance imaging. 28 subjects were endowed with monetary rewards of randomly varying magnitude after performing arithmetic calculations that were either difficult (high effort), easy (low effort) or already solved (no effort). Subsequently, a forced donation took place, where a varying part of the endowment was transferred to a charity organization, causing a loss for the subject. Results show that reward magnitude positively modulates activity in reward-processing brain areas (subgenual anterior cingulate cortex and nucleus accumbens) only in the high effort condition. Furthermore, anterior insular activity was positively modulated by loss magnitude only after high effort. The results strongly suggest an increasing relevance of outcomes with increasing previous effort.

## „Achtung Gefahr!, Achtung Gefahr von rechts!“ – Wie genau sollten Car2Car-Warnungen den Fahrer an Kreuzungen warnen?

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Kreuzungen sind komplexe Fahrsituationen, in denen Fahrer verkehrsrelevante Informationen häufig übersehen. Durch Car2Car-Kommunikation wird es zukünftig möglich sein, Fahrer frühzeitig über mögliche Gefahren zu informieren bzw. warnen, wodurch der Fahrer besser auf die Situation reagieren kann und somit Unfälle verhindert werden können. Eine wichtige Frage ist es, wie spezifisch solche frühzeitigen Warnungen sein müssen, damit sie den Fahrer wirksam unterstützen. In einer Fahrsimulatorstudie mit einer kritischen Kreuzungssituation wurden deshalb zwei unterschiedliche Warnungen verglichen: (1.) spezifische Warnungen mit und (2.) generische Warnungen ohne Angabe der Gefahrenlokalisation. Zusätzlich wurde bei der spezifischen Warnung die Korrektheit der Positionsangabe variiert (richtige und falsche Position), um zu untersuchen, welchen Einfluss eine Fehlwarnung auf das Fahrverhalten hat. Von insgesamt 40 Probanden ( $M = 25.6$  Jahre,  $SD = 9.5$  Jahre) wurden Fahrdaten und subjektive Bewertungen der drei Warnungen erhoben. Die Ergebnisse zeigen einen positiven Einfluss der spezifisch-richtigen und generischen Warnung. Die Fahrer kamen deutlich früher vor dem Gefahrenobjekt zum Stehen und konnten somit eine Kollision besser verhindern. Außerdem wurden diese Warnungen von den Fahrern als positiv bewertet. Insgesamt sprechen die Ergebnisse für generische Warnungen, vor allem, wenn mit Fehlern in solchen frühzeitigen Warnungen heutzutage noch gerechnet werden muss.

## Why often-heard things tend to be true: The ecological rationality of the truth effect

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The more often a statement is repeated, the more people tend to believe it. Repetition leads to this “truth effect” for two complementary reasons, which both build on a valid link between frequency and truth. First, people may remember having heard a repeated statement before and conclude that it is therefore likely to be true (convergent validity). Second, because repeating a statement increases its processing fluency (and because people have learned that fluently processed statements tend to be true), they may infer truth from fluency (fluency’s learned interpretation). Although ample experimental research showed that truth judgments can be biased by normatively irrelevant factors, much less is known about when the frequency–truth link is warranted. By analyzing large text corpora we show that frequency (and thus fluency) tends to be a good indicator of truth in many domains. To illustrate, among the most commonly misspelled words on Wikipedia articles, the spelling that appears more frequently on the internet is the correct spelling in 97% of cases. Based on experimental findings, our ecological analyses (grounded in cognitive models of memory and learning), and analytical arguments, we discuss why frequency generally indicates truth and derive boundary conditions for this frequency–truth link.

## **When “Cheer up!” leads to unhappiness: Introducing a first experimental approach to measure dissatisfaction caused by the empathic short circuit**

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Providing an integration of diverse facets of empathy, Altmann & Roth (2012) developed the empathy process model, in which the empathic short circuit (ESC) is a major element. It describes a reaction in an empathetically demanding situation that is meant to help your counterpart but actually serves as emotional relief for yourself, like “Cheer up!”. ESCs are considered typical in everyday life, but it is assumed that an unreflective occurrence of ESCs arouses dissatisfaction in the one who commits it.

The presented study is a first experimental approach to test the assumption that committing an ESC causes dissatisfaction. After watching a video of an emotional narration, subjects pick an answer they consider appropriate for that situation. Subjects are randomly assigned to different conditions where the possibility to choose between ESC- and non-ESC-answers is varied. Afterwards, dissatisfaction is measured implicitly using the IPANAT and explicitly via self-report. By conducting this experiment after an empathy training course for nursing students, the influence of acquired knowledge about the ESC is examined. It is hypothesized that both implicit and explicit measures should indicate dissatisfaction after giving ESC-answers when there is knowledge available, whereas subjects without that knowledge should only show dissatisfaction on implicit measures.

## **Both sides of the story: Integrating person and situation in social dilemma decision making**

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Although person and situation factors have been widely studied as determinants of social dilemma decision making, few systematic, theory-driven investigations exist on the interplay of the two. However, to understand cooperation more fully, it is vital to specify and test how person and situation mutually shape behavior. In a series of studies in the Prisoner’s Dilemma and closely related games, we show that the basic personality factor honesty-humility (as conceptualized in the HEXACO model of personality) is highly predictive of the degree to which players cooperate. More importantly yet, it also accounts for players’ tendency to adapt their behavior to situational and contextual determinants, such as experimentally manipulated payoffs or the probabilistically expected behavior of the other player. The findings corroborate the importance of a theoretical view which integrates dispositional and situational determinants of cooperation.

## Information search with too much choice: The effects on risk taking

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The way we search for information influences the kinds of decisions we will make, in part, because it influences the likelihood that we will experience rare events. As choice set sizes increase beyond two options, this potentially becomes even more important, as we may explore more and more options, but reduce our search within options. Furthermore, as the number of choices increase, this may reduce our capacities to use a consistent decision strategy. Thus, the breadth of our search in a complicated, multi-armed choice environment, can lead to potential problems both for risk assessment and decision strategies. We investigated this in environments with different choice set sizes using the sampling paradigm, where people can sample options prior to making a final decision. Our results reveal systematic changes in information search, but suggest that decision strategies are stable. Our results further suggest that risk assessment, due to limited information search, becomes systematically biased. Finally, we provide analytical results showing how simple assumptions about information search in multi-armed environments can generate the above results.

## Impact of sleep on real-life declarative learning

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The aim of this project was to investigate the beneficial effects of sleep on real-life declarative learning. 12 male subjects ( $M=23.5$ ,  $SD=3.06$  years) spent 2 nights in the sleep laboratory. Subjects had to encode 50 Spanish-vocabulary. Each vocabulary was paired with the corresponding line drawing taken from the International-Picture-Naming-Project database. After 2 encoding sessions subjects performed a (cued) recall task which was repeated in the morning thereafter. On average, subjects correctly retrieved 53.89% ( $SD=15.44\%$ ) in the evening and 53.99% ( $SD=15.04\%$ ) in the morning. Overall change between evening and morning recall failed to reach significance ( $t_{11}=-0.160$ ,  $p=0.876$ ). According to their overnight performance increase subjects were divided into 'memory-enhancer' ( $M=5.00$ ,  $SD=2.53$  letters) and 'memory-non-enhancer' ( $M=-4.50$ ,  $SD=2.07$  letters). We could show that frontal slow (11-13Hz) sleep spindle activity is more pronounced in 'memory enhancer' especially during the first ( $t_{10}=2.674$ ;  $p=0.023$ ) and the last quarter of the night ( $t_{10}=2.352$ ;  $p=0.040$ ). Furthermore, a negative relationship ( $r_{11}=-0.659$ ;  $p=0.020$ ) between the duration of REM and overnight memory change was found. Even if we are aware of the limitations of our study (no control-condition, low sample size), these findings indicate that slow sleep spindle activity after real-life declarative learning improves, whereas REM interferes with sleep-dependent declarative memory consolidation.

## **The contribution of memory abilities to rule-based and exemplar-based judgments**

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The ability to make accurate judgments, such as correctly diagnosing a patient, is essential in everyday life. To make a judgment people can rely on two kinds of processes: rule abstraction and exemplar memory. Previous research suggests that abstracting rules requires working memory, whereas exemplar memory relies on retrieving information from long-term memory. Accordingly, we hypothesized that performance in a judgment task that can be solved by rule abstraction (rule-based task) should be a function of working memory capacity, whereas performance in a judgment task that can be solved by exemplar memory (memory-based task) should be a function of episodic memory abilities. To test these hypotheses, 100 participants solved a rule-based and a memory-based task. To describe participants' judgment processes in these tasks, we followed a cognitive modeling approach. Additionally, we assessed working memory capacity, episodic memory abilities, and implicit memory abilities, measuring each skill by three different tests. Confirming the prediction performance in rule-based tasks was related to working memory capacity and performance in memory-based tasks correlated with episodic memory abilities. Implicit memory measures did not predict performance in either rule-based or memory-based tasks. These results highlight the importance of cognitive abilities for predicting how people solve judgment problems.

## **Recently inspected items are no longer inhibited when search is complete**

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Previous research has demonstrated that recently inspected items are inhibited and hence not immediately re-inspected during visual search. In addition, there is evidence that this mechanism of inhibition of return (IOR) persists even if a search is finished. In contrast to these findings, we have recently shown that, if the same display has to be searched successively twice, IOR is reset at the end of the first search. This suggests that IOR might not always be maintained once a search is finished. Here we investigated the possibility that IOR is reset at the end of a search only if a subsequent search follows directly. To this end, we had participants search successively twice in the same display while their eye movements were monitored. Immediately after the end of the first and the second search we probed an item which had been previously inspected or not and measured saccadic latencies to these probed items. The results showed that IOR was reset at the end of a search regardless of whether a subsequent search followed or not. This finding indicates that it is the completion of a search and not the start of a new search that resets IOR.



## **Tax authorities' measures to enhance tax payments: A laboratory experiment to test the impact of coercive or legitimate power on taxpayers' compliance**

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It is the aim of the current study to investigate (1) the effect of coercive or legitimate power on tax payments and (2) to what extent the contrast between power intensities (low vs. high power) have an impact. In a 2 x 2 x 2 design (coercive vs. legitimate power, between subjects; low vs. high power intensity, between subjects; time 1 vs. time 2, within subjects) 150 students base tax decisions (2 x 20 rounds) on scenarios depicting fictitious tax authorities' power. Results reveal that power, power intensity and power changes interact with each other. (1) When power intensity is low, coercive power leads to higher payments than legitimate power. High coercive power and high legitimate power do not differ. (2) While legitimate power has the expected effect on tax payments (effect of intensity, but no effect of change), the impact of high coercive power holds on even after a change to low coercive power. The effect of coercive power seems to be more complex than of legitimate power. Thus, the current study is one of the first experiments to investigate the impact of coercive and legitimate power intensities on tax payments which are respectively remunerated.

## **On the equivalence of different response formats in reasoning tests**

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Besides the decision what material (number, verbal, figural) is chosen for a reasoning test, the response format has to be fixed as well. Therefore a great variety of different formats are possible whereas the most popular format is the typical multiple choice format. Regarding some disadvantages of this format – as for example guessing effects – alternative formats could be chosen. The question is, whether it does matter which response format is chosen. For a large-scale achievement test it was already shown, that multiple-choice and constructed response formats are equivalent regarding the measured construct but that there is an effect on the item difficulty (Hohensinn & Kubinger, 2011).

In the present study the equivalence of three different response formats (two different kinds of multiple-choice format and a free response format) was examined in two different reasoning tests with an experimental design. To separating the influence of the item stem from the influence of the response format, three test booklets containing the same items with different response formats were composed. About 200 students got by random one of the three different test booklets. The results are presented to what extent the different response formats are equivalent in the given reasoning tests.

## **Does sleep-related memory consolidation vary with memory strength?**

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Sleep-related memory consolidation can stabilize memories, reducing items' delay-induced forgetting. To date, it is unclear whether such consolidation depends on one of the most basic features of memory representations, i.e., items' memory strength. We employed a list-learning task, in which participants studied a list of items and were asked to recall them after 12 hours of either nighttime sleep or daytime wakefulness. During study, we varied items' memory strength, employing either study-induced or retrieval-induced strengthening. Participants studied categorized item material either once, twice, or three times (Experiment 1), or studied all list items once with one part of the items being followed by two retrieval cycles, another part by one retrieval cycle, and a third part by no retrieval cycle (Experiment 2). The results show beneficial effects of strengthening and sleep on recall performance. However, whereas the sleep effect did not vary with the level of strengthening in Experiment 1, it did so in Experiment 2, in which the sleep effect was reduced, or nearly absent, when retrieval cycles followed initial study. The finding indicates that strong items show sleep-related consolidation mainly if prior strengthening occurs via study cycles, and less, if at all, if it occurs via retrieval cycles.

## **The relativity of self and other: Evidence from the Social Simon Task**

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Western societies take it for granted that people own some sort of "self", a concept that refers to the phenomenal and social identity of a person over time. Eastern cultures are often more skeptical; e.g., Buddhism considers the self as superfluous and seeks to overcome it through meditation. This suggests that what we consider "self" and "other" are cognitive constructs that are open for modification. We report findings from two studies that indeed provide evidence that one's distinction between self and other (as assessed by the Social Simon effect) depends on dynamic psychological factors, such as whether (1) one's attention is drawn to either personal interdependence (e.g., by having to circle all relational pronouns in a text, such as "we", "our", or "us") or independence (by having to circle pronouns such as "I", "my", or "me"); and (2) one's current cognitive control state supports divergent thinking (induced by the Alternate Uses Task) or convergent thinking (induced by the Remote Association Task). Both attention to interdependence and divergent thinking leads to a stronger Social Simon effect, suggesting greater salience of the self-other distinction.

## Prospective memory from an evolutionary perspective

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Prospective memory (PM) involves the retrieval of intended actions at some point in the future (e.g., remembering to give a friend a message as soon as you see her). From an evolutionary perspective, cognitive functions are adaptive and were shaped by the processing of information relevant for survival or reproduction. For instance, it has been suggested that the human mind is equipped with tools to detect cheating in social exchange (e.g., Cosmides & Tooby, 2005). We assumed that PM tasks should be particularly sensitive and ecologically valid in this regard, given the high importance for any future interaction to remember and avoid cheaters. In our experiments, participants first played monetary trust games with computerized individuals who either cheated, cooperated, or were neutral in a social-exchange situation. In a subsequent event-based PM task, faces of these individuals reappeared as target events that were embedded in another ongoing activity. PM was enhanced for both the faces of cheaters and cooperators relative to neutral faces. We used cognitive modeling to disentangle different components underlying PM performance, thus showing that the prospective component (remembering that something needs to be done) was enhanced for the faces of cheaters.

## What determines differences in search efficiency in blank trials of visual search?

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A result in visual search which did not receive considerable attention in the past is that efficiency differences manifest themselves not only in target trials but also in blank (target absent) trials. It is particularly interesting that physically identical displays are searched through with different efficiencies depending on the search template. Because the focus of models for visual search is on target trials, theoretical or empirical treatments of blank trials have been presented only sporadically. Here I present eye movement data that explore different hypotheses concerning the causes of differential search efficiencies in blank trials.

## **Brain structure and function differs between normal-weight, overweight and obese women grouped based on their eating style**

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The transition from normal weight to obesity is not linear and is paralleled by changes in eating behavior. Eating behavior can be characterized by the amount of cognitive restraint people exert as well as disinhibition of eating. We hypothesized that overweight and obese women differ not only with respect to eating behavior from each other and normal weight women, but also in the cerebral processing of food stimuli. Cluster analysis according to BMI, cognitive restraint and disinhibition (TFEQ) revealed three distinct clusters: normal weight women with low values on both scales, overweight women with a medium BMI, high cognitive restraint and intermediate disinhibition, and obese women with a high BMI, low cognitive restraint and high disinhibition. We acquired structural brain images as well as functional MRI data. VBM analyses comparing the three groups revealed marked differences in grey matter density, e.g. in dorsolateral prefrontal cortex, inferior frontal gyrus, parahippocampal gyrus, primary somatosensory areas and amygdala. Interestingly, we observed activation differences between the groups in the very same areas when subjects viewed pictures of highly palatable food. Taken together, differences in women's weight status and associated eating behavior can be tracked in the central layout and processing of food stimuli.

## **Gender-fair language as a facilitator for women's career progress**

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When applying for a leadership position or acting as a leader, women are still perceived with a 'lack of fit', thus hired less likely and evaluated less favorably than their male counterparts. In many languages different language forms can be used to refer to both women and men: masculine forms (e.g., CEO in German: *'Geschäftsführer'*) and gender-fair forms (e.g., word pairs, CEO in German *'Geschäftsführerin/Geschäftsführer'*). The aim of the present research was to test, whether the use of masculine forms endorse the 'lack of fit' for women in leadership, whereas gender-fair forms reduce it. In two experimental studies we manipulated language form (masculine vs. gender-fair forms) and the gender of the target to hire/evaluate (female vs. male). The results indicated as predicted that masculine forms lead to the 'lack of fit' for women in the leadership context, whereas gender-fair forms reduce it. Women were less employed for leadership positions (Study 1) and evaluated less favorably as leaders (Study 2) than their male counterparts with masculine forms. With gender-fair forms, however, no such differences in the employment and evaluation of women and men were found.

## Distraction and the auditory attentional blink

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When multiple targets are presented in a rapid stimulus sequence, the task-related processing of a target stimulus (T2) preceded closely by another target (T1) is often impaired; this phenomenon is called the attentional blink (AB). Whereas AB is investigated predominantly in the visual domain, a number of studies suggest that it can be observed for rapid auditory stimulation as well. Although AB probably sums a number of effects, the involuntary change of attention (distraction) triggered by salient T1 sounds is often neglected. In the present study we manipulated T1-saliency within a rapid sequence of pure tones by increasing the frequency separation of T1 from the rest of the tones, and investigated whether distraction caused by T1 modulated the detection of a following complex tone (T2). It was found that distraction affected only the immediately following T2s, but not those in later positions when both targets had to be detected. When the same stimulation was used in a second experiment, in which participants were unaware of the significance of T1, and their task was to detect T2 only, distraction affected later positions as well. These results show that the contribution of distraction should not be neglected in (auditory) AB research.

## Bilingualism and affectivity in reading

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It was hypothesized that either the processing of the second language automatically activates the representation of the mother language, or that it takes place in distinct brain regions from those for the mother language. Previous literatures suggested that affective words afford less emotional resonance in the second language than the mother language. Until recently, neuroimaging studies have investigated the processing of emotion-laden words (Kuchinke et al, 2005), sentences, and texts (Ferstl et al, 2005 and 2007). The current fMRI study aimed to investigate neural correlates concerning the interaction between bilingualism and the reading of emotion-laden texts. 24 German native speakers familiar with the novel series "Harry Potter" read emotion-laden (40 fearful and 40 happy) and 40 neutral short text passages from "Harry Potter" series, half of them in mother language (German), and half of them in the second language (English) in the scanner. Results to be presented are: 1) post-scanning passage rating in the dimensions of valence, arousal, happiness, and fearfulness; 2) categorical analysis of fMRI data on the effect of emotion, and its interaction with language; and 3) language-specific parametric analysis of fMRI data based on the post-scanning passage ratings.

## **Anticipated regret in risky decision making: Effect on risk defusing behavior**

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Regret is a negative emotion which we experience when we realize that the actual situation after a decision is worse than if we had made another choice. Regret may be anticipated during the decision process and affect the decision process. Our experiment investigates the effect of anticipated regret on the process of risky decision making and in particular on active risk defusing. 60 participants (students and non-students) had to choose in a quasi-realistic medical scenario. As independent variable we explicitly introduced anticipated regret in the instructions for half of the participants, whereas this was not done for the other half. Information search was operationalized with the Method of Active Information Search: Initially, participants were presented only basic information about the decision situation and the alternatives. Then they could search additional information by posing questions to the experimenter. Dependent variables were the searched-for information units, especially about risk-defusing actions (risk defusing operators, RDOs). As expected, decision makers searched more often for RDOs under explicit anticipated regret. They searched also more information altogether. The discussion of the results includes also reflections about explicitly and non-explicitly introduced regret.

## **The neural underpinnings of informational cascades – An fMRI study of probability updating in a social context**

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Cascades can emerge when it is optimal for a decision maker to decide independent of her own information and to follow the previous decisions. To better understand the emergence of cascades it is of great importance to know how our brain differentiates between private and social information. To study this question we used an adapted version of Anderson & Holt's (1994) Informational Cascades paradigm. 27 participants were required to repeatedly choose the most profitable out of two stocks and to estimate the probability that the chosen stock provides the higher revenue. Before making their judgments, participants received information about the decisions of two other traders and were additionally provided with private information. The Bayesian analysis of the behavioral data shows that, compared to the equilibrium prediction, people tend to overweight their private information relative to the socially inferred information. Accordingly, participants showed an increased activity in several risk-related brain areas when receiving conflicting private information. Two regions within this network – Fronto-Insula and Parietal Cortex – are modulated by the weight people give to their private information. These results suggest a mechanism on how the brain computes a bias towards private information, which can lead to a decreased frequency of informational cascades.

## Cognitive control in two-digit number processing – A computational modelling approach

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In number magnitude comparison the unit-decade incompatibility effect (e.g., 37\_52, 3<5, but 7>2 vs. 42\_57, 4<5 and 2<7) indicates decomposed processing of tens and units. Recent research revealed that this compatibility effect is influenced by processes of cognitive control reflected by adaptations to stimulus characteristics.

Here, we present an updated version of our computational model on two-digit number comparison (Moeller et al., 2010) comprising two systems for the separate comparisons of tens and units as well as a system integrating the outputs of these separate comparisons. In several simulations we replicated the compatibility as well as the distance effect. Applying error-modulated online-adaptation, we also observed the compatibility effect to vary for different proportions of within-decade fillers (e.g., 42\_46) and different proportions of compatible vs. incompatible number pairs corresponding to recent empirical findings.

We were also interested in how far the numerical distance effect is under cognitive control. Simulations indeed indicated the distance effect to be modulated by adaptations to stimulus characteristics. Subject to its empirical replication possible implications of these results on numerical cognition in general are discussed.

## Brightness and contrast effects on binocular coordination

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When designing text, one of the most important issues concerns the optimal contrast and polarity. Besides recognition performance, fluent reading also depends on moving the eyes in a smooth manner over the text. For binocular coordination, this means that the eyes should verge on the image depth in order to avoid disparate retinal images. However, while reading on a computer screen, the eyes are reported to usually cross in front of the screen (e.g. Nuthmann & Kliegl, 2009) or behind the screen (e.g. Liversedge et al., 2006). A potential explanation for these inconsistencies might be that Nuthmann worked with dark text on bright background whereas Liversedge presented bright letters on a dark background. We will report a series of experiments investigating the effects of contrast as well as of the brightness of letters and background during a reading task as well as during calibrating the eye tracker in advance. Eye crossings strongly depended on contrast and brightness. This demonstrates the importance of carefully setting brightness and contrast values during calibration. Moreover, our data suggest that the visual system easily mislocalizes the screen surface depending mainly on the background brightness.

## Modality dominance patterns among effector systems

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Flexibility in configuring task-sets allows us to adequately respond to environmental stimuli in different contexts, such as in dual-task situations. In the present study, we examined to what extent response control is influenced by the modality of a concurrently executed response. In Experiment 1, participants responded to auditory stimuli with either vocal responses and/or saccades. In Experiment 2, vocal responses were combined with manual responses. In both experiments, we found asymmetric dual-response costs, that is, the response time difference between single- and dual-response conditions varied between response modalities. Importantly, the same (vocal) response showed substantial dual-response costs when combined with saccades (Experiment 1), but no such costs when combined with manual responses (Experiment 2). Experiment 3, combining saccades with manual responses, revealed stronger dual-response costs for manual responses than for saccades. Together, these findings suggest an ordinal dominance pattern among response modalities, representing flexible, response-based resource scheduling during task-set configuration.

## Can we (always) resist? On the (un)controllability of evaluative conditioning

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Evaluative conditioning is the change in liking of conditioned stimuli caused by their pairing with valenced, unconditioned stimuli. A long-standing question is whether such pairings can change attitudes automatically. We developed a multinomial process dissociation procedure to distinguish controllable from uncontrollable processes during learning and quantify their impact on the evaluative conditioning effect. In the *inclusion condition*, participants believe that the valence of the USs can be trusted to form an attitude about the CSs. In order to separate controllable from uncontrollable processes involved in this task, an *exclusion condition* was designed. The instructions stated that the valence of the USs should actually be opposite to the US valence presented. In three experiments we show that both controllable and uncontrollable learning mechanisms contribute to the final evaluations. These results have important implications for dual process theories of attitudinal learning, suggesting that automatic and controlled processes are qualitatively distinct.



## Phonemic and syllabic awareness of adult literates and illiterates in an indian alphasyllabic language

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Whereas much research has explored the role of phonological awareness for literacy acquisition in alphabetic languages, much less is known about the influence of these metaphonological abilities during the acquisition of non-alphabetic scripts. Here we investigated the phonemic and syllabic awareness of adult literates and illiterates from the same socioeconomic background speaking Hindi: a transparent Indian alphasyllabic language. We observed that phoneme and syllable manipulation abilities of Hindi literates were far from ceiling even after many years of reading instruction. Illiterate participants were found to have very poor phoneme and syllable manipulation abilities but showed some syllable, rhyme, and phoneme awareness in recognition tasks. This suggests that some basic metaphonological abilities develop even in absence of literacy. Some advanced phonemic manipulation abilities were found to be very poor even in literates, which suggests that such skills do not develop automatically during the acquisition of an alphasyllabic writing system. Overall, these data suggest that phonological and syllabic awareness associated with the acquisition of an alphasyllabic script occupies a middle ground on a continuum between the high metaphonological abilities of literates in an alphabetic script and the poor phonological awareness of literates in a logographic script (literates of the traditional Chinese script).

## Post-learning verbal information alters memory for hand-manipulative tasks

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Verbal mis-information that is presented after participants have witnessed an event alters visual memory for this event. The goal of the present study was to examine influences of verbal mis-information on learning a hand-manipulative task. We presented participants with a stop-motion-animation of a nautical knot. Thereafter, all participants completed a fill-in-the-blank questionnaire in which they had to assign words from a given list to the blanks of the questionnaire. In the experimental condition, the items of the questionnaire described the steps of the knot of the animation. The questionnaire was designed in such a way that participants were forced to assign the word "left" to a blank in which they should fill in the word "right", thus providing mis-information about this particular step. Finally, participants had to do a visual recognition test and to tie the knot. Both visual recognition and knot-tying performance was influenced by the verbal mis-information. Further, we could show that verbal mis-information does not completely "overshadow" visual memory for hand-manipulative tasks. Instead, we found a selective impairment in visual memory and knot-tying performance for the steps we presented the mis-information. Thus, verbal mis-information does not only alter visual memory but also memory for hand-manipulative tasks.

## Manual asymmetries in plan generation and recall during object manipulation

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The selection of grasp postures depends on two processes: plan generation and recall. This study investigated whether these processes are modulated by the hand used during object manipulation. Participants grasped a plunger from the home platform (90cm high) and transported it to a target platform (50cm, 70cm, 90cm, 110cm, or 130cm high), using either the dominant left, or the non-dominant right hand (home-to-target moves). After bringing their hand back to the side, participants returned the plunger to the home platform with the left or right hand (target-back-to-home moves). For the home-to-target moves, grasp heights were inversely related to the heights of the target platforms. For the target-back-to-home moves, participants grasped the plunger close to where they had grasped it during the home-to-target moves, indicating that they recalled the location at the plunger and slightly modified the previously generated movement plan. The grasp height recall effect was present for all hand sequences, providing evidence for a reliance on information stored in extrinsic coordinates. Furthermore, participants exhibited a stronger adjustment of grasp height to the final platform height with the right hand, both during the home-to-target and the target-back-to-home moves, suggesting a better anticipation of future task demands for the dominant hand.

## Facial mimicry to dynamic facial expressions of the elderly

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Studies suggest that young adults have difficulties recognizing facial emotions shown by the elderly because wrinkles and folds may interfere with the perception of emotional expressions (Malatesta et al., 1987; Hess et al., 2012). Yet, there is potential for adverse consequences when the emotional content of an elderly person's message is misunderstood. Our research extends these findings by addressing the question as to how emotions expressed by older vs. younger persons are mimicked. We used video clips of spontaneous emotional facial expressions of anger, sadness, happiness and disgust shown by younger and older adults. Facial EMG at *Orbicularis oculi*, *Zygomaticus major*, *Corrugator supercilii*, and *Levator labii alesque nasii* was measured while 39 young participants (18 – 30 years) viewed the video clips. We found significant differences in the tendencies to mimic younger vs. older persons. The patterns suggest that age-related beliefs about emotion expressions impact on facial mimicry.

## Experimental modulation of social cognition by oxytocin

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Oxytocin (OXT) is a neuropeptide widely known for its peripheral hormonal effects in sexual reproduction. The past decade, however, has witnessed a tremendous surge of interest in the additional role of OXT as a potent neuromodulator of social cognition. This experimental work has generated much excitement about identifying the neurochemical underpinnings of sociality in humans, and discovering a potential compound to treat social functioning deficits. Recent studies from our laboratory, however, show that while OXT can exert robust prosocial effects by improving social reinforcement learning and by enhancing emotional empathy, it has also been found to enlarge social distance and to promote defensive responses to social threats. These ambiguous findings can be interpreted within an evolutionary framework of biological protectionism serving to secure and motivate pair-bond formation and parenting.

## Processing information in a foreign language reduces confirmation bias

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In a recent study, Keysar et al. (2012) showed that well-established framing-effects (Tversky & Kahneman, 1981) disappear when decisions are made in a foreign language. The authors discuss emotional distance and cognitive load as possible factors mediating this effect. We investigated whether the *foreign language effect* also holds for another cognitive bias commonly observed after decision making: the confirmation-bias, i.e. favoring information consistent with one's preference over preference-inconsistent information. Using an internet-based setting, we applied a classic confirmation-bias paradigm: Participants (N=51) read short summaries of pro- and con-arguments regarding the use of neuro-enhancers. After forming and indicating their opinion on the issue, they had to select a subsample of the summaries to read the summaries' full-text. We experimentally varied whether participants completed the tasks in their native language (L1, German) or a foreign language (L2, English). As hypothesized, significantly less participants showed confirmation bias in the L2-condition (12 of 25) than in the L1-condition (20 of 26). Shedding light on the influence of discussed mediators, our participants reported significantly higher cognitive efforts in the L2-condition compared to the L1-condition but we found no differences regarding participants' emotional involvement. L2-effects on evaluation-biases investigated in a current study will also be reported.

## **Fraction comparison in the eye of the beholder**

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Fraction comparison is a difficult task even for adults. Different strategies, for example comparing numerators and denominators separately, play a significant role. The aim of the present experiment was to identify whether strategies used by adults in comparing fractions were accompanied by systematic eye movements or fixation sequences. One-digit as well as two-digit fractions were presented to 20 participants. The presented fraction pairs could have same or different denominators and numerators, with fractions with common denominators being compared fastest and most accurately, followed by fractions with common numerators and fractions with different numerators and denominators. The number of fixations also increased with difficulty. The analysis of the fixation sequences (fixation triplets, for example: left numerator – right numerator – left numerator) confirmed the assumption that different types of fraction pairs were associated with distinctive sequences of eye movements. For example, when fractions with the same denominator were presented, participants showed a tendency to more often fixate the numerators alternately. The analyses also showed that the differences in fixation sequences found for one-digit fractions were even more clearly apparent in two-digit fractions. These results showed that the use of strategies in comparing fractions can be deduced from eye movement patterns.

## **Being moved, being touched, and being stirred in relation to other emotions – their location in affective space**

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Emotional states designated by words like being moved (bewegt sein), being touched (berührt sein), being stirred (gerührt sein), and being deeply moved (ergriffen sein) are rarely examined in psychology research. In this study we explored the relation of these emotional states to other emotions and determined their location in affective space. Therefore, we had 930 students rate one out of 23 different German emotion terms regarding how the feeling designated by this emotion term is to be characterized on 40 bi-polar adjective pairs. Exploring the data using cluster analysis, multi-dimensional scaling, and factor analysis revealed that being moved and related terms form a coherent cluster situated neatly between the emotion class of sadness and joy. The being-moved emotion class is characterized by an overall slightly positive valence and low-to-mid arousal pattern while having also a higher mixed valence score as compared to other emotions.

## Eye movements as a process tracing measure of memory-based diagnostic reasoning

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In diagnostic reasoning, knowledge about symptoms and their likely causes is retrieved to generate and update diagnostic hypotheses in memory. By letting participants learn about causes and symptoms in a spatial array, we could apply eye tracking during diagnostic reasoning to trace the activation level of hypotheses across a sequence of symptoms. Gaze allocation on former locations of symptom classes and possible causes reflected the diagnostic value of initial symptoms, a bias towards the focal hypothesis, symptom rehearsal, and hypothesis change. Gaze behavior mapped the reasoning process and was not dominated by auditorily presented symptoms. Thus, memory indexing proved applicable for studying reasoning tasks involving linguistic input. Looking-at-nothing revealing memory activation consistent with process models of diagnostic reasoning was stable even after one week.

## Classification and appreciation of ambiguity in art

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Ambiguity is often associated with negative responses – only few situations allow enjoying ambiguity. Experiencing art is one prominent example. Nevertheless, theories of judgment formation like the “processing fluency account” (Reber, Schwarz, & Winkielman, 2004) suggest that easy to process (non-ambiguous) stimuli a) are processed faster (shorter RTs) and b) are preferred over hard to process (ambiguous) stimuli. Here we test effects of ambiguity (ambiguous versus non-ambiguous pictures of paintings) and duration (10ms, 50ms, 100ms, 500ms) on the classification performance (speed and accuracy) and on aesthetic appreciation (liking, interestingness) of artworks. We found no effect of ambiguity on classification performance (RTs). As indicated by signal detection analyses, at 100ms PT 50% of the participants were able to successfully classify ambiguous content, at 500ms even 75% performed above chance level. Moreover, ambiguous artworks were found significantly more interesting (conditions 50ms to 500ms) and were preferred over non-ambiguous stimuli at 500ms. These results suggest that in complex images, as in artworks, early perceptual fluency-related mechanisms and conceptual ambiguity-related mechanisms interact in the formation of an aesthetic judgment.

## Who is talking in backward crosstalk? How action goals influence dual-task performance

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Specific interference phenomena can influence dual-task costs, and commonly their direction and size are ascribed to overlaps in stimulus and response features of both tasks. One particularly interesting example is a variant of the backward crosstalk effect (BCE), where improved Task 1 performance is observed if the Task 2 response shares features with the response or stimulus of Task 1. Here we ask which aspects of responses are critical for BCEs. Inspired by effect-based models of action selection (e.g., the ideomotor theory) we suggest that not the bodily movement per se but rather its contingent, change in the environment (i.e. its action effect) is the crucial aspect. Across several experiments this assertion is supported: BCEs occur when Response 1 shares features with the visual effect of Task 2 (instead of the mere observable motor movement), and they occur when both responses yield similar visual effects. These results contribute to the understanding of dual-task performance and give some indications on how to facilitate dual-task performance.

## Modeling learning in a parallel constraint satisfaction network model

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A key aspect of making good decisions is fast and accurate learning of cue-criterion relations in complex environments. Elaborating on previous work on a formalized process model of decision making—the Parallel Constraint Satisfaction model (PCS)—we develop and compare a learning mechanism for PCS—the Delta-rule—to alternative models of decision making such as the reinforcement learning theory of strategy selection for fast and frugal heuristics. In our study, participants were asked to decide which of two stocks in a market game is more profitable. In each trial, experts were presented that speak for or against the stocks. The experts suggested the more profitable stock with a specific probability that was unknown. After each trial, participants received feedback on the accuracy of their decision and thus also on the accuracy of the experts. We compared observed choices and decision times with model predictions. We also tested a critical property of the learning rule for PCS. The Delta-rule is sensitive to changes in cue-criterion relations (i.e., dynamic environments): Incorrect decisions lead to a stronger impact on the change of weights than correct decisions. Overall, we found strong support for the Delta-Rule in PCS as an accurate model of human learning.

## How irrelevant information affects people's probability judgments

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Making probability judgments is an important human skill. When making probability judgments people often encounter and process information sequentially. This sequential nature of the information flow necessitates adjustments of beliefs. Sometimes, however, new information is irrelevant for the task at hand and does not provide any valid information for improving a judgment. Nevertheless, people's probability estimates are often influenced by irrelevant information, thus diluting valid information. This dilution effect has been observed in many areas such as perception, consumer research, or social reasoning. However, the cognitive processes underlying the dilution effect have not yet been cognitively explained. We present a similarity-updating model, which is based on two assumptions: First, probability judgments are influenced by the similarity between a sample of information and the population producing the sample. Second, information presented sequentially is integrated additively. With this model, we predicted people's probability estimates in three card game tasks, in which participants updated their initial beliefs based on sequentially presented information. Compared to a Bayesian benchmark, the similarity-updating model described people's initial and revised probability judgments better. We conclude that irrelevant information dilutes people's probability judgments because irrelevant information is integrated with the relevant information via a similarity-based probability updating process.

## Eye movements to “nothing” have an active role during visuospatial memory retrieval

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Several studies have reported that spontaneous eye movements occur with visuospatial imagery and that they closely reflect content and spatial relations from an original picture or scene during episodic memory retrieval (e.g., Brandt & Stark, 1997; Johansson, et al., 2006). Nevertheless, the role for these eye movements to “nothing” is elusive and has been debated extensively in current research (cf., Ferreira et al., 2008; Richardson et al., 2009). Do they have an active and functional role when visuospatial information is retrieved from memory or are they merely an epiphenomenon which does not interact with mnemonic mechanisms in any useful way? The present study was designed to address this fundamental issue by investigating how imposing different eye movements on participants affects retrieval performance of visuospatial information. Results provide robust evidence that eye movements to “nothing” do have an active and supportive role during visuospatial recollections, and that they indeed can act as facilitatory retrieval cues in this process.

## **Age-related differences in controlling the contents of working memory: Evidence from switching between filter settings**

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Filtering efficiency, i.e., the ability to prevent irrelevant information from being stored, seems to be a major factor of variations in working memory capacity. Moreover, recent data suggest that a filter deficit also contributes to age-related changes in working memory performance. In order to investigate the ability to control the contents of working memory in more detail, we collected data with a novel filter-switching paradigm. The data show that when selection criteria need to be adjusted, filtering out distractors is more demanding and more irrelevant material gains access to working memory. Importantly, this switch-related filter deficit was larger for older than for younger adults suggesting that older adults suffer from a deficit in flexibly adjusting filter settings to changing requirements.

## **The grasp-height effect in young children**

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The present contribution centres on the development of motor planning processes in object grasping. Specifically, in object-transport tasks adults efficiently adjust initial grasps to task demands: as an example, there is an inverse relation between initial grip-height and the height of the planned goal-position when adults are asked to position a bar on different heights of a shelf. This has been termed the “grasp height effect” (Cohen & Rosenbaum, 2004). Employing the corresponding paradigm, we examined how planning efficiency develops in 3- to 5-year-old children. The task was to transfer a bar from the centre of a shelf to higher or lower positions, and children’s grip heights were measured. As expected, for both age-groups we found significantly lower grip heights for grips with higher goal-positions, and vice versa. As opposed to developmental studies with the classical bar paradigm, the present findings underscore the early emergence of end-state comfort planning in young children.



## **Graded pair comparisons are an equivalent substitute for quadruple comparisons in emotion scaling experiments**

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Junge and Reisenzein (2012) showed that indirect scaling methods based on graded pair comparisons (a form of difference measurement) yield more precise measurements of emotion intensity than rating scales. Another advantage of scaling methods based on difference measurement is that they allow to test, rather than merely assume, that the obtained scale values form an interval scale. However, these tests, as well as some difference scaling methods require comparisons of pairs of pairs (quadruples) of stimuli as data. Because direct quadruple comparisons are very laborious, we tested in two experiments whether quadruple comparisons derived from graded pair comparisons – much more economical, and probably also a less cognitive demanding judgment – are an acceptable alternative. In Experiment 1, we compared scalings of disgusting pictures derived from direct quadruple judgments and graded pair comparison judgments in a within-subject design; in Experiment 2, we did the same for scenarios that elicited relief. In both experiments, we found that the scale values derived from graded pair comparisons are, for all practical purposes, equivalent to those derived from quadruple comparisons. This makes indirect scaling methods based on difference measurement even more attractive for the measurement of emotion intensity.

## **Violating the triangle inequality in cued memory recall**

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Semantic relations are often described in spatial terms. For example, models of activation spreading imply a spatial interpretation. Tversky and Gati (1982) have challenged the idea that semantic relations can be represented as a spatial metric. They showed that similarity judgments violate either the triangle inequality (TI) or segment additivity. They favored the view that it is the TI that is violated. In the present talk I discuss additional theoretical arguments for this view, and I present experimental data on cued memory recall for word tuples that are most easily interpreted in terms of a TI violation. Participants learned word pairs, triples and quadruples that were taken from several items of a version of the Remote Associates Test (RAT; Bowers, 1990). RAT items consist of three task words that are associated only remotely, plus a solution word that is associated closely to each of the task words (e.g., actor, falling, dust: star). Activation spreading models predict that higher-order tuples (e.g., triples) are more difficult to remember than lower-order tuples (e.g., pairs). In contrast to this, cued memory recall was facilitated when a solution word was added to a pair or a triple of task words.

## **Martin Vogel – Champion of just intonation in music**

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Martin Vogel was an ingenious musicologist who was not satisfied accepting what at his time was considered “truth by consensus” about harmony that the ultimate culmination of tuning systems was twelve-tone equal temperament, that Wagner’s harmony paved the way to atonality, and that atonality was the logical endpoint of western music. Vogel asked the critical questions: Why are there twelve tones per octave? Why did musicians across centuries struggle to find tuning systems that reconciled this system with just intonation of fifths and thirds? And why is the major seventh chord the most common tetrad? Vogel extended Euler’s Tonnetz by introducing a third dimension for natural sevenths, and suggested a formula that enable us to determine which tones of his Tonnetz should be chosen for a complex chord. Vogel’s Tonnetz enables us to easily and intuitively understand “mysterious” chords such as the famous Tristan chord. Vogel had several instruments built that could be played in just intonation. He was also interested in the history of the origin of music. The best way to honor Martin Vogel is to give just intonation a chance. This involves experimental research on consonance and dissonance in music.

## **Adaptive group decision making**

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How do groups make decisions? We propose the framework of ecological rationality to study two important aspects of adaptive group decision making: (1) the environmental structure of the task and (2) the group composition regarding task-relevant features. (1) Extending the study of adaptive strategy selection in individuals to the group level, two experiments investigated whether two-person groups (dyads;  $N = 240$ ) working on a multi-attribute comparison task learn to adapt their decision strategy to the payoff structure of the environment as fast as individuals. Choice as well as information search data show that both individuals and dyads learned to select adaptive strategies over time, with a steeper learning rate in dyads. (2) We studied the impact of naturally occurring differences between groups regarding their composition on strategy performance and selection. The focus here was on the recognition heuristic, so that task-relevant features that influence the performance of group strategies are the validity of the group members’ recognition and knowledge. Participants ( $N = 129$ ) performed an inference task in groups of three, with the goal to infer which of two German companies had the higher market capitalization. Again, choice and discussion data support the notion of adaptivity in group decision making.

## **Putting Martin Vogel to test: An attempt to evaluate a musical theory**

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Vogel's musical theory explains harmony in terms of ratios of small numbers built from the prime numbers two, three, five, and seven. It predicts advantages of pure tuning over equal temperament tuning and a good degree of consonance for minor chords if set in the right way, i.e., with the third being the lowest tone. The present study tests these predictions with chords based on string instrument sounds, set in different ways and tuned either in pure or equal temperament. Chords are rated by musically skilled listeners with respect to their consonance/dissonance, familiarity, pureness, emotion and complexity. These ratings are analyzed with a principal components approach. The results of this analysis are in accordance with Vogel's theory.

## **Neurobiological aspects of psychotherapy in OCD**

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Patients with obsessive compulsive disorder often demonstrate profound functional dysregulations compared to healthy subjects especially in fronto-striato-thalamic brain areas. These functional anomalies seem to be related to the symptomatology of the patients. In the present study we focused on functional responses related to OCD-associated pictures and their changes during psychotherapy. In addition, the functional MRI results were combined with self-assessment ratings of the patients. The results of the patients demonstrated increased responses especially in the anterior cingulate cortex, supplementary motor area, the dorsolateral prefrontal cortex, insula, thalamus, cuneus and parieto-occipital areas before treatment during the presentation of OCD-relevant information. These responses decrease considerably during psychotherapy. The comparison of fMRI results and self-ratings revealed that the functional brain responses change during different phases of the therapy. These results may indicate that different therapeutic processes may be related different brain responses.

## Zeitabhängige und zeitinvariante Aspekte des Blickverhaltens auf komplexen Szenen

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In Studien zum Blickverhalten auf komplexen Szenen werden die Stimuli zumeist einmalig dargeboten und mögliche Effekte zunehmender Bekanntheit der Bilder auf Blickbewegungsparameter bleiben unberücksichtigt. Wir untersuchen, wie sich das Blickverhalten über mehrfach wiederholte Stimulusdarbietungen hinweg verändert.

Wir fanden Veränderungen der Fixationsdauer, der Sakkadenfrequenz, der Sakkadenlänge, des Ausmaßes an visueller Exploration (Entropy) und der Zwischensubjekt-Varianz und Innersubjekt-Kongruenz von Fixationskarten. Gleichzeitig zeigt sich jedoch keine signifikante Veränderung des bottom-up Einflusses primärer Bildeigenschaften auf das Blickverhalten, aber ein bedeutsamer Einfluss des Bildtyps. Dieser Zusammenhang zwischen Bildeigenschaften und Fixationswahrscheinlichkeiten interagiert auch deutlich mit der Sakkadenlänge, wobei wir zeigen können, dass eine reduzierte Korrelation nach längeren Sakkaden keine Signatur mangelnder Zielpräzision ist. Dieser Sakkadeneffekt wird zudem nicht vom Bekanntheitsgrad der Stimuli beeinflusst und ist auch kein exklusives intra-individuelles Phänomen.

Wir resümieren, dass vorliegende Ergebnisse substantiell für das Verständnis von Aufmerksamkeitsveränderungen über die Zeit sind und empfehlen zudem, inter-individuelle Unterschiede in der Blickbewegungsforschung zu berücksichtigen.

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Kaspar, K. & König, P. (2011b). Viewing behavior and the impact of low-level image properties across repeated presentations of complex scenes. *Journal of Vision*, 11, 1-29.

## Do predictiveness effects on overt attention in contingency learning depend on the valence of the outcome?

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The relation between attention and associative learning has been discussed controversially. According to the Mackintosh (1975) model, reliable predictors of outcomes are expected to attract most attention during learning, whereas Pearce and Hall (1980) argued that learning (and attention) is driven by prediction errors and should thus be directed to cues that are associated with uncertain outcomes. Recent Pavlovian conditioning studies suggest that the amount of attention being paid to predictive cues does also depend on the valence of the outcome. In the present study, the attentional effects of predictive and unpredictable cues were tested in a passive contingency learning task with both positive and negative affective outcomes. The participants' task was to learn the predictive relations between various visual stimuli (cues) and the occurrence of an affective auditory event (i.e. a crying or a laughing child). Eye-tracking data show that the predictive cues were attended longer than the unpredictable cues, particularly if the outcome was positive. However, the attentional bias was reduced for cues that predicted the occurrence of a negative outcome. These results suggest that the valence of an outcome determines whether overt attention during contingency learning is driven by the predictiveness or the prediction errors associated with the cues.

## **Recognizing familiar faces: Evidence for average and instance based mental representations**

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How are familiar faces represented in the brain? The concept of “Face Recognition Units (FRUs)” containing abstract, structural (as opposed to pictorial) information has proven useful to explain the observation that familiar, but not unfamiliar faces are easily recognized across a range of previously unseen images. It has been suggested that one possibility to acquire structural codes involves creating a mental average across seen instances of a person.

We used a face learning paradigm and contrasted average and instance based recognition and its neural correlates. Participants learned six face identities presented across different views, displaying six emotional expressions each. For each identity, one expression was presented six times more frequently than the others. At test, participants performed a familiarity task on instances of frequent and infrequent expressions, weighted and non-weighted expression averages and neutral faces. In behavior we found recognition advantages for averages and learned instances, with particular benefits for weighted averages. Whereas the face identity sensitive component N250 was larger for learned compared to novel faces, this effect was not further modulated by test condition. Overall, somewhat in contrast to the classical “FRU” concept, the results provide evidence for efficient face representations containing both abstract and episodic information.

## **Cognitive load while approaching signalized intersections measured by pupil dilation**

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Approaching urban intersections can be a demanding driving task, due to a variety of different factors, like complex intersection layouts, high traffic density, or maximum approaching speed. Special cases are signalized intersections, because of the signal change from green to yellow (yellow-onset). Suddenly, due to yellow-onset, a driver can be in a situation with conflicting action alternatives. In this context, it is of special interest how top-down and bottom-up processes are influencing decision-making and action selection. To examine the cognitive mechanisms involved in action selection after yellow-onset, an experiment was conducted in the dynamic driving simulator of the DLR. For this purpose it was investigated how the existence of a lead car (lead car vs. no lead car) and of a cognitive demanding secondary task (secondary task vs. no secondary task) influence the workload of drivers approaching an intersection, measured by pupil dilation. Results show a significant increase in pupil dilation while solving secondary tasks and a tendency that without lead car the dilation is greater compared to the condition with lead car. These results indicate that car following might be realized by simple and workload reducing driving heuristics.

## The onset of stereoscopic vision in the first year of life

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In this longitudinal study, infants were tested weekly between 6 and 16 weeks of age. They were presented with two stimuli, a dynamic random-dot stereogram (RDS) with crossed horizontal disparity ( $0.5^\circ$  or  $1^\circ$ ) and a dynamic RDS with vertical disparity ( $0.5^\circ$  or  $1^\circ$ ). The stimuli were presented on an autostereoscopic monitor equipped with a face-tracking camera.

Four experimental conditions were run. In two conditions ( $0.5^\circ$  and  $1^\circ$  disparity), infants were tested using the *forced-choice preferential looking (FPL) technique*. In two additional conditions ( $0.5^\circ$  and  $1^\circ$  disparity), infants were tested using the *classical preference (CNP) technique*.

In all conditions, mean relative preferences for the horizontal disparity target increased linearly. Relative preference scores for the horizontal RDS target were generally higher in the FPL than in the CNP conditions. In the FPL conditions, preference for the horizontal RDS exceeded chance (.50) from 8 weeks on. In the CNP conditions, preference for horizontal disparity started to become significantly different from chance probability after 12 weeks. The CNP data confirm earlier findings according to which responsiveness to horizontal disparity arises at 3 to 5 months of age. The FPL data, however, suggest that perception of horizontal disparity emerges at 8 weeks of age.

## Measuring criterion noise in signal detection theory: The case of recognition memory

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Traditional approaches within the framework of signal detection theory (SDT; Green & Swets, 1966), especially in the field of recognition memory, assume that the positioning of response criteria is not a noisy process. Recent work (Benjamin, Diaz, & Wee, 2009; Mueller & Weidemann, 2008) has challenged this assumption, arguing not only for the existence of criterion noise but also for its large magnitude and substantive contribution to individuals' performance. A review of these recent approaches for the measurement of criterion noise in SDT identifies important shortcomings and confoundings. A reanalysis of Benjamin et al.'s (2009) data sets as well as the results from a new experimental method indicate that the different forms of criterion noise proposed in the recognition memory literature are of very low magnitudes, and they do not provide a significant improvement over the account already given by traditional SDT without criterion noise.

## **Do pictures help to memorize? Measuring working memory in everyday life with different presentation forms**

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The aim of this study was to clarify the role of item presentation on working memory performance of older adults. We therefore measured the WM-capacity of 38 older adults ( $70,16 \pm 5,8$  years) in the laboratory and in an everyday life scenario (EDL). WM performance in the laboratory was estimated with two established WM tasks (digit span and grid span test, Emery et al. 2002), which differed in their memory domain (verbal vs. visual-spatial). To simulate an EDL, a supermarket was constructed within the laboratory. In it, participants had to memorize a list of 12 products (either as words or as pictures of the products) (i) in the same order as arranged within the supermarket or (ii) in random order, what requires rearrangement. Participants then had to collect as many of the products as possible. We figured out that presentation of words and pictures in EDL-task did both rely on verbal WM but not on visual WM. Hence there was no difference in item presentation for the arranged EDL-task but for the rearranged one. In accordance to these findings we suggest that it is helpful strategy to memorize information via pictures in EDL, especially if information processing is needed.

## **Task demands influence sentence coding: Evidence from self-paced reading and the visual world paradigm**

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We studied sentence coding processes under different task demands to investigate the degree of semantic processing in verbatim recall, gist recall and comprehension. In a self-paced reading study, reading for content was fastest, reading times for verbatim and gist recall were longer, but did not differ from each other. Furthermore, there was little variation over the sentence with reading for comprehension, whereas verbatim and gist recall showed peaks at syntactic breaks. Correctness did not differ between recall conditions. These results suggest that although the products of the two recall conditions are similar, there are differences in the coding processes. Experiment 2 explored these differences using the visual world paradigm. Here eye-movements are being measured, while participants see pictures and listen to sentences. We used a display of four items potentially related to the sentence. At a certain point in the sentence, only one of these items could go on to be mentioned. Fixations of this object before it was heard are interpreted as predictive semantic processing. Predictive eye-movements occurred more frequently and earlier with content-based instructions (gist recall and comprehension) as compared to verbatim recall. We will interpret these results in light of an embedded processes account of sentence recall.

## **Neural correlates of the integration of object features in visual working memory**

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The integration of visual object features has been thoroughly investigated in perception, but it is unclear what processes mediate feature integration in working memory (WM). Here, we compared two conditions of WM maintenance that only differed in how the WM contents were created. Participants learned associations between letters and object features. During test, two, three, or four letters were presented and the associated features had to be retrieved and combined in WM, resulting in a coherent object representation that should subsequently be matched to a comparison object. A control group retrieved and maintained whole objects consisting of two, three, or four features. We analyzed EEG theta coherence before the comparison object appeared, because here both groups maintained the same objects. In contrast to the control group, the maintenance of two, three, or four features integrated in WM was associated with increased neural coupling between parietal and occipital electrodes. This suggests that the maintenance of features integrated in WM requires enhanced interaction between posterior cortical areas, in which the individual features are assumed to be stored, which speaks for the claim that the constructed objects are maintained through dynamic links between the object features.

## **Task sets modulate brain activity in semantic processing pathways during subliminal priming: Further evidence for an attentional sensitization of unconscious cognition**

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In classical theories of automaticity and attention, unconscious automatic processes are thought to be independent of higher-level attentional influences. However, in our attentional sensitization model we propose that unconscious automatic processing depends on attentional enhancement of task-congruent processing pathways. In line with this assumption, previous studies showed that a subliminally presented stimulus can only elicit facilitatory effects (priming) on subsequently presented visible targets if the process-relevant stimulus dimension belongs to the active attentional set. We investigated the functional neuroanatomical architecture of attentional sensitization of unconscious semantic processing with a modified masked semantic paradigm in a functional magnetic resonance imaging study: In our induction task paradigm, participants attended before masked prime presentation in a classification task either to semantic or perceptual stimulus features, which should activate a semantic and perceptual task set, respectively (induction task). Thereafter, a subliminal semantic priming task was presented. Brain activity was modulated by semantic priming only after the semantic but not after the perceptual induction task in ventral temporal and inferior frontal cortex, brain areas known to be involved in semantic processing. Hence, attentional top-down control modulates unconscious processing in semantic pathways for optimizing goal-related information processing.



## Your unconscious knows your name

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One's own name constitutes a unique part of conscious awareness, but does this also hold true for unconscious processing? In the present study, we ask whether the own name has the power to bias a person's actions unconsciously even in conditions that render any other name inefficient. Participants judged whether a letter string on the screen was a name or a non-word while this target stimulus was preceded by a masked prime stimulus. Crucially, the participant's own name was among these prime stimuli and facilitated reactions to following name targets whereas the name of another, yoked participant did not. These results extend traditional findings on "breakthrough" phenomena of personally relevant stimuli to the domain of unconscious processing. Thus, the brain seems to possess adroit mechanisms to identify and process personally relevant stimuli even in the absence of conscious awareness.

## Multiple-measure strategy classification in risky choice

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A myriad of strategies that people could use when making risky choices has been proposed. Therefore, one of the central questions is which of these strategies may actually be used by decision makers. In particular, it remains unclear which models adequately describe risky choices on the process level (rather than predicting choices only). To answer these questions, the multiple-measure maximum likelihood strategy classification method is extended from probabilistic inferences to risky choice. The main advantage of this method is that it includes additional dependent measures beyond choices. Thereby, it improves the efficiency of the classification process and allows differentiating between strategies with identical choice predictions. Through simulations, we generate items (gamble pairs) that maximally differentiate between sixteen different risky choice strategies based on choices and decision times as dependent variables. Subsequently, these gamble pairs are presented in an experiment and participants are classified based on their choices and reaction times. In addition, a retest is conducted to allow for reliability estimates of the classification. The results and implications of the model comparisons are discussed. They speak in favor of models assuming the weighted integration of outcome and probability information and against the predominant use of decision heuristics.

## Which information is used to make donation decisions? An eye-tracking analysis

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In donation requests different kinds of information (such as verbal descriptions, numerical facts and pictures) are used to illustrate the suffering of people in need. This research project examines what kind of information is especially important to donors while considering their numerical skills (i.e., numeracy) as a potential moderator. We designed 12 donation requests varying the donation domain (i.e., humanitarian aid, environment protection, animal protection) and the content of the pictures. Using recent eye-tracking technologies, we assessed the information search patterns of 91 participants that were asked to make real donation decisions for each of the donation requests. Results demonstrate that donation requests with more informative pictures receive higher donation amounts particularly in the domain of humanitarian aid and environmental protection. Additionally, longer fixation times on pictures increased donation amounts, but this effect depended on numeracy (i.e., less numerate individuals donated more the longer they look at the pictures, whereas high numerate individuals donated less). Implications for the conception of donation requests are discussed.

## Bilateral unipolar tDCS modulates bilateral cognitive processes differentially

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Transcranial direct current stimulation (tDCS) is an innovative method to explore the causal structure-function relationship of brain areas. We investigated the specificity of *bilateral unipolar* tDCS (e.g., cathodal on both hemispheres) applied to intraparietal cortices bilaterally for the first time using a combined between- and within-task. Regarding between-task specificity, we observed that bilateral unipolar tDCS affected a numerical (mental addition) but not a control task (colour word Stroop) indicating a specific influence of tDCS on numerical but not on domain general cognitive processes associated with the bilateral IPS. Moreover, with respect to within-task specificity we only found the numerical distractor distance effect in mental addition to be modulated by direct current stimulation, whereas the effect of target identity was not affected. This implies differential influences of bilateral unipolar tDCS on the recruitment of different components within the same task (number magnitude processing vs. recognition of familiarity). In sum, this first successful application of bilateral unipolar tDCS not only corroborates one specific proposition of the Triple Code Model (Dehaene et al. 2003) that number magnitude information is represented bilaterally in the intraparietal cortices but also provides first evidence for the potential of bilateral unipolar tDCS in the examination of neurocognitive processes.

## Dynamic adaptation to social environmental changes

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In a series of studies we investigated whether unexpected changes in the social environment leads to conflict and corresponding conflict adaptation processes. Participants performed a visual go/no-go task while a co-actor either executed the complementary part of the visual go/no-go task or a different auditory go/no-go task. Further, we varied the frequency of social conflict, as operationalized by an unexpected simultaneous response of both participants in the previous trial. Results showed that simultaneous responses lead to conflict when two co-actors share the same go/no-go task and also when sharing different go/no-go tasks. Furthermore, we found that conflict adaptation seems to depend on the frequency of social conflict. The present results suggest that two people sharing the same or different tasks actively monitor their co-actors actions, leading to an adaptation of their own behavior.

## List-method directed forgetting is selective in the 3-list and 2-list tasks

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When people are cued to forget previously studied irrelevant information and study new information instead, such cuing typically leads to forgetting of the precue information. But what do people forget if before the forget cue is provided, both irrelevant and relevant information have been encoded? We examined in a series of experiments whether subjects are able to selectively forget the irrelevant precue information, when relevant and irrelevant precue items were presented subsequently in two separate lists (3-list task), and when the two types of items were presented alternately within a single list (2-list task). The results suggest that people can, in fact, selectively forget irrelevant precue information, in both the 3-list and the 2-list tasks. Theoretically, these findings are in line with the retrieval-inhibition and selective-rehearsal accounts of list-method directed forgetting, but challenge the context-change account.

## **Duration perception of emotional faces depends on the perspective**

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It is well known that emotional and neutral events differ in regards of their perceived duration. For example, Gil & Droit-Volet (2011) showed that the perceived duration of emotional face stimuli depends strongly on the presented emotion. This effect is often explained by typical patterns of arousal induced by the stimulus. But, for faces, the arousal level might depend on whether a face looks at the observer. In order to explore this hypothesis, subjects rated the duration of neutral, sad and angry faces photographed from 0° (frontal), 45° and 90° perspectives (Pictures of Facial Affect – Ulm) in a classic bisection task. Our results replicate the prolonged temporal perception of angry compared to neutral faces. They further show that this effect declines from 0° to 90° perspective. This outcome is discussed in regards of arousal modulating stimulus parameters varying over perspective like social implication (e.g. fight or flight reactions) and detectability.

## **Der Einfluss farbigen Umgebungslichts auf das wahrgenommene Aroma von Wein**

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Aromawahrnehmung ist das Paradebeispiel für die multimodale Integration. Daher ist es nicht verwunderlich, dass der wahrgenommene Geschmack eines Getränks durch dessen Farbe beeinflusst wird. Frühere Studien aus unserem Labor zeigten, dass sogar die Farbe der Umgebung das wahrgenommene Aroma beeinflusst. Im vorliegenden Experiment verglichen wir die Wirkung von (a) der Veränderung der Umgebungsfarbe (während die Getränkefarbe unverändert blieb) mit (b) der kombinierten Auswirkung einer veränderten Umgebungsfarbe und Getränkefarbe. Zu diesem Zweck beurteilten die Teilnehmer das Aroma von Weißwein in schwarzen undurchsichtigen (a) oder transparenten Gläsern (b). In den schwarzen Gläsern änderte sich die Weinfarbe nicht durch die unterschiedliche Umgebungsfarbe, in den transparenten Gläsern schon. Im Rahmen von Paarvergleichen für jeden Glästyp (a) und (b) wurde der identische Wein unter verschiedenen Umgebungsfarben (rot, grün, blau oder weiß) verkostet. Skalenwerte für die verschiedenen sensorischen Eigenschaften (Gesamteindruck, Süße, Fruchtigkeit, Säure und Aromaintensität) wurden über das erweiterte Bradley-Terry-Luce-Modell mit der Berücksichtigung von Reihenfolgeeffekten geschätzt. Die Ergebnisse zeigten signifikante Effekte der Umgebungsfarbe auf das Aroma in beiden Glasbedingungen. Wider Erwarten waren die durch die Umgebungsfarbe induzierten Veränderungen im Aroma für die beiden Glästypen sehr ähnlich.

## **Allais-Paradox and Regret Theory in practical experiments with managers – (ir)rational behavior in the wild**

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Allais, M. (1952) showed in his laboratory experiments that the independence axiom as defined in the Expected Utility Theory (EUT) based on von Neumann, J.; Morgenstern, O. (1953) doesn't hold. He extracted the common ratio and the common consequence effect as two examples of irrational behaviour (Allais-Paradox). In the following years a broad variety of approaches had been developed to explain the people's behaviour differing from the EUT. Broadening the EUT the Regret Theory (RT) by Loomes, G.; Sugden, R. (1982) takes into account the interdependencies of options and their consequences in pair wise choices. During the last decades a lot of laboratory choice experiments has been carried out to test the independence axiom and alternative theories to the EUT. Most of the results verified the findings from Allais, M. (1952) and the RT. Besides there is an intensive discussion about the external validity of this experimental results. This article reports about an experiment based on practical decision situations and carried out within a group of specialised managers. The results show in contrast to the past laboratory experiments that there is no significant Allais-Paradox behavior. Moreover in the experiments the RT doesn't perform significantly better than the EUT.

## **A neuroeconomics perspective on the "Tragedy of Commons"**

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The world is facing a natural resource crisis because humans are overusing the resources of the planet. The authors investigated why people often exhaust unregulated common natural resources but successfully sustain similar private resources. Using functional magnetic resonance imaging they showed that sharp depletion of a common (shared) and a private resource deactivated the ventral striatum, a portion of the basal ganglia that is involved in the valuation of outcomes. Across individuals the observed inhibition of the ventral striatum negatively correlated with attempts to preserve the common resource, but the opposite pattern was observed when individuals dealt with their private resource. The results indicate that the basic neural value signals differentially modulate people's behavior in response to the depletion of common versus private resources. More generally, the results could explain why the notion of ownership has a dramatic impact on resource sustainability.

## Information valence impacts category-split effects

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Frequency estimation is one of the most basic tasks in everyday life. However, there are systematic factors that inflate subjective frequencies. One well-established frequency inflation is due to category-split (Fiedler & Armbruster, 1994; Kruger & Evans, 2004): When estimating the size of relevant stimulus categories, people provide higher estimates assessing subcategories compared to assessing categories as a whole, which is why the whole is less than the sum of its parts. The present research investigates the impact of information valence (positive rather vs. negative information) and the timing of the category split (presentation vs. estimation) on such split-effects. Based on similarity differences between positive and negative categories, category-split effects should be greater for negative information when splits are implemented at presentation, but the reverse should be true for category-splits at estimation. In four experiments, participants estimated the frequency of several categories of smiling or frowning faces, and positive and negative holiday options. Results show that category-split effects' magnitudes depend on stimulus valence, but also on the timing of the split.

## Interozeptive Sensitivität im Kindesalter – Ihr Vorliegen sowie Zusammenhänge mit kardialer autonomer Aktivität und emotionalem Erleben

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Die Wahrnehmung körpereigener Signale (Interozeption) spielt für viele Konzeptionen von emotionalem Erleben eine wichtige Rolle. So konnte gezeigt werden, dass bei Erwachsenen die Stärke ihrer Ausprägung sowohl Einfluss auf die Emotionsverarbeitung, die Intensität des emotionalen Erlebens, als auch auf die behaviorale Selbstregulation hat. Repräsentative Daten für Kinder- und Jugendliche zu diesem wichtigen Thema fehlen allerdings bisher, obwohl die interozeptive Sensitivität als bedeutsamer Risikofaktor für diverse Psychopathologien beschrieben wird. Präsentiert werden sollen Daten zur interozeptiven Sensitivität von 1600 Kindern zwischen 6 und 11 Jahren, die im Rahmen der PIER-Studie der Universität Potsdam in Brandenburg und Umgebung experimentell über die Herzwahrnehmungsfähigkeit (Wahrnehmen der Anzahl der eigenen Herzschläge über drei Zeitintervalle, wobei die tatsächliche objektive Herzfrequenz aufgezeichnet wird) erhoben wurden. Gezeigt werden soll zum einen Vorkommen und Verteilung der kindlichen Herzwahrnehmungsfähigkeit, sowie Zusammenhänge mit dem Geschlecht, dem BMI sowie sowohl emotionsspezifischen Fragebogen- (Selbst- und Fremdbbericht) als auch physiologischen (Herzratenvariabilität) Maßen. Daraus resultierende Implikationen beim Einsatz der interozeptiven Sensitivität im Kindesalter für zukünftige entwicklungspsychologische und klinische Fragestellungen sollen diskutiert werden.

## Gender differences in the neural correlates of stress reactions

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Little is known about gender differences in the neural correlates of stress reactions. Initial results indicate differentiated neural stress networks in women and men: Men show enhanced physiological stress reactions whereas women report enhanced subjective reactions [1, 2].

The current study aims at characterizing the effect of gender on psychosocial achievement stress reactions at the subjective, psychophysiological and neural level.

Healthy women and men conducted the “Montreal Imaging Stress Test” [3] where inter-individually comparable cognitive demands are employed in a stress situation. The neural BOLD-activity, psychophysiological data (cortisol, electrodermal-activity), and subjective stress reports were collected.

Preliminary results reveal gender differences that are specifically striking on the neural level: Women recruit attentional, cognitive and stress-related brain regions, namely cuneus, supramarginal gyrus and precuneus, more strongly than men during psychosocial achievement stress. This first study investigating gender effects in the neural correlates of stress reactions via an adaptive design highlight different responses to psychosocial stress situations in women and men. Data on gender specific stress reactions are especially essential on the clinical perspective for understanding stress related psychiatric disorders (e.g., schizophrenia, depression).

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[1] Wang et al (2007); [2] Kelly et al (2008); [3] Dedovic et al (2005).

## Trust, power, tax compliance: A worldwide evaluation of the slippery slope framework

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The slippery slope framework of tax compliance integrates different determinants of tax compliance and assigns them to two major dimensions. Accordingly, tax compliance depends on the factors trust in authorities and perceived power of authorities, but trust on the one hand fosters voluntary compliance, whereas power on the other hand leads to enforced compliance. The present study tested these main assumptions of the slippery slope framework by manipulating trust and power via different scenarios in more than 30 countries on five continents. As predicted, the highest levels of compliance were found in conditions where trust and power were high. In addition, participants in conditions of high trust indicated more voluntary compliance, just as participants in conditions of high power reported more enforced compliance. Furthermore, indices of perceptions of actual levels of trust and power for all countries were calculated and compared to data on shadow economy and corruption from other sources. Overall, the present results support the assumptions of the slippery slope framework and confirm the importance of trust and power as determinants of tax compliance.

## **Interhemispheric connections shape individual conscious experience of visual illusions**

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Recent research has demonstrated that people show a large degree of behavioral variability even in very basic sensory functions. We investigated two paradigms that have been extensively studied in consciousness research: (1) The ‘motion quartet’ produces alternating perceptions of horizontal and vertical motion without any changes in the physical characteristics of the display. (2) The ‘traveling wave’ of binocular rivalry uses competing presentations of separate stimuli to the two eyes, which also leads to spontaneous switches in conscious perception spreading in a wave-like manner across the visual field. Both paradigms show characteristic deviations when neural processing has to be integrated between brain hemispheres. In order to identify the anatomical source of the interindividual differences, we used diffusion tensor imaging and functional magnetic resonance imaging to localize different visual areas and their fiber connections between left and right hemispheres through the corpus callosum. Our results show that separate connections between early visual (traveling wave) and motion-related (motion quartet) areas predict the respective differences in conscious perception between individuals, revealing a high degree of specificity in the anatomical basis of subjective experience.

## **The effect of monetary reward on distractor interference in singleton distractor search**

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Stimulus-driven accounts of attention (e.g. Theeuwes, 2010) posit that the first phase of visual selection is entirely regulated by bottom-up processes. A paradigm often used to examine this theory is the additional singleton paradigm (Theeuwes, 1992). Several studies have shown that a salient color distractor that is completely irrelevant for the task still captures attention and slows reaction time. Yet there is also evidence that the amount of practice and incentive to suppress the distractor modulates distractor interference in this paradigm, supporting the view that attentional capture can be affected by top-down control (Müller, Geyer, Zehetleitner, & Krummenacher, 2009). This experimental study sought to further explore the latter hypothesis by investigating whether monetary reward can modulate distractor interference. Attentional capture was expected to decrease in high reward trials compared to low reward and neutral trials. Analysis revealed that reaction times were significantly faster in high reward trials than in low reward and neutral trials, but the color singleton did not impair reaction times. Additional studies were carried out to test whether the lack of attentional capture was due to heightened top-down control or due to characteristics of the material used.



## Training spatial ability in augmented reality: Evaluation of a three-dimensional spatial test including a strategy training

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In an interdisciplinary research project, a three-dimensional dynamic spatial ability test was developed that is presented in three-dimensional augmented reality. The test includes a macro-adaptive strategy training that allows for an individualized training based on the participant's pretest performance. To measure its effects, a pretest and two posttests, connected by link items, were constructed and evaluated using the Rasch model in three studies. In this presentation, we focus on Study 3, in which the final training was evaluated. A sample of 99 (67 males) students from a business and a technical school was participated. Rasch model-conformity was analyzed using quasi-exact tests both within and between test forms and time points. The training had a positive effect on participants with low and moderate pretest ability. In addition, it eliminated the pretest differences between the two school types. As in other studies using three-dimensional stimulus material, no gender differences were found.

## How fluency supports source memory for familiar names in younger and older adults: ERP and behavioral evidence

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It is a matter of current debate whether and how the access to source information may rely not only on recollection, but on familiarity-based processes as well. By means of behavioral measures and event-related potentials (ERPs), the present experiments examined potential influences of fluency on source memory for famous names. In Experiment 1, source judgments were more accurate for repeated visually learned versus non-repeated visually learned names while no such beneficial effect was apparent for repeated auditorily learned versus non-repeated auditorily learned names. Additionally, visually presented items at test elicited an N400-like ERP effect (300-600 ms), differentiating between visually and auditorily learned names, for correct source memory decisions only. We interpret this effect as indexing a decision-relevant fluency mechanism arising from within-modality priming of visually learned names. This idea was further supported in Experiment 2, in which the pattern of behavioral and ERP effects for older adults was found to be analogous to the one in younger adults, in line with the assumption of spared fluency processes in older adults. In sum, the experiments suggest that fluency assists person-related source memory via within-modality priming in both younger and older adults.

## The moderating role of attachment avoidance in adaptive automatic self-regulation processes during mate searching

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Previous research revealed that an avoidant attachment style interferes with adaptive regulation of automatic attention orienting during mate searching (Koranyi & Rothermund, 2012). Specifically, it has been shown that participants high in attachment avoidance fail to automatically focus on opposite-sex others who display signs of reciprocal romantic interest. The present experiment examined the influence of attachment avoidance on *automatic evaluations* of romantic reciprocators (experimental group) vs. non-reciprocators (control group). Participants in the experimental group imagined that an attractive person shows signs of reciprocal romantic interest, whereas participants in the control group were instructed to think of someone attractive without explicitly imagine reciprocal liking. Automatic evaluation of romantic (non-)reciprocators was assessed with an Affective Priming procedure. In line with the hypothesis, participants low in attachment avoidance automatically evaluated romantic reciprocators as more positive than non-reciprocators, whereas participants high in attachment avoidance showed the opposite effect. Results are discussed in terms of interindividual difference in adaptive automatic self-regulation processes during mate searching.

## Inattentional deafness in music: Who has it, who doesn't?

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By definition, inattentional deafness (ID) in music describes the inability to consciously perceive an unexpected musical stimulus, due to attending a certain facet of the piece. We here try to reveal if *expertise*, *field-dependence*, *concentration* and *conscientiousness* are moderating factors for ID with music.

Participants listened to a modification of the first 1'50" of Richard Strauss' *Thus Spake Zarathustra*, with the experimental group counting the number of tympani beats and the control group just listening. An accompanying e-guitar interlude (20") served as the unexpected stimulus. Participants were then asked if they had noticed the e-guitar. The impact of *expertise* was investigated by comparing musicians ( $n = 57$ ) with non-musicians ( $n = 58$ ). *Visual field-dependence* was assessed with the Embedded Figures Test, *concentration performance* with the d2, and *conscientiousness* with the NEO-FFI.

Results demonstrate an ID effect under dynamic musical conditions for non-musicians ( $p < .001$ ) as well as for musicians ( $p = .018$ ). While high field-dependence goes along with less ID ( $p = .04$ ), participants with ID tend to score higher on concentration ( $p = .104$ ) and conscientiousness ( $p = .052$ ).

## How culture influences social feedback processing of character traits

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Culture shapes decision-making in social interactions. East Asian cultures emphasize interdependent self-views more than Western cultures. Here, we tested how East Asians and Westerners incorporate self-relevant social feedback after a real-life interaction.

Participants got to know each other in groups of five by playing a board game and rated each other on 80 trait adjectives. Afterwards, participants first rated themselves and then saw how three others had supposedly rated them. To assess how participants updated their views, they rated themselves a second time. We obtained fMRI data from Chinese (n=28) and German (n=27) participants in Germany. To exclude that the behavior of the Chinese participants could be attributed to living within a foreign culture, we obtained behavioral data from Chinese (n=25) and German (n=24) participants living in China.

Chinese showed greater updating than Germans, which was unrelated to living in a foreign culture. Medial prefrontal cortex activity differed between Chinese and German participants when they received social feedback. Activity in parts of the mentalizing network was parametrically modulated by the absolute difference between own ratings and feedback. Our results show that culture modulates self-related neural activity and the extent to which people change their self-views when receiving feedback from peers.

## EEG correlates of stable and unstable object representations are similar across stimulus categories

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During the observation of an ambiguous figure, like the Necker cube, our perceptual system is instable and alternates spontaneously between two (or more) mutually exclusive representations. Tiny figural changes can disambiguate the ambiguous figure and thus stabilize one representation. We investigated whether and how ERPs (event related potentials) to ambiguous figures, leading to such instable percepts, differ from ERPs to unambiguous figure variants, evoking stable percepts.

Results: (1) Tiny figural changes, rendering an ambiguous figure unambiguous, cause a sizable positivity at about 400 ms after stimulus onset ("P400"), which is absent with the ambiguous figures. (2) The P400 amplitude increases monotonously with decreasing ambiguity of the stimulus. (3) This P400 effect was found across three widely different categories of ambiguous figures (geometric, semantic and motion ambiguity).

Our results suggest the existence of a neural evaluation instance which estimates the reliability of the perceptual outcome, given only incomplete and ambiguous visual input. This evaluation seems to operate at a very abstract processing level.

## **Influence of acute bouts of submaximal exercise on working memory – an fMRI study**

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Although beneficial effects of acute bouts of aerobic on working memory have not consistently been documented, the overwhelming majority of evidence suggests a positive influence of aerobic exercise on cognition. To elucidate underlying neuronal mechanism, we set out to investigate the influence of acute bouts of moderate physical exercise on working memory by means of fMRI in young adults.

Prior to the MR-scanning session 19 participants performed an exercise test to ascertain their individual maximal lactate steady state. Participants underwent two scanning sessions: one subsequent to the exercise intervention and the other after a rest condition. Functional images were acquired while participants worked on an n-back task covering different complexity levels. The results showed that participants worked faster on the 2-back condition but no differences were found in the easier conditions. Analysis of functional images revealed stronger activation in the 2-back task after the exercise condition. Fronto-parietal areas that are part of the working memory network exhibited strongest activation changes. These results suggest that moderate bouts of exercise have beneficial effects on working memory but they are complexity-dependent.

## **Effects of student nationality on teachers' judgments of writing performance**

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In Luxembourg, children who speak Romance languages at home (most notably Portuguese) generally show lower academic performance and have higher chances of attending lower school tracks. While these differences may be partly due to language difficulties or other actual performance disparities, social judgment theory suggests that negative immigrant stereotypes may also bias teacher evaluations and independently contribute to this inequality. The current experiment explored whether Luxembourgish teachers are influenced by nationality in their evaluation of written texts. 56 Luxembourgish teachers graded spelling, grammar, and expression for one of two short German essays ostensibly written by a Luxembourgish or Portuguese child. A 2 (essay) x 2 (nationality) MANOVA showed a main effect of essay,  $F(3,50)=5.83$ ,  $p=.002$ , no main effect of nationality,  $F(3,50)=2.16$ ,  $p=.11$ , and a marginally significant interaction between essay and nationality,  $F(3,50)=2.36$ ,  $p=.08$ . Simple effects tests revealed that the Portuguese child's spelling was scored higher than the Luxembourgish child's when overall essay quality was poorer. While the small scope of the study limits its generalizability, these results do raise the question of how performance expectations may moderate judgment biases and of the importance of stimulus choice in research exploring text evaluation.

## **An attentional drift-diffusion model of value-based decision making**

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Most organisms facing a choice between multiple options look repeatedly at them, presumably implementing a comparison process between the items' values. Little is known about the nature of the comparison process in value-based decision-making or about the role of visual fixations in this process. Here we show that a computational model of value-based binary choice in which fixations influence the comparison process, provides an accurate explanation of complex relationships between fixation patterns, reaction times and choices in several eye-tracking experiments.

## **Phonetische Messung von Alkoholisiertheit unter akustischen Fahrzeuginnenraumbedingungen**

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Die vorliegende Studie beschreibt einen Messansatz zur Detektion von Alkoholisiertheit anhand von Stimmmerkmalen. Die Vorteile dieser automatischen Echtzeit-Analyse liegen in ihrer Objektivität und der einfachen Datengewinnung. Zudem werden wiederholte Messungen über lange Zeiträume ermöglicht. Alkoholkonsum beeinflusst verschiedene Stufen der Sprachproduktion (z.B. kognitive Sprachplanung, Atmung, Phonation und Artikulation), sodass die Stimme unter Alkoholeinfluss zunehmend undeutlich wird.

Um Stimmkorrelate von Alkoholisiertheit in einem realen Setting zu identifizieren, wurde ein Sprachkorporus mit insgesamt 162 Sprechern (84 männlich, 78 weiblich) zwischen 21-75 Jahren (gemittelt 31 Jahre) aufgebaut. 20 Minuten nach dem Alkoholkonsum wurde die Blutalkoholkonzentration sowohl durch Atemluft als auch Blutprobe gemessen. Verschiedene Arten stimmphonetischer Merkmale, die in anderen Kontexten häufig Verwendung finden, wurden extrahiert. Hierzu zählen Frequenz- und Lautstärkeanalysen sowie artikulations- und stimmqualitäts-spezifische Merkmale.

Mehrere der berechneten Merkmale zeigten signifikante Korrelationen mit den Blutalkoholwerten. Sprachbasierte Alkoholmessungen könnten somit zukünftig eine einfache Möglichkeit zur ambulanten Kontrolle darstellen.

## **Expertise and age in complex movement timing**

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Young (mid-twenties) and older (late 50s and early 60s) professional musicians and age-matched novices (20 participants per group) performed simple and rhythmic timing tasks while lying in a 3-Tesla fMRI scanner. In line with the model developed by Krampe, Mayr, & Kliegl (JEP:HPP 2005) we found different Weber slopes for tasks requiring low-level timing, rhythm programming (Vorberg & Wing, 1996) and task set control. At the neural level this behavioral dissociation corresponded to the increased activation of fronto-parietal (rhythm programming) and prefrontal regions in novices. Older adults showed lower timing accuracy in complex rhythms, presumably due to age-related declines in frontal brain regions. Older expert musicians were spared from this decline due to their reliance on primary and secondary motor regions, which was similar to young experts. Our data demonstrate the decoupling of expert-specific mechanisms from age-sensitive domain general functions at a neural level.

## **Contribution of ease of imagery and imagery ability to confusion of source memory**

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The Source Monitoring Framework SMF can be described as an integrative collection of assumptions on the brain's ability to identify sources of mental experiences (Lindsay, 2008). Only a few studies have yet tested concrete hypotheses, and made specific predictions regarding the memory features enabling source monitoring. Finke, Johnson and Shyi (1988) conducted one of the few studies which may be cited to prove the influence of specific memory features. The core assumption of the SMF that easy imagery can lead to source confusion is based on this study. The researchers varied vertical and horizontal orientation of stimuli, but did not control for ease of imagery or for individual imagery ability. Furthermore, their design cannot foreclose that the observed effect is due to the encoding process during the recognition task instead of the imagery process during encoding. In a first experiment, we tried to replicate the experiments of Finke et al. (1988). However, this time we controlled for ease of imagery of stimuli, individual imagery ability, imagery instructions and recognition conditions. Contrary to Finke et al., no significant effect of symmetrical orientation was found. Furthermore, only without imagery instructions, ease of imagery and imagery ability are correlated with source monitoring.

## The influence of location on preference for artworks

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The spatial location of an item influences its evaluation, with an item occupying a central location being preferred and having a higher value (Valenzuela & Raghurir, 2009). The current study investigated whether this centre-stage effect applies to the aesthetic appreciation of artworks. Participants were presented with three artworks in a row (left, centre, and right location) and their eye movements were recorded as they selected their preferred artwork. On each trial the artworks depicted slightly different images, or were identical images. In the latter case items could be of positive or negative emotional valence as predetermined in an earlier rating study. It was found that triplets of identical artworks showed a higher proportion of central choices, indicating a centre stage effect for these items'. Eye-tracking data showed that the first fixation was more frequently directed to the artwork in the centre, and the central artwork was fixated more often in all conditions. Moreover, when the artworks were different the last fixation was more frequently directed to the preferred item. The results have implications for our understanding of factors influencing art appreciation. They also suggest that location effects for preferences depend significantly on eye movements indicating modulations of attention.

## Conceptualizing construal level in terms of category width

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We propose category width as a basic construct to conceptualize and measure construal level. Across three experiments we investigated the influence of psychological distance and construal level on category width, defined as the difference between separate estimates of the upper and lower boundary of a stimulus attribute. In each experiment, participants were presented with a series of visual stimuli (bridges, foods, consumer products) and asked to provide interval estimates, that is a minimal and a maximal estimate, of a quantitative attribute (length, quantity, price). Increasing the spatial distance of the target (France vs. USA), using more abstract labels to denote the target (fruit vs. blueberry) and generating categories in contrast to exemplars in an unrelated mindset manipulation task increases the category width used to represent the target stimulus. We conclude that high-level stimulus representations cover a wider range of attribute values than low-level representations. The discussion focuses on both category width as an explanatory source as well as a measure for construal level.

## **Analyses of experimental designs on fundamental research of psychological assessment – better you use sequential testing**

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As in particular fundamental research of psychological assessment is very cost-intensive due to the fact that mainly individual testing (1 administrator and 1 testee) is needed, which lasts up to 2 hours for each testee, statistical sequential testing of a given hypothesis is to prefer. That is, testees (subjects) are randomly allocated to several groups (e.g. control and treatment group) according to an experimental design one after the other and starting with 2 subjects in each group the aimed-for statistical test is applied in order to analyze the data. With regard to an a-priori defined type-I-, type-II-risk and with regard to an a-priori defined (relevant) effect size the result decides whether either the null-hypothesis or the alternative hypothesis is to reject, or both of them can not be rejected, yet, but further data have to be sampled for repeated analyses. In this paper an overview will be given of respective statistical approaches and of their efficiency with regard to saving subjects; finally suggestions are given how to deal with these approaches in the case of multi-variate data.

## **Imagined intergroup contact leads to intergroup contact-seeking behavior**

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Imagined intergroup contact is defined as the mental simulation of a positive interaction with an out-group member. This new indirect contact strategy leads to decreased intergroup bias and, importantly, to enhanced intentions for future out-group contact. Extending previous research, we tested for the first time whether people actually seek more contact with out-group members after positive imagined contact. In our experiment, 60 participants imagined either a positive interaction with a Turkish out-group member or an interaction with an in-group member or a control scenario without any social interaction. Following the imagination task, participants played several rounds of a virtual ball-toss game with two further virtual players. They were then told that for further rounds of the game they were supposed to choose their teammates. Participants were presented with a list of potential teammates (all were represented by a picture and a name) that included German players, Turkish players and players of other nationalities. As predicted, after imagined out-group contact, participants chose significantly more Turkish teammates compared to both control groups. This result demonstrates that imagined contact leads to actual intergroup contact-seeking behavior, suggesting that imagined contact has the potential to increase the frequency of direct intergroup contact.



## **An unknown fundamental asymmetry between approach and withdrawal: The unequal ease of doing the same again**

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One of the oldest notions in motivational psychology is that there are two basic types of behavior that organisms can exhibit when encountering an environmental stimulus: The organism can either approach the stimulus or withdraw from it. The present study demonstrates that there is a fundamental asymmetry between approach and withdrawal in terms of how current behavior is shaped by previous behavior. Across three experiments, repeating the same motivational response facilitated responding only in case of approach responses but not in case of withdrawal responses. This difference in repetition facilitation was observed regardless of whether stimuli were familiar (Experiment 1) or unfamiliar (Experiment 2), and whether responses were compatible or incompatible to preexisting motivational tendencies associated with the stimuli (Experiment 3). The asymmetrical repetition effects were unrelated to stimulus-specific or manual response-specific repetition effects, and were not attributable to differential stimulus-response learning. The existence of an asymmetry in repetition facilitation between approach and withdrawal may be a serious confound in many previous studies examining approach-withdrawal processes. From an evolutionary point of view, a weaker inclination towards repeating previous behavior in case of withdrawal may be adaptive because this allows more flexibility when switching from flight to fight behavior.

## **Remembering daisies and daffodils: Influences of list presentation format and working memory capacity on older adults' use of semantic clustering**

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Even though memory generally declines with increasing adult age, older adults' memory performance remains malleable and can be improved through effective encoding strategies. Prior research has demonstrated great variability in older adults' use of encoding strategies on memory tasks. It has also been shown that older adults' ability to use certain encoding strategies is limited due to the demands these strategies pose on general cognitive abilities like working memory capacity. The present study examined younger (18 – 30 years) and older (60 – 84 years) adults' use of semantic clustering when the study list was either presented word by word or as a whole list, keeping study duration constant. For older adults, the whole-list presentation format resulted in higher clustering and word recall compared to the individual-words format, even under dual-task demands. Further, older adults' clustering was positively correlated with working memory capacity in both presentation format conditions. Age and presentation format effects are further examined by considering the interference of semantic clustering with performance on a secondary task as well as metacognitive beliefs. Thereby, the findings give insights into ways to improve older adults' memory performance by facilitating use of encoding strategies.

## Can change blindness be reduced by learning?

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The experimental paradigm of change blindness refers to the relative inability to detect changes between visual scenes which are masked by a global transient. It is attempted to reduce this quite stable effect by providing the possibility to learn the position of the next change through the category/context of the visual scene. The combination of change blindness and a classical implicit serial learning paradigm resulted in reduced change blindness and faster detection in learning and test blocks as compared to random blocks. Therefore learning clearly has a beneficial influence on this perceptual phenomenon.

## Long-term influencing factors on the choice of driving speed: The example of action and state orientation

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Recent theoretical approaches of modelling speed behaviour assume that the choice of speed is determined by environmental characteristics and drivers' capabilities (e.g. TCI, Fuller, 2005; CSB Brandenburg & Thüring, 2012). Following Wegmann and Aarts (2006) drivers' characteristics can be split into short-term (i.e. stress, distraction) and long-term (i.e. attitudes, personality) influences. Moreover Brandenburg and Thüring (2012) assume that the influence of long-term factors on choice of speed is mediated by the presence or absence of short-term factors. Whereas previous investigations of Brandenburg & Thürings (2012) assumptions mainly focused on the impact of environmental characteristics on choice of speed (e.g. Lauckner & Brandenburg, 2012), no studies aimed to explore the proposed mediator effect on side of the driver characteristics. To test whether the influence of long-term influences is mediated by short-term factors, a driving simulator experiment with  $N = 34$  subjects was set up. Results show, that short-term influencing factors like distraction mediate the relationship between long-term influencing (e.g. action and state orientation, age) and choice of speed. These empirical findings are in line with theoretical assumptions of Brandenburg & Thüring (2012) as well as Wegmann and Aarts (2006).

## Learning to read hooks up visual analytical skills with grapheme-phoneme-mapping: Evidence from illiterates

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Learning to read puts evolutionary established language and visual object recognition functions to novel use. This leads to rearrangements and differentiations in these functions, for instance, the habitual preference for holistic perceptual organization in visual object recognition and its suppression in perceiving letters (as we showed in earlier studies, Lachmann and van Leeuwen, 2004). In the present study, we performed the experiment in which the differentiation between holistic non-letter processing and analytic letter processing in literates was originally shown (van Leeuwen & Lachmann, 2004) with illiterate adults. The original differentiation is absent in illiterates. They uniformly showed analytic perception for both letters and non-letters. This result implies that analytic visual perception is not a secondary development resulting from learning to read but, rather, a primary mode of perceptual organization on a par with holistic perception.

## To be(at) or not to be(at): Do reaction times reflect rhythmic entrainment?

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According to Dynamic Attending Theory (DAT), human observers entrain their attention to temporal regularities in the environment (for a review see Jones, 2010). Although many empirical findings are generally in line with this assumption, only few studies addressed DAT's predictions regarding a specific processing benefit for stimuli conforming to sequence regularity compared to earlier or later stimuli. In a recent study, I found that reaction times were shorter in a rhythmic than a random condition –irrespective of the exact timing of the stimulus relative to the sequence (Lange, 2010). In my talk, I will present two approaches to test different explanations for this pattern. The first bore on the notion of individual differences in beat sensitivity, whereas the second tested the idea that any effect of attentional entrainment in earlier work might have been blurred by the increase in response speed with increased foreperiod duration (variable-foreperiod effect). Although both studies found faster responding in rhythmic versus random conditions, neither showed any evidence that the time course of attention as predicted by DAT was mirrored in reaction times. Thus, rhythmic stimulation seems to have a rather unspecific effect on reaction times, hence questioning the applicability of DAT to reaction time data.

## **Bilingualism and verbal working memory – Evidence from n-back and cued recall tasks**

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Bilingualism can have positive effects on cognitive processes (Bialystok, 2010). Bilinguals showed enhanced performance on measures of executive function, but smaller vocabulary in each of their languages as they maintain two lexica. The study investigated whether this advantage would extend to word recall. 21 monolingual English speakers and 24 English speakers with at least one other fluent language were tested with the n-back task and a word memory recall task consisting of three word lists. Words were paired with a rhymed distracter. Each word list was shown twice to balance left vs. right sided presentation. A pair of eyes was inserted as valid or invalid cue, which thereafter looked towards the target word. A 3 (memory lists) by 2 (repetition) by 2 (cue type) by 2 (language group) showed that cue validity was not significant. All participants were better in the recall of the repeated word list. Word memory deteriorated during the experiment due to proactive interference, but significantly less so for bilinguals – but there were no differences in the N-back task between the two groups. This showed that while vocabulary may be smaller for a single language, word learning abilities were superior in bilinguals.

## **The role of spatial frequencies for attentional bias effects of facial expressions**

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Facial expressions are salient social cues conveying information about the internal state of the expresser and providing social feedback in communication. Importantly, different facial expressions (e.g., happiness or anger) seem to exhibit different information profiles, i.e. salient visual cues being most characteristic for different expressions seem to be coded in different spatial frequency (SF) bands.

Like other affective stimuli, facial expressions have often been shown to bias processes of attentional orienting and information selection. Given the differences in SF-profiles, we were interested in whether specific discriminative SF-bands mediate the occurrence of attentional biases for emotional faces. For this, we used several well-established attention paradigms (e.g., flanker task and dot-probe), assessing whether specific emotional facial expressions bias attentional capture and/or attentional disengagement only when expression-specific crucial SF-information is presented. Here, we report first results.

## **“Hey robot, where are you heading?” An online study to explore the expectations towards the motion behavior of a transport robot in a social environment**

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Service robots not only face technical challenges but also need to exhibit appropriate non-verbal social behavior for manifold reasons. Predictable robot motion behavior helps to facilitate interactions, to avoid annoying or even scaring people and contributes to a socially accepted robot companion. A wide range of research within the scope of HRI deals with the physical appearance of robots, however, the non-verbal social behavior has rarely been addressed. In particular, the relationship between a machine-like robot (without overtly human-like features) and its rather human- or nonhuman-like motion behavior has not yet been a subject of investigation.

An initial online survey with a machine-like robot aims to gain first insights into the attributed robot’s capabilities, of people’s expectations of the robot’s motion behavior as well as its social acceptance. Therefore, three transport robots with different physical appearances (ranging from machine-like to human-like) and various video clips of the moving machine-like robot were presented. The video clips foreshadowed potential conflict situations between robots and humans encountering each other in diverse settings. Subsequently, subjects were asked to indicate their preferred solution for the following robot motion behavior. Attained results and ensuing research objectives for follow-up studies will be presented at the conference.

## **Auditory task switching: Exploring intentional control of auditory selective attention**

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An important aspect of cognitive control is the ability to shift the focus of attention. Attention shifting can be examined with task-switching procedures. In task switching, participants usually switch among several tasks using visual stimuli. In our research, we combined task switching with dichotic listening and examined the ability to shift intentionally among auditory tasks. Specifically, participants performed a numerical size categorization on spoken number words. The selection criterion could either be speaker sex (female vs. male) or ear (left vs. right) and was indicated by a cue prior to auditory stimulus onset. In Experiment 1, the selection criterion was blocked (1<sup>st</sup> vs. 2<sup>nd</sup> half of the experiment). In Experiment 2, the cue-stimulus interval (CSI) was additionally varied and was either short or long (block-wise). In Experiment 3, the CSI was constant and the selection criterion varied randomly trial-by-trial. We found clear performance costs with instructed attention switches. These auditory attention switch costs decreased with long CSI. The preparation benefit was larger for ear than for gender. These data suggest that the ability to intentionally shift auditory attention is faster for ear than for gender.

## **I would like to apply a diffusion model to my experimental data – but do I have enough trials?**

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The diffusion model (Ratcliff, 1978) is a mathematical model of reaction time and accuracy which allows separating different cognitive components from the performance in binary classification tasks (e.g., rate of information uptake, response criteria). While for diffusion model analyses often large numbers of trials ( $n > 1000$ ) are recommended the question of how many trials are essential for accurate parameter estimation hasn't been addressed systematically. In a series of simulation studies the performance of three different parameter estimation procedures (chi-square, maximum-likelihood, and Kolmogorov-Smirnov) was compared in terms of efficiency of parameter recovery. In different studies, the number of trials, the number of free model parameters, and the values of model parameters were varied systematically. As expected, with an increasing number of trials and a decreasing number of free parameters the estimation procedures supplied more precise estimates. Interestingly, under certain conditions an accurate estimation of parameters is possible from small datasets ( $n < 60$ ). This finding demonstrates that the application of the diffusion model is also possible for experimental paradigms with a restricted number of trials.

## **Robust predictions of driver intent using gaze data: Investigating how much data is needed**

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Gaze behaviour is known to be an indicator of information gathering. Distinct driver-gaze-patterns prior to execution of certain driving manoeuvres have been identified and were used to build a neural network model which predicted drivers' intended manoeuvres without need of any car data. The work presented here seeks to move closer towards the goal of using gaze data in Advanced Driver Assistance Systems (ADAS) so that the intentions of the driver can be inferred from what is implied by the available data. Drivers' gaze behaviour was measured prior to and during the execution of different driving manoeuvres performed in a dynamic driving simulator. The effects upon prediction of the amount of gaze data used at increasing pre-manoevrue times were investigated. Multiple 10 second sections of driver gaze data prior to manoeuvre commencement were available. Windows of this gaze data, ranging in size from 0.5 seconds to 10 seconds, formed the input vectors used to train and test neural network models. The pre-manoevrue times investigated ranged from 0 seconds to (10 – window) seconds. The relative difficulty of predicting different manoeuvres and the accuracy of the models using different sized windows of gaze data at different pre-manoevrue times are discussed.

## **Individual differences of conflict-monitoring: When cognitive demand is more important than aversive feedback**

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The extended conflict-monitoring theory postulates that conflict information is aversive because of anticipated cognitive demand. The N2 amplitude is an indicator of conflict-monitoring intensity. Despite some evidence showing a modulation of the N2 by means of aversive feedback, evidence of N2 variations by means of cognitive demand is rare. By manipulating cognitive demand and the intensity of aversive feedback we aimed at comparing: (1) a cognitive demand model predicting a more intense conflict-monitoring for enhanced cognitive demand, (2) a reinforcement model suggesting that more intense aversive feedback intensifies conflict-monitoring, and (3) a cognitive demand x reinforcement model predicting the most intense conflict-monitoring for high cognitive demand combined with high aversive feedback. Ninety participants performed a go/nogo task. Results were most compatible with the demand model with a more negative frontal nogo-N2 occurring in the high vs. the low demand condition. Individuals with a higher sensitivity to conflict information and aversiveness (Trait-BIS) showed a more negative nogo-N2 in a condition with intense aversive feedback. High cognitive demand served as a more aversive signal than aversive feedback, but for conflict-monitoring in higher Trait-BIS the intensity of aversive feedback matters.

## **Hands up: Why hand location matters for joint action**

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Previous research has shown that one's own hand position affects spatial attention in a covert orienting of attention paradigm. The present study examined if hand position affects spatial attention in a social Simon task. A Simon task was distributed across two individuals, each person was taking care of only one of two responses with varying hand positions. An Individual go/nogo and a standard (two-choice) Simon task were also used as control tasks. The size of the Simon effect was modulated by hand position in the social Simon task, but not in the Individual go/nogo nor in the standard Simon task. A second experiment tested if the modulatory effect of hand position on the social Simon effect is related to one's own or the other person's hand position. In the discussion, I try to explain how two different spatial attention mechanisms (prioritization of space and/or attention shifting) may specifically modulate joint action.

## Modeling interference in visual-working memory

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In visual-working memory, researchers debate the nature of working memory capacity. Some researchers suggest discrete capacity limits, whereas others proposed that the capacity of working memory is limited by a continuous resource. We propose another explanation: The capacity limit of working memory arises from the interference between items. We developed a mathematical model, the Generic Memory Model (GMM), to implement this theory. In GMM, decisions about which response option to choose in a recall experiment are based on the relative evidence generated internally for each response option. There are three sources of evidence from memory: (1) Activation from recently experienced items regardless of their context, (2) context-dependent activation of items arising at retrieval in response to activating a context cue (e.g., a location) bound to that item, and (3) baseline activation for all response options. We replicated an experiment testing recall of visual stimuli, the color wheel experiment (Zhang & Luck, 2008). We fit GMM alongside the slot-averaging model (Zhang & Luck, 2008), a resource model, and the three-component mixture model (Bays et al., 2009) to the data. The Bayesian Information Criterion shows that GMM model is the best account of the data. (198 words)

### Source and destination memory: Two sides of the same coin?

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Whereas in a conversation *source memory* involves remembering from whom you have heard something, *destination memory* involves remembering to whom you have said something. Despite its practical relevance, destination memory has been studied little compared to its counterpart, source memory. Two initial reports suggested that destination memory generally should be poorer than source memory, and that older people should show particularly poor destination memory. To test these predictions, we developed an ecologically valid paradigm to investigate source and destination memory within participants. Young and older adults were asked to listen to sentences read by two examiners (source condition) as well as to read sentences to two examiners (destination condition). Afterwards, they underwent a forced-choice memory test for the two sources/ destinations which was expected for half of the participants, but unexpected for the other half. We found that a) destination memory was only worse than source memory if encoding was incidental, but not if encoding was intentional, and that b) older and young adults performed similarly under both, incidental and intentional encoding-conditions. Also, source and destination memory were significantly inter-correlated. Together, these results contradict the initial findings and support the view that source and destination memory rely on similar processes.



## **(Never) mind the music: All brains automatically form melodic pitch expectations**

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Forming expectations is inherent to musical listening, and emotional and aesthetic responses to music depend on the fulfilment/violation of such expectations. Here I present the results of 3 separate EEG experiments (total  $N=122$ ) on melodic pitch expectations elicited by ecologically valid musical stimuli, whose note-by-note expectedness are estimated by our computational model based on statistical learning (Pearce & Wiggins, 2012). All 3 experiments showed a robust negative deflection of the ERP for unexpected notes, as compared to expected notes, over frontal electrodes during an early (100-150 ms) time window confirming other studies (e.g., Koelsch & Jentschke, 2010). Experiment 1 showed that this frontal negativity was not modulated by attentional demand and/or a dual task. Experiment 2 showed that this frontal negativity was not modulated by musical training. Experiment 3 showed that notes could be classified above chance as either expected or unexpected based on single-trial EEG. Altogether these results showed that early brain responses to melodic pitch expectations are predominantly automatic, and do not require active engagement with or training in music.

## **Representing fractions on the mental number line? A study with Chinese college students**

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Whole numbers are assumed to be represented along a mental number line, on which the distance between two numbers determines how easily they can be discriminated (distance effect), and smaller numbers are located to the left whereas larger numbers to the right (Spatial-Numerical Association of Response Codes, SNARC). The magnitude system is assumed to be able to represent both integers and rational numbers. If the assumption stands, distance effect and SNARC would be observed with fractions. In Experiment 1, 32 university students were instructed to compare two fractions randomly selected from  $1/2$ ,  $1/3$ ,  $2/3$ ,  $1/4$ ,  $3/4$ ,  $1/5$ ,  $2/5$ ,  $3/5$  and  $4/5$ . Four blocks (72 trials each) were administered on a computer with all combinations of these conditions, response hand (left/right) and task requirement (choosing the bigger/smaller fraction). The procedures in Experiment 2 were similar except that the fractions were written out in Chinese characters. Results showed that overall distance (the distance between the values of two fractions) predicted response speed and accuracy. No SNARC effect was observed. The results were consistent between two Experiments.

## **TVA as the foundation of an integrative model of visual working memory**

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Visual Working Memory (VWM) is one of the most crucial structures of our cognitive system. Most recent models of VWM propose a modular structure of several subsystems that differ with respect to persistence and abstraction of preserved information [1]. This approach highlights the differences between the subsystems like sensory memory and VWM, without specifying the transitions from one system to the other. Therefore we propose an integrative approach to VWM accounting for the close connection of visual attention, sensory memory, VWM, LTM, as well as perceptual learning processes. We assume that these processes share the same neural basis. TVA and especially its neural formulation NTVA [2] provides a formal framework for such an integrative model. We will present results from behavioral experiments as well as predictions obtained with our models. NTVA provides a bridge between cognitive psychology and neuroscience.

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## **Emotional and motivational effects of the “baby schema”**

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The baby schema, i.e. infant-like facial features or body proportions, is considered to elicit positive emotional responses and protective/caretaking tendencies. However, experimental evidence is altogether scarce and mostly restricted to schematic drawings.

In the present study, photographs of child faces (16 infants, 16 school children) were morphed to show either more or less baby-like characteristics (high vs. low baby schema). Participants (32 male, 32 female students) were presented either faces of infants or of school children; high vs. low baby schema faces were presented in blocks within the groups. Viewing time, electrodermal responses, and ratings of the emotional and motivational impact were taken for each stimulus. Additional measures of emotional and motivational state before and after each stimulus block served to elucidate stimulus-outlasting effects.

As expected, high baby schema faces were viewed longer, led to higher electrodermal responses, were rated as more positive and to induce more protective/caretaking tendencies, especially in females. Interestingly, we found a higher positive mood after viewing the high baby schema faces as well as an increased sexual interest in women, and a reduced aggression in males.

Especially the latter results, although in accordance with assumptions in the literature, need further experimental clarification.

## **Sexual orientation affects the perception of human body odors**

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Sexual orientation affects both preferences for human body odors as well as processing of its compounds.

We show that the olfactory sensitivity to the male body odour compound androstenone is affected by male sexual orientation. Further, effects of sexual orientation on the central nervous processing of complex human body odors are reported. By means of cotton pads, axillary odours were collected from 49 homosexual and heterosexual men and women and presented to 28 (14 lesbian) women as well as 28 (14 gay) men via a constant-flow olfactometer. The EEG was recorded from 61 scalp positions and chemosensory event-related potentials as well as current source densities were analyzed.

Regarding early stimulus encoding, a processing advantage for body odors obtained from potential partners is evident (P2-latency). Concerning later stimulus evaluation (P3-amplitude), the processing of body odors of individuals not constituting potential partners is enhanced in both gay men and lesbian women. The neuronal sources correspond to medial frontal and parietal neocortical areas. These results emphasize that body odors may function as significant social signals within the context of human mate choice, even in regards to gender and sexual orientation. Effects of such body odors on basic social behaviors will be discussed.

## **Distracter induced confidence shifts in recognition memory**

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A number of studies revealed participants' capability to adjust confidence judgments in response to the difficulty of the recognition memory task, which accords with assumptions of the signal detection theory (SDT). In previous studies, criterion shifts were induced by varying the memory strength of the studied items (Hirshman, 1995). However, according to SDT an adjustment of criteria should also be caused by varying the distracter set: In case of distracter and target items being less discriminable, confidence criteria should become more lenient (shifting to the left). The present study investigated under which conditions criterion shifts can be induced by varying the distracter set. The stimulus set consisted of faces in different orientations (left vs. right). The testing phase comprised two blocks with different distracter sets. In one block, distracter items consisted of new faces. Thus, the discriminability between old and new faces was high resulting in more stringent confidence criteria. In the second block, distracter items consisted of old faces in a different orientation. By consequence, the discrimination was considerably more difficult, and, as result, participants' confidence criteria should be less stringent. Despite the fact that participants received no instruction about different distracter sets decision criteria changed as predicted.

## **Social projection: Approaching others by increasing self-other similarity**

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This research tests whether social projection should be conceptualized as a motivated process that reflects an approach movement on the social dimension of psychological distance. Given that people would want to approach positive targets but avoid negative targets, it is hypothesized that positive but not negative targets elicit social projection. Four experiments in which target valence was manipulated by means of evaluative conditioning and emotional expression of the target face support this hypothesis. Furthermore, earlier research has shown that we tend to approach others when we feel threatened. Therefore, it is hypothesized that threat elicits social projection. Preliminary evidence for this hypothesis comes from two experiments in which the so called cyberball game was used to operationalize threat. It will be discussed in how far a motivational perspective complements the cognitive perspective that has dominated social projection research so far.

## **How could warnings for drivers benefit from crossmodal speech priming?**

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We repeatedly found crossmodal priming benefits with (time-compressed) auditory word primes and visual targets in Stroop-like experiments. Hence, we aim to transfer these findings to traffic scenarios in order to explore benefits from auditory warnings. Therefore, we modified the experimental setup by introducing a continuous driving task with visual stimuli presented on gantry road signs. In each trial one out of four predefined targets (traffic light, tractor, ambulance, children) was presented among three filler symbols. Symbols were either red or green; the task was to detect which target was presented and to indicate its color via button-press. We explored how response time was influenced by two-syllable spoken word primes (congruent, incongruent, neutral to targets) presented via headphones 100 ms prior to target onset. In the first block, primes were non-informative with respect to the target, whereas in the second block, they predicted the target in 80 % of trials. For both blocks, we found a significant congruency effect. Congruent primes improved target classification in comparison with all other conditions. Moreover, for primes in the second block, incongruent primes relatively increased response times. Our findings confirm that even while driving, congruent speech primes can crossmodally increase visual detection/classification of relevant objects.

## Effects of motor congruency on empathy and prosocial behavior

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It is established that being imitated increases positive affect and prosocial behavior towards the imitator. What remains to be clarified is the nature of the mechanism behind this link: can the effects be explained by automatic motor resonance processes that facilitate other-related processing, by experiences of increased effectance, or is a “conceptual” notion of similarity sufficient for the effects to occur? And to what extent are effects on prosocial behavior mediated by empathy? This talk will outline a series of experiments designed to assess the contributions of these factors. In particular, we will discuss findings of a study isolating the effects of bodily congruency of the imitator’s movements on empathy and prosocial behavior towards him. In this study participants performed spontaneous joystick movements and watched movement videos of two other individuals with whom they were in a simulated live interaction. We manipulated the congruency between the participant’s and the actors’ movements. Next, we assessed behavioral and physiological measures of empathy in our participants while they watched their alleged co-players undergoing a pain stimulation procedure. Prosocial behavior towards each of the two actors was assessed by measuring participants’ willingness to take over pain stimulation from them, and by a socio-economic game.

## Bridging the gap between continuous and discrete measurement models of recognition memory

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Two measurement models compete for disentangling the cognitive processes involved in item recognition: the *signal detection model* (SDM) and the *two high-threshold model* (2HTM). Their main disagreement concerns the conceptualization of evidence strength as a continuous vs. discrete variable in memory. The SDM assumes that evidence strength varies according to Gaussian distributions along a single internal evidence continuum. In contrast, the 2HTM postulates discrete memory states—equivalent to a SDM with rectangular distributions. Assuming evidence strength to be unidimensional, we propose that empirical evidence distributions deviate more or less from Gaussian distributions (SDM) into the direction of rectangular distributions (2HTM). To test this hypothesis, we (a) investigated model fit of the SDM and the 2HTM to binary and confidence-rating ROC data and (b) explored the shape of the evidence distributions on aggregated and individual level. Our results explain the similar conclusions drawn from measures in the competing models and the highly correlated goodness-of-fit of both models to empirical data: Empirical evidence distributions in recognition follow a family of distributions which can contain Gaussian and rectangular distributions as special cases.

## **Predicting pitch perception of Shepard tones: A probabilistic threshold model**

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Pitches of Shepard tones are highly ambiguous and circular. If two Shepard tones are presented successive, the judgment in respect to the pitch direction differs individually and further depends on the distance between the two pitch classes, on the pitch class of the first Shepard tone or on the envelope of the Shepard tones. A new probabilistic pattern-matching model of pitch perception is presented which is capable to predict most of the empirical findings. Thereby is assumed that the cochlea consists of overlapping frequency selective auditory filters, which isolate individual partials of a complex sound. Further each cochlea filter is associated with a binary random variable, which codes if partials are filtered or not. Thereby the expected value of each binary random variable is determined by a so called threshold function. It is assumed that the pitch of a Shepard tone is a function of the pattern of all partials which are not filtered. Advantages and disadvantages of the model are discussed.

## **Changes in situation models modulate recognition and prediction performance in audio-visual media**

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Humans understand text and film by mentally representing their contents in situation models. These describe situations using five dimensions: time, space, protagonist, causality, and intentionality (Zwaan, Langston & Graesser, 1995). Changes in one or more dimensions (e.g., a new character enters the scene) cause discontinuities in the storyline and are often perceived as boundaries between two meaningful units. Such breakpoints constitute important points in time: Compared to situations during an ongoing event, situations at event boundaries are remembered more precisely and predictions about what happens next become less reliable. We hypothesized that these effects are dependent on the number of changes in the situation model. In two experiments, we had participants watch sitcom episodes and measured recognition memory and prediction performance for breakpoints that contained either a change in character, a change in time, a change in both dimensions or no change in any of these dimensions. Results showed a linear relationship: the more dimensions changed, the higher was the recognition performance. At the same time, with increasing number of dimension changes participants' predictions became less reliable. We conclude that situation models are a means to study event perception and that updating of situation models at event boundaries occurs incrementally.

## Reading ability predicts anticipatory language processing in 8 year olds

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Literate adults orient towards an image of a cake upon hearing sentences such as “The boy will eat the cake” immediately upon hearing the verb EAT (Altmann & Kamide, 1999): verb processing includes anticipation of nouns that qualify as arguments for these verbs. Recent findings, however, suggest that literacy modulates anticipatory eye movements in adults (Mishra et al., 2012). Here, we examine the extent to which children’s anticipation of upcoming language is modulated by their reading skills. Eight-year-olds were presented with images of two objects, e.g., a cake and a bird, and heard sentences such as “The boy eats the big cake”. Overall, children oriented towards the image of the cake prior to hearing the noun (cake), immediately after hearing the verb EAT. Crucially, the amount of time spent looking at the semantically appropriate noun in semantically constraining sentences positively correlated with their real word reading scores (SLRT-II) but not with other language scores (ETS 4-8).

## Effects of arousal, pleasantness and complexity on eye movements when viewing natural scenes and paintings

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Eye movements have been found to depend on the emotional content (pleasant/unpleasant vs. neutral) and the complexity (figure-ground composition vs. complex scene) of an image (Bradley et al., 2011). This suggests that motivationally relevant cues prompt information seeking. However, arousal may be an underlying dimension influencing eye movements. Furthermore, it is an open question whether the findings extend to aesthetic experiences. We compared eye movements in a free-viewing task in response to natural scenes and representational paintings which varied in complexity, pleasantness and arousal. Twenty-eight participants (16 females) viewed randomly presented 32 natural scenes and 32 paintings for 25 s. Preliminary results show that arousal and complexity, but not pleasantness, independently affected fixation durations and fixation counts when viewing natural scenes. Complex and high-arousing pictures elicited more and shorter fixations. Moreover, complex pictures induced longer saccades. Also, unpleasant pictures led to longer saccades, particularly in high-arousing pictures. The pattern of results differed for paintings, for which only unpleasant pictures elicited more and shorter fixations. Complexity interacted with both arousal and pleasantness when saccade length was considered. These findings suggest that arousal, pleasantness and complexity modulate eye movements and that aesthetic experience plays a role in these processes.

## **Assessing the function of the fronto-parietal attention network: Insights from resting state fMRI and the attentional network test**

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The analysis of time series from functional magnetic resonance imaging (fMRI) acquired outside of task conditions (resting state fMRI) is a rather new imaging technique with a rapidly growing interest in the field. Neural networks of high temporal and spatial coherence in the resting state have been reliably identified. From a functional perspective, however, little is known about the networks' role in cognition and behavior. Here we seek to assess this question by combining techniques from experimental psychology and resting state fMRI in an individual differences approach. It has been hypothesized that one of these networks (the fronto-parietal network) might support attention by contributing to a ready state that allows for the rapid deployment of attentional resources once it becomes appropriate. We modeled the network in  $N = 23$  healthy participants who had previously performed on the attentional network test, a behavioral protocol for the assessment of temporal, spatial and executive attention. Both temporal and executive attention were related to functional connectivity of the fronto-parietal network at rest. The methodological approach demonstrates how techniques from experimental cognitive psychology can be used to assess the functional role of resting state brain activity for behavior.

## **Functional hemispheric asymmetries of global/local processing mirrored by the steady-state visual evoked potential**

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Hemispheric differences in global/local processing have been reported by various studies. It is still under dispute, however, at which stage of processing these hemispheric differences occur. The content-level binding theory (Hübner and Volberg, 2005) assumes that the hemispheres differ at a post-sensory stage, i.e. in their capacity of binding stimulus information to its respective level. The present study tested this assumption by means of steady-state evoked potentials (SSVEPs). In particular, we tagged hierarchical letters with 12 Hz while participants categorized the letters at the previously cued level (global vs. local). The information at the two levels could be congruent or incongruent with respect to the required response. Since binding is only necessary if there is a response conflict, asymmetric hemispheric processing should be observed only for incongruent stimuli. Indeed, our results showed that congruent stimuli elicited equal SSVEP global/local effects in both hemispheres. In contrast, incongruent stimuli elicited significantly lower SSVEP amplitudes for a local than for a global target level at left posterior electrodes, whereas a reversed pattern was seen at identical right hemispheric electrodes. These findings provide further evidence for a level-specific hemispheric advantage for content-level binding.



## Reducing stereotype threat effects with implementation intentions: The self-regulation of distracting thoughts

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The present work explores the effectiveness of a specific intervention strategy, namely implementation intentions (IIs), to counteract stereotype threat effects. We postulated that providing people with IIs targeting processes underlying stereotype threat would improve performance. In Experiment 1 ( $N = 89$ ), participants under stereotype threat were provided with IIs to help them either to focus on the task (Thought-Replacement II) or to ignore distracting thoughts (Thought-Suppression II). Whereas the Thought-Replacement II eliminated the stereotype threat effect, the Thought-Suppression II did not. In a second experiment ( $N = 234$ ), we aimed to replicate the effect of the Thought-Replacement II in classrooms. Additionally, we adapted the Thought-Replacement II format to address negative emotions (Emotion-Replacement II). Again, targeting distracting thoughts eliminated the stereotype threat effect, but targeting negative emotions was not effective. The results are discussed in terms of IIs' potential as intervention strategies and their potential to test processes underlying stereotype threat effects.

## Evaluative consequences of selective attention: Distractor devaluation effects hold for ignored outgroup but not ignored ingroup members

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Intrigued by recent research on the devaluation effects of ignoring nonsocial stimuli (e.g., abstract paintings, letters), we asked whether such effects also pertain to social stimuli (i.e., faces of ingroup vs. outgroup members). In our experiment ( $N = 91$ ), participants attended to and ignored faces of ingroup and outgroup members and repeatedly evaluated these faces on a liking scale. The results showed that ignoring outgroup members by attending to ingroup members increased ingroup bias due to a devaluation of outgroup distractors. However, ignoring ingroup members by attending to outgroup members did not result in comparable effects (i.e., ingroup bias did not change as ingroup distractors were not devalued). This result pattern was found in two separate blocks of the experiment. Thus, the evaluative consequences of selective attention for social stimuli affect evaluations only in one direction, that is, to increase ingroup bias.

## Response priming in touch

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The response priming paradigm is typically used to investigate the influence of a shortly presented stimulus (i.e., the prime) on subsequent responses to target stimuli. In congruent trials prime and target are both linked with the same response whereas prime and target in incongruent trials require different responses. Participants show faster reaction times and fewer errors in congruent compared to incongruent trials. This difference in reaction time and error rates is termed as the priming effect. In the visual modality the magnitude of the priming effect is a clear function of the prime-target stimulus-onset-asynchrony (SOA). The present study ( $N = 17$ ) was conducted to test whether the same modulation of the priming effect by SOA can be found for tactile stimuli. We mapped two non-spatial, vibrotactile stimuli to different responses and manipulated the SOA in four steps from 100 to 250ms. Similar to findings in the visual modality, the size of the priming effect increased with increasing SOAs. It seems that analogous mechanisms influence processing of tactile and visual primes. Yet, due to the unimodal character of this investigation, it would be premature to refuse any differences in the temporal dynamics of visual or tactile processing.

## When does the bias start? Inaccurate representations of reasoning problems

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Research on reasoning and judgment often uses problems where intuition and reasoning are in conflict, suggesting different solutions. We used methods from research on language comprehension to investigate whether biased responses to these problems are a consequence of incorrect problem-solving or whether they start earlier, from misrepresenting the information in the premises. In one study, participants solved several problems. Then the problems were presented again in different versions, changing conflict problems to no-conflict problems and vice-versa. Participants who were more sensitive to these changes showed better reasoning. In another study, participants who responded incorrectly to conflict problems subsequently performed better when their attention was drawn to the conflict. These results suggest that biases can start before the problem-solving stage, from misrepresenting the conflict between reasoning and intuition.

## Impaired contingent attentional capture predicts reduced working memory capacity in schizophrenia

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Although impairments in working memory (WM) are well documented in schizophrenia (SZ), the specific factors that cause these deficits are poorly understood. Here we tested whether heightened susceptibility to attentional capture would result in WM encoding problems in SZ. 30 patients with SZ and 28 healthy subjects were presented with a search array and reported the orientation of the target. In some of the trials, a flanker stimulus preceded the search array that either matched the color of the target (relevant-flanker capture) or not (irrelevant-flanker capture). WM capacity was determined in each subject using the visual change detection paradigm. Patients needed more time to find the target in the no-flanker condition. After adjusting the individual exposure time, both groups showed equivalent capture costs in the irrelevant-flanker condition. In the relevant-flanker condition, capture costs were increased in patients vs. controls when the stimulus onset asynchrony between the flanker and the search array was high. The increase in relevant capture costs correlated negatively with WM capacity. This study demonstrates preserved stimulus-driven attentional capture but impaired contingent attentional capture associated with low WM capacity in SZ. The findings suggest a selective impairment of top-down attentional control in SZ, which may impair WM encoding.

## On the robustness of prime response retrieval processes: Evidence from auditory negative priming without probe interference

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Visual negative priming (NP)—a slow-down in responding to previously ignored stimuli—has been shown to depend on the presence of probe distractors, a finding which has been seen to support the episodic retrieval model of NP, however, facilitated prime-to-probe contingency learning might also underly this effect. In two identification experiments, the role of probe distractor interference in auditory NP was investigated. In each experiment, one group of participants was exposed to probe distractors while another group ran the task in the absence of probe distractors. The spatial cuing of the to-be-attended ear was varied between experiments. Whereas participants switched ears from prime to probe in Experiment 1, they kept a stable attentional focus throughout Experiment 2. For trials with probe distractors, NP was present in both experiments. For trials without probe distractors, the only after-effect of ignoring a prime distractor was an increase of prime response errors in ignored repetition compared to control trials, indicating that prime response retrieval processes took place. Whether NP beyond this error increase was found depended on the stability of the attentional focus. The findings suggest that several mechanisms underly auditory NP with the only robust one being prime response retrieval.

## The role of accent and language competence on conformity toward nonnative speakers

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How do we react to speakers with a nonnative accent? In the present study we investigated the role of nonnative accent strength and language competence on conformity toward a native/nonnative Italian speaker. Italian participants were assigned to one of four conditions. They watched a movie in which Georg, a German student (or Giorgio, an Italian student) studying at an Italian university, spoke for 10 min about campus life. Georg's accent and language competence varied. Depending on the condition, Georg perfectly spoke Italian (high competence, no accent), spoke good Italian with some nonnative accent (high competence, nonnative accent), spoke Italian with some mistakes and with a nonnative accent (low competence, nonnative accent) or was introduced as native Italian, Giorgio. Participants showed less conformity when Georg spoke Italian with some mistakes and a nonnative accent compared to the other conditions in which Georg/Giorgio spoke Italian perfectly or was Italian. Interestingly, participants showed an equal amount of conformism toward Giorgio and Georg when he had a good competence in Italian. This result suggests that having a good language competence in the host country language can override the negative effect of categorization.

## Changes in the representation of newly-learned words: Behavioural and imaging data

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How do memories of newly-learned words change over time? In Experiment 1, students learned novel words that were spoken or printed, and were then tested in an auditory pause-detection task on existing words that overlapped phonologically with the novel words. Words learned auditorily entered into competition with existing words after one night's sleep, but not immediately after familiarization, while competition effects for words learned from print emerged only after a week. Novel words thus appear to acquire fully abstract (modality-independent) representations only after at least a day. In Experiment 2, students were trained on two sets of novel spoken words: one where exposure was only to the words' phonological forms; one where pictures of unfamiliar objects were associated with the words. A lexical competition effect again emerged after overnight consolidation. This effect was stronger for the form-only words. But overall memory performance was better for the picture-associated words. fMRI results revealed greater involvement of neocortical word-form processing areas immediately after training in the form-only condition. Retrieval of picture-associated novel words involved the episodic/hippocampal memory system more extensively. During lexicalization, the relative involvement of different memory networks appears to change depending on the richness of information available about novel words.

## The wisdom of crowds in unexploded ordnance (UXO) classification

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Unexploded ordnance (UXO) poses a serious problem worldwide, injuring and killing people in former areas of conflict and constituting an environmental hazard in former military practice ranges. We investigate the performance of laypeople in classifying UXO based on their electromagnetic signatures as inverted from metal-detector data. Stimuli consisted of 216 response curves generated by different metallic items, based on real-world data from a blind test for UXO discrimination, set up by the Strategic Environmental Research and Development Program (SERDP) of the United States military. Participants were trained on a random subset of items, with the size of the training set manipulated between subjects (with 100%, 50%, or 14% of the training items). Performance was assessed by presenting 30 items not encountered during training. Many individual participants achieved good performance, even with the smallest training set. We then implemented a “wisdom-of-crowds classifier”, which categorizes items according to a voting system based on the behavioral data. Performance of this classifier was comparable to state-of-the-art computational methods, such as support vector machines. We consider ways in which the human visual perceptual system may help solving computationally difficult classification tasks.

## Authentic faces? Towards an understanding of the intuitive processing of emotional facial expressions

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As early as the 1870s Charles Darwin already recognized the importance of emotional expressions as crucial regulators of behavior, especially in nonverbal communication. Since the daily viewing, interpreting and judging of the faces of others is part and parcel of social communication, most of us are natural experts at what has come to be termed as “facial recognition”. But what neural network(s) underlie the fast and decisive yet subconscious nature of these judgments? Are there differences between the networks engaged in deliberate and intuitive judgments of facial expressions? We investigated these questions in a neuro-imaging study, asking participants to judge the authenticity of either happy or fearful facial expressions (Ebner et al., 2010); basing their decision on a first and quick impression (group 1: “intuitive”) or to study the expression thoroughly and respond using criteria such as facial muscle position in the eye- and mouth region (group 2: “deliberate”). The results of our whole-brain analysis revealed distinct activation patterns for the two groups in line with our hypotheses. Further comparative parametric analyses utilizing each participant’s mean reaction time as covariant revealed a kind of differentially expandable common processing network for both strategies, which seems to speak against a dual-systems view of these judgment processes.

## **Beyond monitoring: After-effects of responding to prospective memory targets**

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Responding to bivalent stimuli (i.e., stimuli with features relevant for different tasks) slows subsequent performance. In prospective memory research, prospective memory targets can be considered as bivalent stimuli because they typically involve features relevant for both the prospective memory task and the ongoing task. The purpose of this study was to investigate how responding to a prospective memory target slows subsequent performance. We embedded the prospective memory task in a task-switching paradigm and we manipulated the degree of task-set overlap between the prospective memory task and the ongoing task. The results showed consistent after-effects of responding to prospective memory targets. The specific trajectory of the slowing depended on the amount of task-set overlap. These results demonstrate that responding to prospective memory targets results in after-effects, a so far neglected cost on ongoing task performance.

## **Effects of context and inversion for 8-10 years old children and adults: Validation across object categories**

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Recently it was demonstrated that 8-10 years old children show strong effects of context congruency and inversion in face matching tasks (Meinhardt-Injac, et al., 2011). Further, 8-10 years old children showed a pronounced asymmetry in face matching performance with internal and external features, with particular worse performance when internal features had to be focused. In the present study it was investigated whether these effects are face specific, or merely reflect general deficits of 8-10 years old children to selective attending and ignoring in matching tasks. I used watches stimuli as controls, since they strongly resemble faces in their inner/outer object structure. As with faces, 8-10 years old children reached substantially lower performance levels than adults with watches. However, effects of context congruency and inversion were absent. Further, the inner parts and the outer parts of watches were matched equally well. These results indicate that effects of context congruency and inversion, as well as the strong performance asymmetry observed for external and internal features, are face specific. This suggests that 8-10 years old children are generally able to handle feature-selective attending and ignoring in speeded matching tasks, but suffer from serious deficits in selectively attending the internal features of a face.

## Regulation of emotion and oxytocin in schizophrenia: An fMRI study

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Schizophrenic patients are known for having difficulties with their emotion regulation abilities, especially in using strategies like cognitive reappraisal (van der Meer et al., 2009). Furthermore there exists some evidence for diminished oxytocin plasma levels in schizophrenic patients (Dehning et al. in prep.) as well as a major role of oxytocin in emotion regulation processes (Quirin et al., 2010).

As part of a larger study 20 male schizophrenic patients and 20 healthy controls completed an emotion regulation task (McRae et al., 2008) in fMRI scanner. Subjects were presented by 120 picture stimuli in total (40 of neutral valence, instruction “watch”, 40 of negative valence, instruction “watch”, 40 of negative valence, instruction “reappraise”). Participants had to rate their level of negative affect on a 6 point Likert-scale. Oxytocin-levels were derived at two timepoints.

Schizophrenic patients revealed no difference in their behavioral ratings of negative affect compared to control group. On a neural level there were significant lower activations in areas known to be involved in emotion regulation processes as tempoparietal junction, ACC, PFC and amygdala as well as a lower oxytocin-plasma-level in patient group. Our results confirm a positive relationship between activation in left precuneus, left amygdala, insula and patients’ negative syndrome.

## Chemosensory anxiety signals and emotion regulation – an ERP study

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Effects of social chemosignals on emotion regulation in a social context have not yet been investigated. Aim of this study was to examine the central nervous correlates of emotion regulation towards anxious faces in the context of body odours using event-related potentials (ERP).

36 women (18 socially anxious) were asked to reappraise their emotional response to anxious male faces. Faces were presented either in the context of anxiety sweat (collected from men awaiting an oral examination), neutral sport sweat, or pure cotton administered via a constant-flow olfactometer. An EEG was recorded (25 electrodes) and effects of emotion regulation instruction (enhance, decrease, watch), chemosensory context, and social anxiety were analyzed for early (N1, N170) and late (P3, LPP) ERP components.

Results show increased amplitudes of the N1 and N170 and decreased amplitudes of the P3 and LPP in the context of chemosensory anxiety signals compared to pure cotton. When cotton or chemosensory anxiety signals were presented, socially anxious participants compared to non anxious participants, showed larger LPPs during the regulation instruction “watch”. The current results show that the physiological response to emotional faces is affected by context odours, underlining the importance of olfaction in emotion perception and regulation.

## **Language changes the social perception of occupational groups: The case of masculine generics and word pairs**

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Gender-fair language (GFL) -naming both women and men- has a substantial impact on the mental representation of women and men, as former studies have shown. When using exclusively the masculine form as a generic, women are represented significantly less than men. Surprisingly, little research has been conducted to understand how the perception of occupational groups is affected by GFL use. Providing evidence from an Italian-Austrian study with over 400 participants, we will argue that GFL pervasively impacts the perception of occupational groups, in terms of perceived gender-typicality, prestige, stereotypes of warmth & competence and average income. Moreover we will show that effects differ for stereotypically feminine versus masculine occupations.

## **Facebook use is predicted by nucleus accumbens response to gains in reputation**

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Facebook is an online social networking platform used by over one billion people worldwide, but functional neuroscientific evidence explaining Facebook use has yet to be demonstrated. With Facebook's relation to social approval and reputation management in mind, we hypothesized a relationship between the way the brain processes positive social feedback regarding one's reputation (gains in reputation) and one's degree of Facebook use. To test our hypothesis, we recorded functional neuroimaging data while participants received either gains in reputation or monetary reward. We demonstrate that gains in reputation and monetary reward both increased the blood oxygen level-dependent signal in the ventral striatum. Importantly, we also showed that, across participants, when responding to gains in reputation, reward-related activity in the left nucleus accumbens predicts Facebook use. No relationship was observed between nucleus accumbens activity due to monetary reward and Facebook use. Also, a control step-wise regression analysis showed that Facebook use primarily explains our results in the nucleus accumbens. With these results we take an important step in explaining the use of social networking websites such as Facebook.



## When more is better: Reaping the benefits of large assortment sizes

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Previous research showed that on the one hand consumers find large assortments more attractive than small ones, and large assortments increase the probability of finding an option that best fulfills one's needs. On the other hand choosing from large assortments may also decrease choice satisfaction presumably because of information overload and suboptimal choices. In three experiments we replicate decreased consumer satisfaction after choosing from a large assortment compared to a small one. As can be shown, experienced information overload mediates this effect. In this respect, we also show that eliminating information overload when choosing from large assortments leads to a reversal: more satisfaction after choosing from large assortments compared to a small one. In Experiment 1 information overload was reduced by presentation format: choosing attributes sequentially rather than simultaneously decreased task difficulty and increased satisfaction. Experiment 2, building on Unconscious Thought Theory (Dijksterhuis & Nordgren, 2006) showed that deliberating the choice unconsciously while being distracted led to more satisfaction after choosing from large compared to small assortments. Finally, in Experiment 3, unconscious thought was particularly helpful when participants were primed to process holistically rather than analytically.

## Cognitive regulation of food craving modulates electrocortical processing of food-cues

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In our current obesogenic environment, exposure to visual food cues can lead to craving and overeating if not cognitively regulated. In the current study, we focused on the time course of neural food cue responding under such regulation by recording event related potentials (ERPs) in addition to subjective craving ratings. Female participants ( $n = 25$ ) were presented with either high-calorie (HC) or low-calorie (LC) food images under instructions to imagine either immediate (NOW) or the long-term effects (LATER) of consuming this item. Ratings indicated that the effect of regulation strategy depended on caloric content: the LATER perspective reduced cravings for HC foods relative to the NOW perspective. For LC foods the pattern was reversed: craving increased under the LATER perspective. Neurally, early ERPs (occipital N1, 150-200ms) were sensitive to food type but not to perspective. Late ERPs (late positive potential, LPP, 350-550ms) showed a perspective\*caloric content interaction: LPPs were larger in the HC-LATER condition than in all other conditions possibly indicating that a cognitive focus on negative long term consequences induced negative arousal. Thus, whereas early attentional processing reflects caloric content only, later phases include the affective valence mediated by cognitive regulations. Considering long term consequences might also promote more healthy food choice.

## Microsaccade-evoked brain activity informs about the locus of spatial attention insights from simultaneous eye tracking and EEG

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Attention can be covertly shifted to peripheral visual locations. Recent studies have shown that covert attention shifts are often accompanied by microsaccades – small involuntary gaze shifts that occur during attempted fixation. By altering the retinal input, microsaccades generate brain responses throughout the visual system, detectable in the scalp-recorded EEG as a microsaccade-evoked potential (MSEP). The MSEP is characterized by signal components (P1 and N1) similar to those of traditional event-related potentials (ERPs). While seminal studies have demonstrated that visual ERPs are gain-modulated by attention, it is unknown whether the MSEP is also influenced by higher cognitive processes. Here we test the hypothesis that brain responses evoked by the microsaccadic refreshment of early visual cortex inputs are selectively enhanced at attended locations. Eye movements and EEG were simultaneously recorded in a spatial cueing task with endogenous cues. Replicating behavioral studies, microsaccade-direction after cue onset was slightly biased towards the attended hemifield. Crucially, however, for microsaccades throughout the cue-target interval, P1 and N1 of the MSEP were enhanced at scalp sites contralateral to the attended hemifield. In conclusion, microsaccades are not simply artifacts in the EEG; instead, they elicit sizeable brain potentials, which can serve as non-intrusive neural probes of attentional processes.

## Distracter induced blindness effects in RSVP letter sequences

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The conscious perception of visual features is modulated by processes of selective attention. In the distracter-induced blindness paradigm the detection of a visual feature (e.g. coherent motion in a random dot kinematogram) is impaired when task irrelevant, target-like distracters (lures) are presented prior to the target. In the present experiments, distracter-induced blindness effects are examined in RSVP letter sequences. In the attentional blink the ability to detect a second target (T2) while identifying a first target (T1) is impaired. The additional presence of lures in this paradigm leads to a further impairment of T2 detection and to a suppression of lag-1-sparing. Consequently, distracter-induced blindness takes not only place in paradigms using simple visual feature like coherent motion, orientation changes and color switching. Furthermore, it extends to more complex information like the identities of letters.

## Old dog, new tricks – Adapting the Stroop test for visual attention assessment

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Following technological development, stereoscopic displays are becoming a conceivable option for facilitating operators' information processing in complex work environments such as air traffic control. The need for applied research on visual attention allocation in complex operator stations calls for new paradigms that are practicable with experts and naïve participants. The present study investigates the suitability of combining a modified Stroop word-colour interference test as primary task (T1) and a secondary task (T2) for examining visual attention deployment in stereoscopic displays. In order to find the optimal task layout to fit both, the demand of readability and the parallel processing of T2, different Stroop test stimulus display durations were empirically tested. The best results with error rates in T1 between 4-6% – while avoiding ceiling effects in T2 – were found with a presentation duration of 500ms/stimulus. Introducing randomized congruent stimuli, demanding a different response, proved practicable to prevent participants from using undesired solution strategies. The study showed the potential of applying the modified Stroop test in future applied as well as basic research on visual attention assessment.

## The capital error: How a German spelling rule slows down reading

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It is a distinctive feature of the German written language that all nouns must begin with a capital letter. This norm became compulsory with the first German spelling rules in 1902. Even though the debate on this rule dates back to the 16th century, there is little empirical research on its presumed benefits for reading speed. Previous findings suggested that by learning German, a new cognitive function is formed which improves reading speed by facilitating the detection of nouns. Furthermore it was accepted that this function positively affects reading across languages. We conducted an experiment using native Russian speakers whose second language skills in German were controlled for. A within-subject design comprised of 12 texts in 2 languages (German, Russian) and 6 spelling rules (varying in their degree of capitalization) was administered. In contrast to previous findings, we also included a condition without capital letters. Reading speed for Russian texts with capitalized nouns was significantly slower than for texts without any capital letters. We conclude that the capitalization of nouns does not have a general positive effect on reading speed, not even for readers who are acquainted with it.

## Sex differences in autonomic and hemodynamic correlates of aggressive behavior in children

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Because youth with aggressive conduct disorder (CD) often inflict pain on others, it is important to determine if they exhibit atypical empathic responses. Some researchers propose that aggressive behavior derives from blunted arousal; others have documented exaggerated affective responses. One shortcoming is that research has been conducted almost exclusively in boys. Here we report physiological and fMRI analyses of children with CD to better investigate relationships between arousal, regulation, and aggression. 120 children (60 CD) aged 9-11, were recruited. A diagnostic assessment of aggression was administered. Children were then scanned in an MRI scanner while watching stimuli depicting people being hurt. Pupil dilations were recorded while scanning. Psychophysiological responses to viewing others in pain differed between sexes. For males, proactive aggression was positively associated with pupil dilation; for females, scores were negatively related (Sex x Aggression,  $p < 0.001$ ).

Results suggest that aggressive boys and girls respond differently to viewing others in pain. Pilot data indicates that boys' responses may reflect heightened enjoyment coupled with reduced regulation. For girls to exhibit the opposite response suggests either that they are better at regulating levels of arousal that are similar to boys', or they have lower arousal. fMRI analyses underway will help distinguish these possibilities.

## Listening to Tomatis' audio therapy: An effect study on spatial ability

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Spatial abilities can be improved by means of training, e.g. descriptive geometry lessons in school (Gittler & Glück, 1998) or video games (Feng, Spence & Pratt, 2007). The Tomatis audio therapy (TAT) aims to improve vestibular and auditory perception by applying a technique of repeated sound sensory stimulations, and also claims to improve spatial abilities. Yet, scientific evidence is currently lacking.

The reported quasi-experimental study conducted pre, post (after 4-6 weeks) and follow up tests (after 3 months) with 30 participants in each control and experimental group. Participants' mean age was 34.77 years ( $SD=11.6$ ). Spatial ability was assessed with the Rasch calibrated *Three-Dimensional Cube Test* (3DC, Gittler, 1990, consisting of 13 tasks) and *Endless-Loops-Test* (ELT, Gittler & Arendasy, 2003, consisting of 21 items). Treatment effects were investigated in the theoretical framework of Item Response Theory. Results indicated positive short term effects of TAT for both spatial ability tasks. A positive long term effect could be found for the 3DC, but not for the ELT. Training possibilities of spatial abilities are discussed in light of these results with a focus on the methodological requirements for the measurement of change.

## No delays in application of perceptual learning in speech recognition

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Recent experiments report that listeners can rapidly adjust their phonetic categories to accommodate unusual pronunciations. These experiments expose one group of participants to an ambiguous fricative between /s/ and /f/ replacing /s/ in s-final words and the other group to an ambiguous fricative replacing /f/ in f-final words. In a test phase, listeners are presented with stimuli from /s/-/f/ continua (e.g., “life” – “lice”), and participants who heard the ambiguous fricative replacing /f/ chose the f-final words more often than participants hearing the fricative replacing /s/. We used eye-tracking to see when this learning affects perception, comparing the effect of exposure with the effect of the fricative spectrum on looks to /s/- versus /f/-final words. The onset of the exposure effect in the eye-tracking data was at the same time as the onset of the effect of the fricative spectrum. This indicates that perceptual learning affects early stages of speech perception. Importantly, this shows that this paradigm can be used to ascertain the properties of pre-lexical presentation to address the old, but unresolved question how listeners mediate between sound and meaning in spoken-word recognition.

## Ignoring relevant and irrelevant stimuli: Attending to one additional stimulus prevents the integration of another additional stimulus into event files

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In selection tasks where target stimuli are accompanied by response irrelevant or distractor stimuli, responses to target stimuli, target stimuli and the distractor stimuli can be encoded together as one episode (i.e., event file) in memory. Subsequent repetition of any aspect of such an episode can lead to the retrieval of the whole event file including the response. Thus, repeating a distractor can retrieve the response given to a previous target, a phenomenon labeled distractor-response binding. Past studies show that this effect occurs both if distractors are relevant and also if distractors are irrelevant for the participant’s task. The present experiments use two sets of response irrelevant distractors and vary the amount of attention distributed to the distractor sets. Attended distractors were defined by location (N = 22) or by distractor identity (N = 15). In both experiments, distractor-response binding was only found for attended but not for unattended distractor stimuli. The results give further information about the conditions under which response irrelevant additional stimuli influence human behavior.

## Neural foundations of the asymmetric dominance effect

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Many economic theories of decision making assume that individuals evaluate choice alternatives independently of each other. However, there is a substantial amount of evidence showing that this independence assumption is frequently violated in decision making. Preferences between two consumer products, for example, change when a third asymmetrically dominated choice alternative is added. Here, we investigated whether this so-called asymmetric dominance effect can be generalized to decisions under risk and which neural processes drive the effect. We found that the target option was chosen significantly more often when an asymmetrically dominated choice option was part of the choice set (decoy condition). A rigorous model comparison revealed that none of the tested models performs substantially better than the others. On the neural level we could show, that brain activity during the decoy condition is higher in brain regions implicated in risk processing (e.g., anterior insula and dorsomedial prefrontal cortex). Our results, thus, provide evidence that the asymmetric dominance effect is present in decision making under risk. Differences in brain activity in brain regions previously implicated in risk processing indicate that the asymmetric dominance effect is related to differences in risk processing.

## The impact of direct manual experience on anticipatory eye movements

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Recent studies have shown that anticipatory eye-movements (AEM) occur during action execution and observation. Furthermore, a connection between action experience and the ability to anticipate action goals has been proposed. This is taken as evidence that anticipatory fixations of action goals indicate the use of action knowledge for prediction. By a pre-post design, we examine how direct experience shapes AEM. Participants are provided with scenes showing an actor performing a block stacking task (BST). Subsequently, different action plans are primed by different subject-performed tasks. Participants perform either the BST, similar grasping tasks (puzzles), or a different manual task (pursuit rotor). Afterwards, subjects are again provided with the BST scenes. Eye-movements are assessed by a Tobii T60 eye-tracker. We hypothesize that direct manual experience with the BST or similar manual tasks but not the pursuit rotor task will cause shorter latencies and a higher amount of AEM during the post-test. Preliminary results provide evidence that direct experience with the BST and similar manual tasks prime specific action plans and therefore indicate that AEM are correlates of active action knowledge.

## Individual change in memory search throughout old age

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How do memory search processes change as individuals age? One view proposes that individuals tend to over-persist on semantic categories with increasing age, and hence switch less between categories. An alternative view proposes that aging is associated with increased switching between categories, induced by an age-related decline in local cue-maintenance. We evaluate these two hypotheses by formally modeling the memory retrieval sequences of 426 older adults in the animal fluency task (“name all the animals you can think of”), taken at multiple points during each individual’s lifetime. We modeled retrieval using a modified version of the Search of Associative Memory model applied to a semantic representation based on the Wikipedia corpus. Our results indicate that older adults switch between two kinds of retrieval cues – global frequency and local similarity with the previous item recalled – to traverse categories in semantic memory. Additionally, as people age, they rely more on the global frequency cue and switch more often between semantic categories. This result supports the difficulty in local cue-maintenance as a mechanism of age-related decline in memory search.

## Visual consciousness and predictive coding

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The predictive coding framework represents a paradigm shift in neuroscience and impacts on concepts of mind and experience. Brain processes are traditionally studied as a function of sensory stimulation. In contrast, predictive coding states that the brain continually generates models of the world based on context and information from memory in order to predict sensory input. In terms of brain computation, a predictive model is created in higher cortical areas and communicated to lower sensory areas through feedback connections. To investigate the information content of feedback projections, we have exploited a strategy based on non-stimulated sections in retinotopic regions (apparent motion path, occluded natural scenes, blindfolded subjects). In these regions we investigate the information content of activation patterns and can therefore decode cortical feedback. Our results show that contextual predictions are processed in V1. High resolution MRI indicates that the cortical feedback is especially strong in outer layers of V1. To investigate prediction error, we have used probe stimuli that were presented in a matching or non-matching context (i.e. apparent motion illusion). The results demonstrate that non stimulated regions in V1 contain predictions that influence subsequent conscious perception.

## **Mental accounting in consumer decisions: On the impact of income source on spending behavior**

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Mental accounting theory describes a set of cognitive operations applied by consumers to organize and track their financial activities. The majority of studies deal with how expenditures depend on different mental accounting practices. Research on mental accounting of income, in contrast, is relatively scarce. In the experimental questionnaire study to be presented ( $N = 107$ ) we manipulated income source (“hedonic source: money won in a casino” vs. “serious source: money from a tax refund”) and the amount of income (25 Euro vs. 250 Euro), and analyzed the likelihood of spending the amount on six different consumption possibilities (ranging from “hedonic” options such as buying clothes to “serious” options such as unpaid invoices). Participants indicated on a 5-item scale their individual tendency to categorize their income and expenditures into different mental accounts as suggested by the theory. Results show that money from a “hedonic” source is used for hedonic consumption options and, vice versa, money from a “serious” source is used for “serious” options. In line with mental accounting theory this result is observed only if the amount of income was high. Further, the effect of income source on spending behavior was moderated by participants’ tendencies to engage in mental accounting.

## **Wirkungsermittlung einer Car-to-Car-Warnung vor Gefahrenbremsungen – eine Realfahrtstudie**

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Das Forschungsprojekt „Sichere Intelligente Mobilität – Testfeld Deutschland“ (sim<sup>TD</sup>) hatte die Erforschung und Erprobung der Car-to-X-Technologie als Ziel. Hierzu wurden in einem Feldversuch 22 Funktionen mit 34 Anwendungsfällen untersucht. In diesem Beitrag sollen die Versuche am Beispiel des elektronischen Bremslichts dargestellt werden, welches den Fahrer frühzeitig über eine Gefahrenbremsung eines vorausfahrenden Fahrzeugs warnen soll.

Die Probanden hatten die Aufgabe, mit Versuchsfahrzeugen in Zweier-, Dreier- oder Viererkolonnen mit einem Abstand von etwa 30m eine ca. drei km lange Strecke auf einem Testgelände zu befahren. Das Führungsfahrzeug der Kolonne wurde von einem Vertrauten der Versuchsleitung gesteuert, welcher zu einem vordefinierten Zeitpunkt eine Notbremsung durchführte und dadurch die Warnung auslöste. Um den Effekt des Systems bestimmen zu können, war das elektronische Bremslicht bei einem Teil der Fahrzeuge aktiviert und bei dem anderen Teil deaktiviert.

Insgesamt nahmen an dem Versuch  $N=309$  Probanden teil, wobei immer ca. 15 Fahrer gleichzeitig auf dem Testgelände anwesend waren. Diese Menge an Fahrern brachte auch bestimmte Anforderungen an die Versuchsdurchführung mit sich, welche in dem Beitrag vorgestellt werden. Anschließend werden die Auswertungen zu Fahrdaten (z.B. Reaktionszeiten, maximale Verzögerungen, Abstände) und Befragungsdaten präsentiert und die hieraus resultierenden Ergebnisse dargestellt und diskutiert.



## **Stereotypes as mental schemas: Implications and findings for stereotype activation**

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Current research suggests that stereotype activation is context dependent (Rothermund & Casper, 2010). Following this research we test the idea that stereotypes are organized in mental schemas, comprising category, context, and trait information. Thus, we expected that activation of any two components of a schema would yield activation of the associated third component, resulting in a processing advantage for this component. In a lexical decision task concerning trait words, only priming of matching category word and context pictures yielded reduced response times. A second study demonstrated that only priming of matching context pictures and trait words yielded reduced response times for category words. Completing the perspective, a third study revealed reduced naming latencies for context pictures only after matching attribute and context primes. Results favor a conceptualization of stereotypes as schemata whose activation rests on the activation of a sufficient number of components.

## **Cognitive enhancing effects of modafinil – what we know and what we don't know**

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Modafinil is a wakefulness promoting stimulant licensed (in some countries) for the treatment of excessive daytime sleepiness associated with narcolepsy, sleep apnoea and shift-work. It is widely used outside licensed indications by students, academics, military personnel and other professionals, who have or want to work long hours. Cognitive enhancing effects of modafinil have been shown more or less consistently in a wide range of experimental studies in healthy volunteers. Most of the studies used randomised cross-over or parallel group designs with single doses of 100 to 400 mg of modafinil as compared to placebo. In this selective review of studies performed in our labs in Cambridge and Leipzig we address the following questions: Which cognitive functions can be enhanced by modafinil? Are the effects dose-dependent? Does modafinil only work as a cognitive enhancer in sleep-deprived and/or low performing participants? We conclude that cognitive enhancing effects of modafinil have so far only been demonstrated in laboratory experiments. Most publications on the non-licensed use of modafinil do not address the confounding problem of placebo effects. Experimental studies in naturalistic settings are necessary for an evidence-based discussion of cognitive enhancing effects of modafinil and other stimulants.

## **Guiding without distraction? Endogenous and exogenous attentional processes in standard and augmented reality car navigation displays**

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The nowadays widespread in-car navigation devices convey a continuous stream of visual and auditory information to the driver. Which display is most efficient in guiding the driver along a route without distracting him too much from the traffic? Do current models of visual and multimodal attention, as originated from experimental laboratory paradigms, validly predict attentional processes in driving with a navigation device?

In two real traffic driving experiments with  $n=6$  participants each, we compared three types of displays (SM-SD=standard map with spoken directions, AR-SD=augmented reality with spoken directions, SD-only=spoken directions only) with regard to the following proposed correlates of efficient guiding (endogenous attention) and distraction (endogenous and exogenous attention): gaze distribution, navigation errors, driving errors, and recognition of road scenes.

Results from both experiments indicated that guiding was superior with the SM-SD display, followed by SD-only and AR-SD. Most distraction occurred with AR-SD, followed by SM-SD and SD-only.

Concerning application, we concluded that the AR display is not suited for car navigation. Concerning the ecological validity of basic research on attention, our results were consistent with most prominent models of visual search and attentional capture, whereas models of crossmodal attention or contextual cueing failed to make valid predictions.

## **Assessing the accuracy of the signal detection model: The significance of the information matrix**

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A simulation study investigated the significance of the condition number (the square root of the ratio of the largest to the smallest nonzero eigenvalue) of the information matrix in assessing the accuracy of both estimated parameters and confidence intervals of multinomial models. Monte Carlo simulation revealed the significance of the condition number for assessing the accuracy of estimated parameters as well as confidence intervals of the Gaussian Signal Detection Model. While the overall quality of the estimated parameters and confidence intervals were excellent, the quality of the estimated parameters and confidence intervals deteriorated with increasing condition number, often dramatically so. For fitted models with low condition number (i.e.  $< 100$ ) statistical bias (the difference between the mean of the sampling distribution and the true population parameter) was absent or small for all examined parameters. However, the bias of estimated parameters increased with the condition number. Similarly, the coverage probabilities of the confidence intervals were close to their nominal levels for low condition numbers. For high condition number however the observed coverage both substantial over- and undercoverage was found.

## **Ambiguity in art: About the various ways to irritation and their link to appreciation and ambiguity-tolerance**

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Ambiguity is claimed to be a characteristic of modern art (Jakesch & Leder, 2009) but it is still unclear which kinds of ambiguity exist in art and why we like such perceptually challenging stimuli while fluency of processing is thought to be rewarding (Reber, Schwarz, & Winkielman, 2004). We enlarge Zeki's (2004) definition of ambiguity as switch between multiple schemata with the same probability by extracting four categories of ambiguity out of reports by 20 subjects elaborating 17 modern artworks. Empirical data assessed with the same stimuli suggests that the strength of insights during elaboration affects aesthetic appreciation ( $r=.808$ ,  $p<.001$ ). This is in line with theoretical accounts claiming elaboration to be rewarding by itself (Ramachandran & Hirstein, 1999) or the reduction of prediction errors to induce pleasure (Van de Cruys & Wagemans, 2011). Interestingly, the solvability of ambiguity did not have a significant effect on liking; a reason to question the idea of aesthetic processing as problem solving. Finally, ambiguity-tolerance seems to be a crucial factor determining if ambiguity in art is linearly related to appreciation. We will reassess preliminary data suggesting that ambiguity tolerant people prefer strongly ambiguous artworks while those scoring low on ambiguity tolerance prefer mid-ambiguous artworks.

## **Telltale eyes: Perceiving complexity and beauty in art**

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People often assess their surroundings in terms of beauty, liking or preference. Yet, little is known about what makes this aesthetic way of looking at the world special. Complexity is believed to have an important role in the aesthetic appreciation of visual stimuli. Its influence is, however, not straightforward, with different factors contributing to the perception of complexity and to preference formation. We present an eye tracking experiment aimed to study whether people deploy specific exploratory strategies when they approach visual stimuli with an aesthetic attitude, and to compare them to those used when they are asked to appraise the complexity of the same stimuli. Our results suggest that people's exploration patterns, as measured by fixation count and duration, are determined by the interaction of bottom-up processes, related with the degree of realism of the stimuli, and processes determined by the task—in this case whether participants were judging beauty or complexity. Our results also clarify the effects of different complexity dimensions on beauty and complexity judgments, as well as the temporal unfolding of such effects. This experiment, thus, reveals how the study of eye movements uncovers the diverse determinants of visual exploration.

## **Judgments of helping obligations in a shrinking world**

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According to a popular metaphor, we live in a shrinking world. Philosophers have been concerned with the moral implications of the fact that people become increasingly efficacious in helping strangers across arbitrary distances through technical development. In this work, we conceptually disentangle the interrelations of distance, means, and efficaciousness, and we advance different hypotheses about their potential impact on judgments of helping obligations. The main question is under which conditions the location of an agent's means in relation to the victim is regarded as morally relevant. We develop a new experimental design that allows us to test our hypotheses in both separate and joint evaluation modes concurrently without having to vary the procedure across groups. We find that spatial proximity between an agent's means and a suffering victim only increases people's sense of obligation in so far as it is indicative of increased efficaciousness or personal involvement.

## **Retest-reliability of nonparametric, parametric and diffusion model performance indicators across tasks**

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Mathematical models of errors and response times such as Ratcliff's diffusion model provide parsimonious and precise accounts of the underlying processes. The present work seeks to expand and encourage the use of these models outside specialist circles by establishing the retest-reliability of parameter estimates from the diffusion model. They will be compared to nonparametric and parametric measures across three different tasks.

## When lobsters or helicopters affect action production – Investigating the effects of action-effect compatibility

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Studies on the impact of action-effect representations on human action control have shown that responding is facilitated if there is an overlap between features of an action and features of its effects. In an attempt to extend the scope of such phenomena we asked persons to respond to particular visual attributes of centrally presented stimuli by moving (via pen movements on a graphic tablet) a cursor from a central home position to a target position below or above. Entering the correct target area triggered the presentation of centrally aligned pictures of things that are usually found in the ocean (whale, lobster) or in the sky (helicopter, cloud). Within participants we manipulated the correspondence relations between the direction of the required cursor movement and the typical locations of the objects introduced as action effects. What we found was a correspondence effect: moving the cursor to the top (the bottom) of the screen was initiated faster when a sky object (an ocean object) was to be seen than when an ocean object (a sky object) was to be seen as the movement's effect. This suggests that persons coded the relations between actions and their effects and used these codes in action control.

## Auswirkungen von Spezifität und Zeitpunkt früher Fahrerinformationen zur Kollisionsvermeidung in urbanen Szenarien

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In dieser Arbeit werden die Ergebnisse einer Simulatoruntersuchung vorgestellt, welche die Wirkung von Übermittlungszeitpunkt und Spezifität von Fahrerinformationen über drohende Konfliktsituationen in verschiedenen urbanen Szenarien zum Gegenstand hatte. In Entwicklung befindliche kooperative Kommunikationstechnologien machen es möglich, solche Informationen in kritischen Verkehrssituationen über Notfallwarnungen hinaus an den Fahrer zu vermitteln. Zur konkreten Ausgestaltung einer solchen frühzeitigen Fahrerunterstützung liegen bisher jedoch wenige Forschungsarbeiten vor.  $N = 20$  Probanden absolvierten verschiedene urbane Längsverkehrs- und Kreuzungsszenarien. Die Situationen unterschieden sich hinsichtlich des jeweiligen Konfliktpartners (Fahrzeug, Radfahrer oder Fußgänger) und der Konfliktrichtung. In einem Head-Up-Display wurden Fahrerinformationen über bevorstehende Konflikte zu zwei Übermittlungszeitpunkten zusammen mit einem ankündigenden Ton dargeboten: zum rechnerisch letztmöglichen Warnzeitpunkt  $t_0$  oder zwei Sekunden vor diesem Zeitpunkt ( $t_0 + 2s$ ). Weiterhin variierten die Informationen in ihrer Konflikt- und Richtungsspezifität (d.h. Darstellung der Art und Richtung des drohenden Konflikts wird angezeigt vs. nicht angezeigt). Die Ergebnisse zeigen eine höhere Akzeptanz für richtungsspezifische gegenüber richtungsunspezifischen Anzeigen. Die Wirkung von frühzeitigen Fahrerinformationen auf das Bremsverhalten und die Situationskritikalität wird hingegen vor allem durch deren Übermittlungszeitpunkt bestimmt.

## **Was die Welt in unserem Innersten zusammenhält: Experimentelle Untersuchungen zur multisensorischen Objektwahrnehmung und ihrer Plastizität**

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In Alltagssituationen sind wir von einer Vielzahl unterschiedlicher Objekte umgeben. Um effektiv handeln zu können, greifen wir gleichzeitig und anstrengungslos auf unsere verschiedenen Sinne zurück. Dabei nehmen wir ein Objekt als integrierte Ganzheit wahr, obwohl die über die verschiedenen Sinne (z.B. Sehen, Hören und Tasten) bereitgestellte Information jeweils in weiträumig verteilten Netzwerken hochspezialisierter Hirnregionen verarbeitet wird. In einer Serie von (audio-visuellen und visuo-haptischen) Experimenten setzten wir vorrangig die funktionelle Magnetresonanztomographie ein, um die neuronalen Grundlagen multisensorischer Objekterkennungsprozesse sowie deren Plastizität zu untersuchen. Hierbei zeigte sich, dass sowohl kurzfristig trainingsinduzierte als auch längerfristige (z.B. mit Nikotinabhängigkeit einhergehende) plastische Veränderungen auf Verhaltensebene von jeweils charakteristischen Veränderungen in der Zusammensetzung der Netzwerke vorrangig aktivierter Hirnregionen wie auch hinsichtlich der Interaktionen (Konnektivität) zwischen diesen Regionen begleitet werden. Beispielsweise zeigte sich eine substanzuelle Korrelation zwischen dem visuo-haptischen neuronalen Integrationsmuster in der kortikalen Region LOC (lateral-okzipitaler Komplex) und dem per klinischen Fragebogen (FTNA) erfassten individuellen Grad der Nikotinabhängigkeit. Auf der Basis solcher eher grundlagenwissenschaftlicher Befunde zur multisensorischen Objektwahrnehmung sollen im Ausblick verschiedene klinische Anwendungsmöglichkeiten im Bereich der Abhängigkeitserkrankungen skizziert werden.

## **The role of social identity in the reception of empirical research findings in videogame players**

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The present research tests the hypothesis that identity threat and social identification processes influence people's understanding of and engaging with science using the example of the debate on the effects of violent videogames (VVGs). People who frequently play VVGs (hereafter referred to as "gamers" for simplicity) often fundamentally criticize the research on the effects of VVGs. Two online-studies investigated the role of a threatened social identity in order to explain these critical reactions. "Gamers" were confronted with an empirical scientific study, which either supported the hypothesis of harmful effects of VVGs (threatening study) or not (non-threatening study). Results show that "gamers" evaluated the threatening study more negatively than the non-threatening study. Identification with the group of "gamers" moderated this effect. High-identified "gamers" evaluated the threatening study more negatively and the non-threatening study more positively than low-identified "gamers". Furthermore, group based emotions (like anger and joy) mediated the effect of the identification with the group of gamers. These results demonstrate the crucial role of social identity in the evaluation of scientific findings.

## Mental rotation training for elementary school children

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In an earlier project focusing on map based orientation, mental rotation proved to be important for children's successful navigation. Based on this finding, a computer training for mental rotation was developed. 37 elementary school children participated in this study. Results show no reaction time differences in the pre-post-comparison between training (n=19) and control group (n=18): both groups became faster from pre- to post-test. The four week computer training resulted in slightly less errors, yet there was no significant differential pre-post-effect between the groups. In a second study, 26 fourth-graders participated in a four-week training program: Manual rotation activity was forced in a reciprocal learning setting. This time the comparison with 26 control group children showed a significant training effect for correct responses (ANOVA:  $F(1,50) = 19.5$ ,  $p < 0.001$ ,  $\eta^2 = 0.28$ ). For further analyses the groups were median-split (pre-test results). The weaker half of the training group showed the largest training effect. Reaction time analysis strongly support that holistic mental rotation was improved in the training group. The results also suggest processing differences between boys and girls before and after training.

## Informational vs. objective utilities in information search

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A number of models quantifying the value of information exist. In pure classification tasks, accuracy maximization best accounts for human information search. In other situations, however, situation-specific payoffs apply (benefits and costs associated with correct and incorrect classification decisions). In this case, the informational utility of a query can conflict with its objective utility (e.g., monetary payoff). Our research addresses two questions. Theoretically, we explore in which diagnostic situations search strategies based on the informational utility of a test are adaptive. Computer simulations show that simple heuristic strategies perform quite well—and sometimes even optimal—in many situations. For instance, using the difference of a test's true and false positive rate as a proxy for its objective utility is often a very reasonable strategy. Empirically, we explore people's search behavior in classification tasks in which informational and objective utilities conflict, such as when maximizing classification accuracy and maximizing reward are incompatible. Results show that human information search can be highly adaptive, but sometimes is clearly suboptimal. It is important to take people's goals and search-and-decision processes during learning into account. Search behavior is also very different depending on how environmental probabilities are acquired (e.g. through experience or summary statistics).

## **A causal model theory of risk evaluation**

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Representational effects on risk evaluations are well-established. For instance, people's understanding of risk is mediated by the format in which probabilities are conveyed (e.g., percentages vs. frequencies). We report a new kind of representational effect that is based on the specific nature of people's underlying causal model. Many real-world risks (e.g., accidents, diseases, violence, natural disasters) are caused by mechanisms that generate the observed distribution of events. Our key idea is that an observed frequency distribution is consistent with different assumptions about the underlying causal dispositions. Specifically, we distinguish between two types of causal dispositions: (a) *probabilistic* dispositions assign some inherent likelihood of being affected by some risk to every individual; (b) *deterministic* dispositions assume that every individual will either suffer or not suffer from the event in question, and the notion of risk can only meaningfully be applied to collectives. Crucially, both dispositional constructs may manifest themselves in identical surface representations, yet trigger different risk evaluations. In a series of studies, we diagnose and induce different causal dispositions and examine their practical consequences in abstract and applied domains. We relate our findings to various psychological theories of causality and philosophical notions of probability.

## **How ignored cues may influence decision makers: Effects of distractor-response binding in binary choices under uncertainty**

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The distractor-response binding effect states (Frings, Rothermund, & Wentura, 2007; Rothermund, Wentura, & De Houwer, 2005) that distractors appearing on a prime display create an association with the particular response given in the prime. This association is retrieved when, in the probe, the distractor is repeated; the retrieved response can be compatible or incompatible to the currently demanded probe response thereby influencing behavior. We analyzed whether such binding effects can influence decision making processes. In particular we tested whether the distractor-response binding effect also occurs in binary choice tasks under uncertainty ( $N = 30$ ). Participants had to decide as fast as possible whether two consecutive, imagined patients suffered from either of two diseases. Each decision was based on two cues; one did not discriminate between the two diseases and the other was either strongly associated or was mildly associated with one of the two diseases. We found a significant influence of repeating the invalid cue from the first to the second patient on choice behavior. This result is interpreted as evidence for the influence of distractor-response binding on binary choices under uncertainty.



## **“Attention, please” – Warning strategies in a dual-task condition**

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Within the scope of the state-funded project “Citizen-Friendly Aircraft”, environmental sustainability, operational efficiency, noise reduction, and safety is addressed by developing completely automated curved approaches. The main task left for the pilot during this approach is monitoring the automation. Previous research has shown that humans need assistance in executing such highly automated tasks.

To analyse which warning strategy is most efficient conditions, a study with 22 participants was conducted. The participants were asked to monitor a primary flight display (PFD) and an engine display (ED) simultaneously. In order to support the detection of safety-critical deviations at the PFD, a warning was given at the location of the engine display and compared to a control group without warning. Additionally, the complexity of the engine display and abruptness of changes PFD were varied as different workload conditions.

The results show that deviations in the PFD were more slowly detected when the workload in the ED task was high. The warning was especially effective when sudden deviations appeared in the PFD. However, the warning was only effective if the workload at the ED task was low. Overall, the results support the idea of situation-adaptive warnings strategies.

## **The domain specificity of the red romance effect: Do women choose to wear red in a potential mate situation?**

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In recent research, the color red effect has shown an appetitive mechanism in facilitating the perceived attractiveness and desirability of a potential mate. Furthermore, it was shown that seeing the color red activated a mating goal automatically and in a subtle, i.e. unconscious manner. This effect took place independently of perceiving other positive characteristics of a potential mate. With the present study, we further explore the origins of the facilitating effect of the color red effect in the affiliation domain. We show that among 42 female participants, significantly more (i.e., 15 as compared with 6) women decided to put red in clothes, accessories, or make-up when they expected a potential mate situation (i.e., an attractive experimenter). However, significantly fewer (i.e., 3 as compared with 18) women in the control condition (i.e., an unattractive experimenter) decided to integrate more red to their appearance. The results of this study present for the first time a clear behavioral indicator on how women use color signals to consciously communicate a message of their choice and provides an important step toward an answer on the domain specificity of the color red effect.

## **Limitations and chances of working memory training: Impact on performance and neural efficiency**

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Recent studies show controversial results on the trainability of working memory capacity being a limiting factor of human cognition. In order to contribute to this open question we investigated if participants improve in trained tasks and whether gains generalize to untrained working memory tasks, mathematical problem solving and intelligence tests. By means of electroencephalography (EEG) we additionally investigate if potential behavioral changes are reflected in changed general cognitive activity patterns as predicted by the neural efficiency hypothesis.

Ninety young adults trained over a two week period (7.5 hours total) in one of the following conditions: an adaptive working memory task with increasing difficulty, non-adaptive working memory tasks with constant moderate demands and control reaction time task. All three groups were presented with the same transfer tasks before and after training when also their brain activity was measured. Working memory training had positive effects on trained tasks as well as untrained tasks with a similar surface structure. Tasks that differed in various characteristics showed no working memory transfer gains across the three experimental groups. In the EEG results, an impact of training on neural efficiency was observed. In light of these findings, limitations and chances of working memory trainings are discussed.

## **Sensitivity of the lane change task to measure sleep- and alcohol-related performance impairment**

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The Lane Change Task (LCT) by Mattes (2003) was developed to measure distraction by in-vehicle information systems. Within the project „Validation of a Fitness-For-Duty-Test to Improve Safety in Aviation and Transport“ of the German Aerospace Center, 48 subjects stayed two weeks in a sleep laboratory. Sensitivity of the LCT to effects of different degrees of sleep loss and alcohol (up to 0.1 BAC) was examined. Lane changing and lane keeping performance as well as reaction time were used as parameters. All parameters showed significant impairment due to sleep loss. Moreover the lane keeping and lane changing performance reflected different degrees of it resulting in impaired performance after a night of partial sleep loss, but worst performance after a night of total sleep loss. Alcohol showed only moderate effects on lane keeping performance and small effects on reaction time. The results are discussed in terms of the applicability of the LCT to detect impairment due to sleep loss and alcohol as well as conventions of safety critical driving performance and the lack of a standardized reference range of the LCT.

## The generation of secondary (micro-)saccades in the absence of post-saccadic visual feedback

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Primary saccades are frequently followed by small secondary eye movements including also microsaccades. In the present study, we further elucidate the mechanisms underlying the programming of secondary (micro-)saccades.

The importance of extra-retinal signals (e.g., efference copy) for orienting in our visual environment has received strong support from both, behavioral and neurophysiological experiments. Nevertheless, whether the programming of secondary saccades is also influenced by an extra-retinal error signal has remained unresolved since the beginning of research of this issue. Using eye-tracking, we demonstrate that the orientation of secondary (micro-)saccades is modulated by primary saccade landing position even in the absence of post-saccadic visual feedback. Thus, our results strongly support the idea that secondary (micro-)saccade motor programs are influenced by an extra-retinal error signal. In addition, we replicate a bias of secondary (micro-)saccades to follow the direction of the primary saccade to distant targets.

Our results are compatible with the explanation that secondary (micro-)saccades are the outcome of the overall distribution of activity in a saccadic motor map. Initial target eccentricity and saccadic error co-determine this post-saccadic activity distribution in the oculomotor system and therefore the characteristics of secondary (micro-)saccades.

## Control of eye movements: Effects of aging, task- and response-switching

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In the antisaccade task inhibition of a prepotent response towards a stimulus and selection of a saccade away from it are essential. Further, performance is modulated by task- and response switching. As the ability to control saccades may be affected by aging we tested younger and older participants in single-task (pro- or antisaccades), and mixed-task (pro- and antisaccades) blocks. Specific task switch costs occurred for error rates of prosaccades in the mixed-task blocks for both groups, indicating that antisaccade task rules persisted and affected the following prosaccade. The comparison between single- and mixed-task blocks showed that mixing costs were either equal or smaller for older than younger participants, suggesting that older participants could keep task sets in working memory. The most prominent age-difference was that for the older but not younger group task switching and response switching interacted, leading to less errors when two consecutive antisaccades were made in the same direction. This finding is best explained with facilitation of consecutive antisaccades. The present study demonstrated the impact of response switching and a difference between age groups, underlining that it is important to consider response switching in the antisaccade task, especially when investigating task switching and aging.

## Perceptual hints induce representational changes in insight problems

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It is proposed that insight problems require overcoming self-imposed constraints. The key mechanism is a representational change, either of the given problem elements, or the activated goal representations. In two experiments, we investigated how changing the perceptual saliency of given problem elements does influence the likelihood of a representational change by measuring changes in move selection behavior and solution rate, when solving matchstick arithmetic tasks. The task requires conveying an incorrect arithmetic statement made of Roman numbers into a correct one by moving one single matchstick. In the first experiment, we changed the problem representation by fading out elements of the equation (either operators, or values, or the entire equation), in the second experiment we controlled for working memory aspects and changed only the colors of certain problem elements, so that participants had still the entire information available. We found that changing the saliency of problem elements in both conditions changed the problem representation in comparison with a control group.

## Framing effects are not created equal: Effects of mood on the framing effect

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One of the of the most commonly cited deviations from rational decision making is what has been known as the “framing effect”, i.e., the tendency of being risk-averse when a decision is framed in terms of potential gains and the tendency of being risk-seeking when the decision is framed in terms of potential losses (Kahneman & Tversky, 1979). Yet, despite its propagation, the framing effect across a wide range of studies seems only small to moderate whereby almost a quarter of the effects examined appears either non-significant or in the direction opposite to the prediction (Kühberger, 1998). Given the abundant findings of affective influence on risky choice, it may be assumed that deviations from the framing effect can be attributed to affective states. Accordingly, in a between-subject design we compared choice behavior in a classical framing effect paradigm of participants being induced in a positive, negative or neutral mood state. We compared the results to the predictions of (cumulative) prospect theory, mood regulation theory, and a dual-systems approach. Our results i) seem not to support a dual-systems view and ii) suggest that by taking decision makers’ affective states explicitly into account, the framing effect can be more completely understood.

## Electrophysiological correlates of social evaluation in interpersonal bargaining

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Fairness is a fundamental aspect of everyday social life in general and interpersonal bargaining in particular. Previous research has shown that in simple economic bargaining tasks receiving an unfair monetary offer elicits a negative emotional reaction as well as a so-called *feedback negativity* (FN), a scalp-recorded brain potential reflecting a binary bad-versus-good evaluation in the medial-frontal cortex. We investigated whether this evaluative mechanism is also involved in learning who is an unfair versus fair bargaining partner. An electroencephalogram was recorded while  $N = 34$  individuals participated in an Ultimatum Game, repeatedly receiving fair, slightly unfair, or highly unfair monetary offers from six proposers. These proposers were always fair, always unfair, or occasionally unfair in their offers. Within each trial, participants first saw the face of the proposer before the offer was presented. We found that not only unfair offers themselves induced a FN, but also (over the course of the task) faces of always and occasionally unfair proposers. Thus, during repetitive interpersonal bargaining human faces obtain a subjective value which is based on the preceding interaction history and reflects a basal neural mechanism of bad-versus-good evaluation.

## Vom Fahrer zum Teilzeitpassagier – Eine Analyse des teilautomatisierten Fahrens

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Fahrerassistenzsysteme dienen neben der Entlastung des Fahrers auch der Erhöhung der Verkehrssicherheit (Winner, Hakuli & Wolf, 2009). Bei dem Wechsel vom assistierten zum teilautomatisierten Fahren stellt die Entbindung des Fahrers aus der Systemführung ein potentiell Risiko dar. Die Verschiebung seiner Rolle hin zum Überwacher kann u. a. zu einem mangelnden Situationsbewusstsein, unzulänglichen Reaktionen auf Systemfehler, Fehlbelastungen sowie dem Verlust an manuellen Fertigkeiten führen (vgl. Endsley, 1996; Endsley & Kiris, 1995). Im Rahmen einer Fahrstudie ( $N = 45$ ) wurden drei verschiedene Automationsstufen (manuelles, assistiertes und teilautomatisiertes Fahren) analysiert. Dabei wurde überprüft, ob das Fahren im teilautomatisierten Modus verglichen mit dem manuellen und assistierten Modus zu einem geringeren Situationsbewusstsein, zu einer Fehlbeanspruchung des Fahrers in Abhängigkeit verschiedener Verkehrssituationen (Stadt, Landstraße, Autobahn) und zu einer schlechteren Befindlichkeit der Versuchsperson führt. Als objektive Datenbasis dienen Fahrdaten sowie eine Blickbewegungsmessung. Eine subjektive Bewertung erfolgte mittels Fragebögen zu den Themen Situationsbewusstsein, Befindlichkeit, Beanspruchung, Akzeptanz des Assistenzsystems und Kontrollüberzeugung.

## Principles of multisensory behavior

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The combined use of redundant multisensory signals is often beneficial. Based on the electrophysiology of the superior colliculus, a milestone finding was the formulation of three principles that describe the effectiveness of multisensory processing, known as the temporal rule, the spatial rule, and the principle of inverse effectiveness. These rules are also considered to describe multisensory benefits as observed in behavior, but do they capture these benefits best? To uncover the principles that rule multisensory behavior, we investigated the classical redundant signals effect, that is, the speedup of response times in multi-compared to unisensory conditions. In a detection task, we presented both auditory and visual signals at three levels of signal strength and determined the speedup for all combinations of signals. Based on simulations using probability summation, we propose that two alternative rules apply. First, the principle of equal effectiveness states that the benefit with redundant multisensory signals (here the speedup of response times) is largest when performance in the two unisensory conditions is similar. Second, the variability rule states that the benefit is largest when performance in the unisensory conditions is unreliable. A systematic analysis of empirical response time distributions validated these newly formulated principles very well.

## Meditate to create: The impact of focused-attention and open-monitoring training on convergent and divergent thinking

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The practice of meditation has seen a tremendous increase in the western world since the 60s. Scientific interest in meditation has also significantly grown in the past years; however, so far, it has neglected the idea that different type of meditations may drive specific cognitive-control states. In this study we investigate the possible impact of meditation based on focused-attention (FA) and meditation based on open-monitoring (OM) on creativity tasks tapping into convergent and divergent thinking. We show that FA meditation and OM meditation exert specific effect on creativity. First, OM meditation induces a control state that promotes divergent thinking, a style of thinking that allows many new ideas of being generated. Second, FA meditation does not sustain convergent thinking, the process of generating one possible solution to a particular problem. We suggest that the enhancement of positive mood induced by meditating has boosted the effect in the first case and counteracted in the second case.

## Why the pain of losing outweighs the joy of winning: The role of probability weighting in risky choice

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According to prospect theory—arguably the most popular parameter framework for modeling decision making under risk—people treat information on positive consequences differently from information on negative consequences. The most prominent example of such a gain-loss asymmetry is loss aversion. To account for loss aversion, prospect theory assumes a kinked utility function, with a steeper curvature for losses than for gains. In extensive modeling analyses, we show that gain-loss asymmetries are actually better accounted for by assuming differences in the weighting function, which translates objective probabilities into subjective decision weights. Specifically, an elevation model—a version of prospect theory that assumes a more elevated weighting function for losses than for gains—predicts people choices better than versions with differently shaped utility functions for gains and losses. In additional model recovery analyses, we show that the better performance of the elevation model is not due to greater functional simplicity. Rather, people simply do not seem to choose consistent with a kinked utility function. These results contradict a key assumption in prospect theory and highlight the neglected role of people's differential treatment of probabilities of positive and negative consequences in risky choice.

## The analysis of eye movements in the context of cognitive technical systems

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Understanding mechanisms of attention is important in the context of research and application. Eye tracking is a promising method to approach this question, especially for the development of future cognitive technical systems. Based on three examples, we discuss aspects of eye gaze behaviour which are relevant for research and in the context of cognitive technical systems. First, we demonstrate the omnipresent influence of sudden auditory and visual events on the duration of fixations. Second, we show that the correspondence between gaze direction and attention allocation is determined by characteristics of the task. Third, we explore how eye movements can be used for information transmission in remote collaboration by comparing it with verbal interaction and the mouse cursor. Considering eye tracking in the context of future applications reveals a great potential but requires solid knowledge of the various facets of eye gaze behaviour.

## **External loads increase performance in a Fitts task for the wrist but not the arm**

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An experiment using a Fitts' task (arm/wrist) with an amplitude of 16° and target width of .5° (ID=6) was conducted to determine the impact of adding external loads. We predicted that the wrist and arm performance may be differentially impacted by the added mass. Participants were asked to flex/extend their limb/lever in a horizontal plane at the wrist (arm stabilized) or elbow joint (wrist stabilized) in an attempt to move back and forth between the two targets as quickly and accurately as possible. External loads of 0 kg, 0.568kg, or 1.136kg were fixed at the distal end of the limb/lever. The targets and the current position of the limb were projected on the screen in front of the participant. The results indicated Group x Load interactions for movement time and percent time to peak velocity. Movement time decreased as load increased for the wrist but remained stable across loads for arm movements. Percent movement time utilized to accelerate the limb increased as load increased for wrist movements. For both limbs increased load had no significant effect on endpoint variability. The present findings suggest that the additional load allowed the control advantages of the wrist muscles to be exploited.

## **Opinion formation in internet settings: Effects of process- versus outcome-accountability**

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The internet is progressively gaining importance as a medium for opinion formation. Research has shown that, when forming an opinion, individuals prefer information supporting their initial opinion (preference-consistent) over information conflicting with their initial opinion (preference-inconsistent).

In a first study, we investigated accountability as a possible de-biasing intervention. We asked 60 participants to form an opinion about the potential use of artificial snow machines in a fictitious ski resort and to select the most important information to pass on to the responsible policy-makers. We experimentally varied whether participants should feel accountable for the process of their opinion formation (process-accountable) or for its outcome (outcome-accountable) or not accountable at all (control-group). As predicted, process-accountable participants passed on significantly more preference-inconsistent information compared to both the control group and outcome-responsible participants. Furthermore, in line with our hypotheses, they also rated the quality of preference-consistent information not as high as outcome-responsible participants.

In a current study, framed as decision-setting regarding neuro-enhancers, we investigate whether effects of process- versus outcome-accountability also hold for post decisional information search. We expect process-accountability to reduce confirmation-bias, i.e. favouring of preference-consistent information over preference-inconsistent information, as well as evaluation biases. These findings will also be reported.



## What is the optimal number of answer options in multiple-choice items?

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There is disagreement over the optimal number of answer options in multiple-choice items. An often repeated recommendation is to present as many answer options as possible to reduce guessing. However, on theoretical as well as empirical grounds, several researchers have argued that three options may be sufficient or even optimal. We used the data obtained in a ranking task including all answer alternatives to create items consisting of 2, 3 or 4 answer options. Unlike previous studies, we systematically removed either the best or the worst distractors to investigate whether the psychometric properties of the items and the test depend not only on the number of options, but also on the functionality of the deleted options. When using ranking data to compare the psychometric properties of items with a reduced number of options with those of the original 4 answer version, we found item and test properties to be impaired most when functional distractors were deleted, but to remain relatively stable when dysfunctional distractors were removed. Our results suggest that rather than the number of options, the quality of the distractors determines the psychometric properties of multiple choice tests.

## Using testing to improve learning after severe traumatic brain injury

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Recent work in cognitive psychology suggests that testing can increase memory for both previously and subsequently studied information. An experiment is reported in which we examined whether these beneficial (backward and forward) effects of testing generalize to individuals with severe traumatic brain injury (TBI). Persons with severe TBI and healthy controls studied 3 lists of items in anticipation of a final cumulative recall test. Participants were tested immediately between the study of lists or not. Immediate testing of Lists 1 and 2 enhanced recall of both the previously studied information (Lists 1 and 2) and the subsequently studied information (List 3). The enhancement for the three lists arose for individuals with severe TBI and healthy controls, and did not differ in size between subject groups. The results suggest that persons with severe TBI show a very general benefit from testing, including both backward and forward effects of retrieval practice. Testing thus might be a powerful technique to improve learning and memory in persons with severe TBI.

## **Good emotion, bad intention: Visualizing in-group and out-group smiles**

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Even though smiles are seen as universal facial expressions, research shows that there exist various different kinds of smiles (i.e., affiliative smiles, dominant smiles). Accordingly, we assume that there also exist different mental representations of smiles. However, if this is the case, which representation is activated when people think about a smile? We argue that depending on situational factors such as group membership, different mental representations of a smile are activated: Since in-group members are typically seen as more benevolent than out-group members, in-group smiles should be associated with more benevolent intentions than the ones shown by out-group members. Visualizing in-group and out-group smiles by employing a reverse correlation technique, we found that the mental representations of in-group smiles indeed express more benevolent intentions than those of out-group smiles. The affective content of these smiles was not influenced by group membership. Importantly, the effect occurred even though participants were not instructed to attend to the nature of the smile, pointing to an automatic association between group membership and intention. The implication of this finding for the conceptualization of emotional expressions will be discussed.

## **Dopaminergic stimulation increases selfish behavior in the absence but not in the presence of punishment threat**

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People often face decision situations that pit self-interested behavior aimed at maximizing one's own reward against normative behavior such as acting cooperatively, which benefits others. The threat of social sanctions for defying the fairness norm prevents people from behaving overly selfish. Thus, normative behavior is influenced by both seeking rewards and avoiding punishment. However, the neurochemical processes mediating the impact of these influences remain unknown. Several lines of evidence link the dopaminergic system to reward and punishment processing, respectively, but this evidence stems from studies in non-social contexts. No study has yet examined dopaminergic drug effects on individuals' reward seeking and punishment avoidance in social interaction. Here we show that in the absence of punishment threats, L-DOPA administration leads to more selfish behavior in a social interaction game, likely mediated through an increase in reward seeking. In contrast, L-DOPA administration has no effect on behavior when faced with punishment threats. Our results demonstrate a causal role for the dopaminergic system in social interaction, and might have relevance in the context of the neurochemical basis of anti-social behavior and drug addiction.

## **The influence of overt and covert shifts of spatial attention on interval timing**

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We investigated whether seconds range interval timing in a duration reproduction task is affected when participants make overt and covert shifts of spatial attention. Specifically, participants learned and subsequently reproduced a 6s target duration. Overt and covert attention shifts were manipulated during the test phase timing stimuli by requiring participants either to make saccades to peripheral locations and report the character presented there (overt attention shift) or to maintain fixation at the center of the timing stimulus, but still report the identity of the peripherally presented character (covert attention shift). In the control conditions, participants either reproduced the target duration in conjunction with character discrimination task at the central fixation point (i.e. no shift of spatial attention) or merely reproduced the target duration in the absence of a secondary task. Eye movements were monitored using an Eye-Link 1000 sampling at 2000Hz. Participants reproduced longer durations when they made overt and covert shifts of spatial attention during the timing stimulus as compared to when they did not, but there was no difference between the overt and covert attention shift conditions. The results are interpreted in the context of current models of interval timing.

## **A dose of ruthlessness: Interpersonal moral judgment is hardened by the anti-anxiety drug lorazepam**

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Neuroimaging indicates emotional brain systems are more strongly engaged by moral dilemmas in which innocent people are directly harmed than by dilemmas in which harm is remotely inflicted. To test if this emotional engagement involves anxiety, we investigated the effects of 1 mg and 2 mg of the anti-anxiety drug lorazepam on the response choices of 40 healthy volunteers in moral-personal, moral-impersonal, and nonmoral dilemmas. We found lorazepam caused a dose-dependent increase in participants' willingness to endorse responses that directly harm other humans in moral-personal dilemmas but did not affect response choices in moral-impersonal dilemmas or nonmoral dilemmas. Within the set of moral-personal dilemmas, lorazepam increased the willingness to harm others in dilemmas where harm was inflicted for selfish reasons (low-conflict dilemmas) as well as responses to dilemmas where others were harmed for utilitarian reasons (i.e., for the greater good, high-conflict dilemmas). This suggests that anxiety exerts a general inhibitory effect on harmful acts toward other humans regardless of whether these harmful acts are selfish or utilitarian.

## **Adaptation over a very short timescale: A role for face contrast illusions in social judgments**

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Adaptation over minutes leads to diverse after-effects in face perception (Webster & Macleod 2011). We postulate that judgments of target faces could be biased by other faces simultaneously present in the scene. Successive contrast illusions could build up from rapid adaptation occurring during consecutive fixations of target and neighbouring faces: a neutral face would look less positive in mood when accompanied by happy faces. If it is possible to evaluate faces at different spatial locations in parallel simultaneous contrast illusions could also exist.

We present evidence for face contrast effects for face dominance and argue that such contrast effects could be contributing to apparent 'mate-choice copying' where the attractiveness of a target face is influenced by the attractiveness of accompanying faces (e.g. Little et al 2011). Under a face contrast interpretation, viewing a woman's face next to an attractive (and/or masculine) man should increase the femininity and attractiveness of the woman's face. Conversely, viewing a target woman's face next to another woman who is more attractive and feminine should decrease the target's facial attractiveness. We speculate that perceptual contrast may have extensive effects in the psychology of face and object processing and a diverse impact on social judgments.

## **A psychometric perspective on implicit (indirect) measures: The rocky road from the lab to the field**

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In this talk I will consider implicit measures within the broader context of other types of measurement procedures. I will argue why and in what specific sense implicit measures could be best labeled as indirect. I will subsequently sketch the main steps from the development to the validation and finally to the routine use in applied settings that from a psychometric perspective are needed for a generic assessment measure. Different types of indirect measures will be checked against these steps to verify if they have achieved the standard requirements. I will argue that some of the indirect measures (e.g., IAT) are more promising than others (e.g., affective priming) but that, despite their potential, none has yet achieved all or most needed requirements for being routinely used in applied settings. I will finally focus on what kind of programmatic research strategies are needed and could be fruitful from this perspective.

## **Modeling attentional dwell time in human vision**

**Anders Petersen**

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Attentional dwell time (AD) defines our inability to perceive spatially separate events when they occur in rapid succession. In the standard AD paradigm, participants should identify two target stimuli presented briefly at different peripheral locations with a varied stimulus onset asynchrony (SOA). The AD effect is seen as a long-lasting impediment in reporting the second target culminating at SOAs of 200-500 ms (Duncan, Ward, & Shapiro, 1994). In this talk, I will present the first quantitative computational model of the AD effect – a theory of temporal visual attention (TTVA). The model is based on the neural theory of visual attention (NTVA; Bundesen, Habekost, & Kyllingsbæk, 2005) and introduces the novel assumption that a stimulus retained in visual short-term memory takes up visual processing resources used to encode stimuli into memory. Resources are thus locked and cannot process subsequent stimuli until the stimulus in memory has been recoded which explains the long-lasting AD effect.

## **The influence of social relationships on economic decisions under uncertainty**

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The perceived quality of social relationships influences economic decision making under uncertainty. The mechanisms underlying this influence have been further examined in an experiment, in which 140 participants took part. The influence of social relationships was explored regarding two aspects: The relationship intensity (prior cooperative experience versus anonymous) and the type of relational model (market pricing versus communal sharing framing, cf. Fiske, 1992; Rai, & Fiske 2011). As hypothesized and contradictory to standard economic theory, relationship intensity significantly increased solidarity in a Dyadic Solidarity Game. Furthermore, relationship intensity moderated the effect of relational model framing on solidarity. Additionally, psychological mechanisms based on three relational goals (affiliation, maintaining a positive self-concept, and accuracy, cf. Cialdini & Goldstein, 2004) were assessed: Trust, commitment, and relationship norms were investigated as underlying mechanisms. While trust and commitment partially mediated the impact of relationship intensity on solidarity, communal sharing norms (but not market pricing norms) partially mediated the effect of relational model framing on solidarity under anonymous social relationships. Individual perceptions of trust, commitment, and relationship norms appear to be meaningful psychological variables that further our understanding of individuals' utility functions in interpersonal settings of economic decision making. Theoretical and practical implications of the findings are highlighted.

## **Cultural influences on saccade trajectory modulation by remote distractors**

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Saccade trajectories have been repeatedly found to curve away from a task-irrelevant stimulus (Doyle & Walker, 2001). In this study, we investigated whether this trajectory modulation effect is modulated by participants' cultural background. We asked Chinese and German students to saccade towards a target onset that appeared on the vertical meridian above or below fixation. A distractor onset appeared in one of the screen quadrants simultaneously with the target. We hypothesized that East Asian participants will engage into holistic processing of the visual scene to a greater extent than Western participants, resulting in stronger curvature away from the distractors. Consistently with our hypothesis, we found evidence that the saccades of the Chinese participants tended to curve away from the distractors more strongly than the saccades of the German participants. However, this effect was restricted to the upper distractors. We discuss the findings in terms of cross-cultural differences in the inhibition of distractor-related oculomotor activity, visual hemifield specialization, and cross-cultural differences in the attentional window size.

## **Empathic abilities in psychopathic and non-psychopathic violent offenders**

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Lack of empathy is one of the core features of psychopathy. More generally, deficient empathic responses have also been associated with violent offending. The present study investigated whether empathic deficits are associated with postulated subcomponents of empathy in psychopathic and non-psychopathic offenders or whether a general empathy deficit is observable in these individuals.

Thirty inmates and 30 healthy, non-institutionalized controls participated and were administered cognitive and affective empathic tasks while measuring their skin conductance response.

Data analysis revealed reduced accuracy in violent offenders compared to controls only in the emotion recognition task. In particular, fear and disgust stimuli were associated with reduced physiological responses in the offender group. When focusing on psychopathy, we found increased values of empathic concern and personal distress in non-psychopathic offenders, but not in psychopaths and controls. However, physiological responsiveness during empathy for pain was decreased in both non-psychopathic and psychopathic individuals compared to healthy controls.

The present study is the first to demonstrate that emotion recognition is the only subcomponent of empathy being deficient in violent offenders. Furthermore, the present findings emphasize that psychopathic offenders adequately report perceived empathy although without displaying physiological arousal, whereas non-psychopathic offenders exaggerate their empathic self-report.

## Breaking the law: Intentional errors and their behavioural consequences

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Not all rules can be obeyed at all times – and violating a rule by intention has various consequences beyond its obvious ethical and legal implications. It is unknown, however, whether the simple fact of violating a rule (i.e., committing an error by intention) leaves a fingerprint on the acting agent. A line of behavioural experiments targets this question using reaction time and trajectory data. Converging results indicate that intentional errors are indeed separable from typical intentional actions while also being distinct from errors that are committed by mistake.

## Response-modality switching and the importance of the inferior parietal cortex

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The motor execution of a task necessitates the use of a specific response modality. In two behavioral task-switching experiments, we demonstrated that the use of either hand or foot responses does not affect switching between stimulus categorizations (colour vs. form categorization); yet, modality-shift costs occur when subjects switch between response modalities. To further examine these modality-shift costs, we used fMRI to investigate both common and differential neural mechanisms underlying switching between response modalities as compared with switching between stimulus categorizations. As in the behavioural experiments, both types of switching resulted in switch costs. At the neural level, response-modality switching was associated mainly with left-hemispheric activation of the intraparietal sulcus and the supramarginal gyrus. In contrast, stimulus-categorization switching led to left-hemispheric activations including the inferior frontal gyrus as well as the intraparietal sulcus. A conjunction analysis indicated common activation of the left intraparietal sulcus and the supramarginal gyrus for both types of switching. Together, these results demonstrate the critical role of response modalities in the cognitive representation of tasks. Further, the results indicate that the inferior parietal cortex is generally implicated in the selection of action rules, whereas the inferior frontal gyrus is specifically involved in switching between stimulus categorizations.

## **Modeling bayesian inference judgments**

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For many decisions, people have to gauge the probability of an event using the event's base-rate (BR) and a noisy signal (described by a hit-rate, HR, and a false-alarm rate, FAR; e.g., probability of having a disease given a positive test). People's judgments in such Bayesian prediction tasks are alarmingly inaccurate when people are confronted with probability information and are especially inaccurate for the important situation where an "interesting", rare event (i.e., low BR; e.g., disease) is predicted by a diagnostic cue (i.e., relatively high HR and low FAR; e.g., medical test). Could people improve their judgments in Bayesian prediction tasks by contradicting themselves with dialectical bootstrapping (i.e., simulating the wisdom of the crowds within one mind)? In an empirical study, we modeled people's strategy use in these tasks both before and after a dialectical intervention. We found that contradicting oneself with dialectical bootstrapping led to the use of a different strategy when confronted with the same problem again and subsequently improved judgments (when averaging the two judgments from the same person) as compared with two control conditions. Issues relating to the modeling of strategy use and strategy switching in a Bayesian reasoning context are discussed.

## **Contextual modulation of response order in the PRP paradigm – The case of saccades and manual responses**

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Dual-task interference is often studied within the psychological refractory period (PRP) paradigm, in which a systematic increase of temporal task overlap typically leads to prolonged response times in the second task. This finding is usually interpreted in terms of serial central task processing originating from a bottleneck. Interestingly, this account is exclusively based on the observation of interference within single experimental trials, while less attention has been paid to contextual effects. In two PRP experiments, participants executed saccades and manual responses in response to auditory stimuli with a variable stimulus onset asynchrony (SOA). While Experiment 1 involved a variable stimulus order (i.e., positive and negative SOAs), in Experiment 2 the stimulus for the manual response was always presented prior to the stimulus for the saccade (i.e., positive SOAs only). Results indicate that response order does not strictly follow the order of stimulus presentation but is contingent upon the range of SOAs within a block, suggesting a strong contextual modulation of bottleneck mechanisms.



## Adaptation to reductions: Challenges of regional variation

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An ERP experiment tested whether native listeners can adapt quickly to totally unfamiliar forms of reduction in casual German speech. ERP components like the N400 should be able to indicate if listeners have processing difficulties when hearing such reductions. A regionally constrained reduction type was chosen (reduction of the prefix *ge-* to [k] in Southern German and Austrian accents) and compared to a reduction type that is putatively unfamiliar in all parts of Germany and Austria (reduction of the prefix *ver-* to [f]). A group of Northern Germans (unfamiliar with both types) and a group of Southern Germans (familiar with *ge-*reductions, but unfamiliar with *ver-*reductions) were tested. The Northern Germans, who had problems integrating both types of reduced words into the sentence context (N200 and N400 effects), were able to adapt to *ge-*reductions but not to *ver-*reductions in the short term. The Southern Germans did not show any difficulties with processing either the *ge-*reductions or, surprisingly, the *ver-*reductions. It might thus be that Southern Germans produce this kind of *ver-*reduction after all, under the assumption that at least some experience with a given reduction type is necessary for adaptation to take place.

## 'Unity in variety' in product design aesthetics

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Several visual principles are known to influence how we appreciate product designs aesthetically (e.g., complexity, novelty, and typicality). One of these principles – unity in variety – holds that the greatest pleasure or beauty is arrived at when a maximum of unity or order is combined with as much variety as possible. Most research on unity in variety has been done with art or simple polygonal figures, but not with product designs. We contribute by investigating how unity and variety together influence aesthetic appreciation of product designs. Participants rated photos of twelve espresso machines or twelve lamps on items measuring visual aesthetic appreciation, unity and variety. As expected, unity and variety are negatively intercorrelated ( $r = -.384, p < .001$ ), but both correlate positively with aesthetic appreciation, especially when their shared influence is partialled out ( $\text{partial } r_{\text{unity}} = .341, p < .001$ ;  $\text{partial } r_{\text{variety}} = .326, p < .001$ ). Congruently, a regression analysis shows that both unity and variety independently and positively predict aesthetic appreciation ( $R^2 = .151, F_{(2,813)} = 73.6, p < .001$ ;  $\beta_{\text{unity}} = .361, p < .001$ ;  $\beta_{\text{variety}} = .344, p < .001$ ). These results corroborate that although unity and variety are partially opposites, they can simultaneously influence the aesthetic appreciation of product designs. An evolutionary account for this unity-in-variety principle will shortly be discussed.

## Impaired affective tagging of actions in anxiety

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Dedicated action monitoring brain processes enable human organisms to rapidly detect any mismatch between the desired and the actual (motor) outcome, and in turn to ascribe values (good vs. bad) to actions (correct vs. incorrect). However, these processes are not immune to changes in (negative) affect and (trait) anxiety. More specifically, trait anxiety disrupts the normal linkage between values and actions, presumably because other (internalizing) processes somehow interfere with this fast and early monitoring. Recently, we used a standard affective priming method in order to decipher the values ascribed to simple actions performed by participants during a standard go/nogo task, and eventually highlight how anxiety influenced these processes. Results showed that (i) these actions “automatically” acquired a genuine affective value (correct/good vs. incorrect/bad); (ii) this effect was blunted in participants with enhanced levels of trait anxiety and negative affect; (iii) abnormal early brain processes during action monitoring (ERN component) accounted for this effect at the behavioral level. These findings suggest that anxiety does not merely lead to overactive error detection processes during action monitoring, but instead, it interferes selectively with a generic reward prediction component whereby actions are appraised along an affective dimension in order to anticipate their (immediate) consequences.

## Caloric vestibular stimulation influences emotional processes

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Recent evidence suggests that processing of emotional and vestibular information shares some common mechanisms. In addition, research suggests a dominance of the right hemisphere for both, vestibular processes and processing of negative emotions. The goal of the present study was to investigate the effect of caloric vestibular stimulation (CVS) on mood and emotional processes in healthy participants. 32 participants performed an affective Go/NoGo (AGN) task while they were exposed to cold left or right ear CVS (20°C) and sham stimulation (37°C). Left ear CVS activates more right hemispheric areas, whereas right ear CVS activates more left hemispheric areas. Pictures showing positive and negative content were presented (*IAPS*). In each trial, either positive or negative pictures were specified as targets. Participants had to respond to targets by means of a response button (Go), but to withhold responses to distractors (NoGo).  $D'$  (*hits – false alarms*) was used to measure task performance. For positive stimuli,  $D'$  was higher during right ear CVS, but lower during left ear CVS when compared to sham stimulation. The results suggest that CVS, depending on side of stimulation, has a modulating effect on cognitive and emotional processes.

## The involvement of the DLPFC in risky decision making: A transcranial direct current stimulation study

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Decision making is a complex process engaging several cognitive and emotional functions and involving a distributed bihemispheric, cortico-subcortical neuronal network. The dorsolateral (DLPFC) as well as the ventrolateral prefrontal cortex (VLPFC) are strongly integrated in this network. Brain stimulation studies with transcranial direct current stimulation (tDCS) have shown that neuromodulation with big sponge electrodes covering both DLPFC and VLPFC is able to influence risky decision making. Results from transcranial magnetic stimulation (TMS) experiments revealed that the inhibition of the DLPFC can increase risk taking. However, no study so far showed that a focused enhancement of DLPFC activity results in more cautious behavior. Thus our study used small EEG-electrodes for anodal focused unilateral enhancement of DLPFC activation during performing a risk task. Participants underwent three stimulation sessions (anodal left, anodal right, sham). Only left side anodal tDCS stimulation decreased risk-taking behavior. Thus especially the left DLPFC seems to be essential for the integrative computation of available information for guiding behavior.

## The “Irrelevant Speech Effect” in working memory: The impact of serial order processing

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The so-called “*Irrelevant Speech Effect*” (ISE) describes a reliable impairment of immediate serial recall performance due to task-irrelevant background speech, which participants are instructed to ignore. According to the “*interference-by-process*”-account (Jones), the ISE results from a conflict between different sets of order cues: One arising from deliberate rehearsal of the list items, the other from obligatory, pre-attentive seriation of sound sequences. Consequently, the ISE should be confined to tasks involving serial order retention. However, other models attribute the ISE to modality-dependent interference with phonological representations.

The present study investigates the role of serial order processing in ISE evocation. In Exp.1, serial recall performance was reliably impaired by a single-speaker speech noise, but unaffected by a multi-speaker “babble-noise”. However, the same pattern of results was found in a modified task (“odd-one-out”), which required phonological categorization instead of ordered recall. The ISE in the odd-one-out task was completely abolished, when stimuli were categorized by semantic category (Exp.2), or when a non-speech background sound was presented (Exp.3).

These results indicate that the mechanism of disruption due to IS is modality-specific interference with phonological codes rather than a conflict between cues to serial order.

## The influence of stereotype threat and stereotype lift on fourth graders' mental-rotation performance

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This study examined how the gender difference in mental rotation is affected by experimentally manipulated beliefs about the spatial abilities of men/boys and women/girls. Previous studies show that women's performance in gender-stereotyped domains, including spatial tests, is impaired when negative gender stereotypes are activated and improves when positive or neutral beliefs about gender differences are induced. Since evidence confirming this "stereotype threat"-effect on children's mental-rotation performance is missing, the present study investigated this effect in elementary-school children. 216 males and females solved two paper-pencil mental-rotation tests. In between, a gender-difference instruction was given ("boys better", "girls better", "no gender difference"). A significant interaction of time and gender was found in the "girls better"-condition [ $F(1,69) = 9.65; p < .01; \eta^2 = .12$ ] and in the "no gender difference"-condition [ $F(1,69) = 11.77; p < .001; \eta^2 = .15$ ], but not in the "boys better"-condition [ $p > .10$ ]: As expected, the male performance advantage disappeared after the "girls better"-instruction and the "no gender difference" instruction, because girls improved and boys deteriorated. Thus, the study suggests that the gender effect in mental rotation is affected by stereotype threat and stereotype lift from the very beginning of its occurrence.

## Semantic relations and comprehension monitoring in reading

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We report results of experiments examining comprehension skills during reading in 5<sup>th</sup> grade students. On a fairly basic level this includes the processing of verb-object relations within or across ongoing event descriptions. Targeting a more advanced level of comprehension, we studied the monitoring of semantic consistency in a design using correct vs. contradictory causal relations within a single sentence frame. Finally, the ability to recognize and extract information related to the main topic of a passage was examined as a core component of high-level comprehension. Results include evidence for substantial sensitivity with regard to the typicality of concepts serving as objects, actors or instruments *within* a currently developing event representation. At the same time there appeared to be no priming of verb-agent relations *across* consecutive events. Analyses of individual differences in local eye movement patterns reveal the development of strategies employed by successful vs. struggling readers to maintain coherence and to overcome local comprehension difficulties. A major source of variability in this process turned out to be the efficiency with which students find relevant information, pointing to spatial memory as a major determinant of success in comprehension monitoring.

## Causal diversity effect in sequential diagnostic reasoning

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In diagnostic reasoning, observed symptoms often activate not just one but multiple hypotheses about their potential cause, e.g. a certain disease. Even if two hypotheses are equally supported by observed symptoms one of them can be favored if the symptoms supporting it are more diverse. Symptoms are diverse if they are widely distributed within the causal structure that consists of the causal chains between a disease and its symptoms. Effects of causal diversity have been shown for categorical judgments and diagnostic reasoning. Here, we explore the relative weight of diagnosticity and diversity in sequential diagnostic reasoning. The diagnosticity of symptoms and the length of causal chains were varied via the hierarchical causal structures that participants of two experiments learned before working through diagnostic reasoning trials. Diverse and non-diverse symptom sets were sequentially presented and subsequently participants had to respond with a diagnosis. The diagnostic decision depended on the more diagnostic symptom set. However, if the symptom sets were equally diagnostic, causal diversity influenced diagnostic decisions. The causal diversity effect in sequential diagnostic reasoning is compared to the results from previous studies about diagnostic reasoning and categorical judgments.

## Statistical image properties of architecture, advertisements and aesthetic art

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It has recently been shown that large subsets of aesthetic art images share specific statistical properties. For example, like complex natural scenes, graphic artworks of diverse styles and techniques possess a scale-invariant Fourier spectrum (Redies et al., 2007; Graham and Field, 2007). Moreover, using the Pyramid of Histograms of Orientation Gradients (PHOG) representation of images, we have recently shown that images of colored aesthetic artworks are characterized by a specific combination of PHOG-derived aesthetic measures (moderately high self-similarity, moderate complexity and low anisotropy), compared to other categories of images (photographs of natural scenes and objects) (Redies et al., 2012). In the present work, we carried out a similar PHOG analysis on two other categories of man-made scenes and images: architecture and advertisements. Results show that, on average, both categories of images possess a similar degree of complexity compared to colored aesthetic art. However, photographs of architecture (urban scenes, buildings and facades) are more anisotropic and less or equally self-similar than colored artworks, whereas images of advertisements possess higher anisotropy and lower self-similarity. These results support the general idea that aesthetic artworks are characterized by specific higher-order image properties that distinguish them from other categories of images.

## **Priming effects of masked primes across different types of stimuli and the accumulator model**

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When a masked prime stimulus (e.g., small left pointing arrow) is followed by a target stimulus which is associated to the same responses (large left pointing arrow) participants usually respond faster and more accurately than when prime and target are associated to different responses (left and right pointing arrows). Vorberg et al. (2003) proposed an accumulator model which accounts for the time course of priming effects on performance measures. The model assumes that each stimulus provides evidence in favor of its associated response with a certain activation rate, and a response is triggered when the evidence difference between the two response alternatives exceeds a given threshold. We generalized the original model to account for priming effects within different types of prime and target stimuli. This generalized model predicts, that the priming effect increases with an increasing ratio of activation rates of prime and target stimuli. Here, we examined this model extension by comparing priming effects across arrows and arbitrarily mapped stimuli. Error-rates generally agreed with our predictions, but reaction times did not. Findings suggest that the extension is missing at least one additional process to fully account for priming effects across different types of stimuli.

## **Electrophysiological and behavioral evidence for parallel deployment of visuo-spatial attention in a dual-task situation**

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The present study investigated whether both capacity limited visuo-spatial and central attention are dependent or independent processes. An event-related potential (ERP) and behavioral dual-task study of the Psychological Refractory Period (PRP) type was conducted. Limitations in visuo-spatial attention were realized in a conjunction search task. Here, attention is required for binding target defining dimensions and the related target absent vs. present decision; the amount of attention increases with higher number of non-targets in addition to the target. Conjunction search was presented as Task 2 after a variable temporal interval, the Stimulus Onset Asynchrony (SOA), following an auditory two choice reaction time (RT) Task 1. The ERP component of interest was the N2pc (N2 posterior contralateral). The N2pc amplitude indexes allocation of visuo-spatial attention to the target. If N2pc amplitude was a function of SOA, interference between visuo-spatial and central attention should be found, whereas independence should be indicated, if N2pc amplitude was not a function of SOA. Concerning the results, N2pc amplitude was not affected by the SOA manipulation. Using the locus-of-slack method for behavioral data analysis showed independent processing. Accordingly, we concluded that visuo-spatial attention was deployed in parallel to central attention of another task, revealing distinct attentional mechanisms.

## Visual recalibration of auditory speech affects specific acoustic cues to phonemes

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Listeners use lipread speech to recalibrate auditory speech perception. After hearing an ambiguous auditory stimulus between “aba” and “ada” coupled with a clear visual stimulus (e.g., lip closure in “aba”), an ambiguous auditory-only stimulus is perceived in line with the previously seen visual stimulus. What remains unclear, however, is what exactly listeners are recalibrating: phonemes, or specific acoustic cues. To address this question an auditory “aba”-to-“ada” continuum was created for exposure such that only the formant transitions in the vowel cued place of articulation. If listeners recalibrate phoneme categories they should show perceptual shifts in categorizing an auditory-only “ibi”-“idi” continuum where the formant transitions are uninformative but the burst and friction of the consonant cue phoneme identity (different-cues-same-phoneme condition). If, in contrast, listeners recalibrate specific cues independently of phonemes, then generalization to “ama”-“ana” should be found where cues are identical to exposure (formant transitions) but the perceived phoneme differs (same-cues-different-phoneme condition). Whereas recalibration was robust for all exposure stimuli, no generalization was found for either of the two conditions. Hence recalibration is restricted to the phoneme category experienced during exposure as well as to the specific manipulated acoustic cues. We speculate that allophones could be the target for recalibration.

## Blickverhalten unter dem Einfluss von Müdigkeit bei einer monotonen Autobahnfahrt

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Müdigkeit im Straßenverkehr ist für ca. 20% der Verkehrstoten verantwortlich. Häufig ereignen sich diese Unfälle auf monotonen Straßen und sind sogenannte Alleinunfälle, d.h. die Fahrer sind ohne eine weitere Person im Fahrzeug unterwegs. Dadurch besteht die Gefahr, dass der Fahrer seine Müdigkeit falsch einschätzt bzw. richtig einschätzt aber trotzdem weiterfährt. Daher unternehmen Assistenzsysteme den Versuch, auf Grundlage von Fahrzeugdaten die Müdigkeit des Fahrers zu erkennen. Jedoch funktioniert dies nicht zuverlässig.

Um die Gründe für die unzureichende Erkennung besser zu verstehen, wurden in einer Studie am Lehrstuhl für Ingenieur- und Verkehrspsychologie weitere Parameter zur Müdigkeitsdetektion untersucht. Verwendet wurden hierfür das Blickverhalten sowie die Pupillenveränderung der Fahrer während der Fahrt. Um Müdigkeit bei den Fahrern zu induzieren, wurde eine monotone Autobahnstrecke ohne Verkehr ca. 2 Stunden befahren. Untersucht wurden 32 Personen (25 Frauen; Alter MW = 26.3; SD = 11.6). Ausgewertet wurden das visuelle Suchverhalten sowie die Pupillenveränderung. Es zeigt sich ein größerer Suchradius des vertikalen Blickverhaltens mit zunehmender Müdigkeit. Des Weiteren kommt es mit zunehmender Müdigkeit zu einer Verkleinerung des Pupillendurchmessers.

Die Ergebnisse liefern einen wertvollen Beitrag um Müdigkeit im dynamischen Fahrgeschehen ohne Fahrparameter zu detektieren. Dies kann insbesondere genutzt werden, um weitere Erkennungsalgorithmen zu optimieren.

## **Testing the quantitative belief-desire theory of emotion using nonlinear mixed-effects regression**

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The quantitative belief-desire theory of emotion described in Reisenzein (2009) was tested in a lottery context for the emotions of happiness and unhappiness, fear and hope, and disappointment and relief. Belief-desire theory assumes that the intensity of each of these emotions is a particular quantitative function of belief strength and desire strength. To test the theory, an online study was conducted in which about 220 participants played hypothetical lotteries. Possible gains and losses and their probabilities were systematically varied. Prior to each lottery, participants rated the intensity of their hopefulness and fear using unipolar slider scales; after the outcome was known, they rated their disappointment-happiness and sadness-relief using bipolar slider scales. Specifications of the belief-desire functions for fear, hope, relief, and disappointment proposed in Reisenzein (2009) were fitted to the data using nonlinear mixed-effects regression (Pinheiro & Bates, 2000). The data are currently still analyzed.

## **Determinants of dual-task efficiency: Evidence from analyzing response organization in a concurrent dual-task paradigm**

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Performing two tasks concurrently puts high demands on action organization. This involves, e.g., task-switching or strategies of response selection. Thus far, most research has investigated these cognitive mechanisms separately. The current study investigates how such mechanisms are used to optimize performance in a dual-task with more degrees of freedom for action organization than traditional paradigms, and how the efficiency of these mechanisms depend on different kinds of training.

Two groups of participants ( $n=21$ ,  $n=20$ ) got either single-task or dual-task training in performing two concurrent tasks (memory-search and calculation) which were presented as independent self-paced task threads. Performance assessment included a pre-post comparison of dual-task efficiency as well as microanalyses of response organization. After training, an overall gain of dual-task efficiency was achieved by both groups, but more pronounced after dual-task training. Analyses of interresponse-intervals revealed mixing/switch costs similar to those found in task-switching paradigms, including a higher decrement of mixing costs after training. Moreover, an increased frequency of response groupings was found over time, particularly after dual-task training. This suggests that participants developed strategies of task-interleaving rather than strict sequential processing. The findings provide insights into dual-task skills are developing during dual-task training and how these relate to performance.



## Memory indexing as a process tracing measure in quantitative estimation

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While remembering information that is no longer visible, individuals tend to look at the location where the information was previously presented. Previous research has demonstrated that these eye movements to “nothing” can be used to infer information search and cue usage in memory based decision making. Thus, tracking eye movements during memory retrieval can afford a new process tracing measure in complex cognitive tasks. Here, we apply memory indexing to quantitative estimation. Participants learned attributes and characteristics of several consumer goods that were presented in fixed spatial arrays. Later, they had to estimate the price of the goods. Eye movements in the judgment phase reflected the weighting of different attributes and were predictive of price estimates. Furthermore, gaze patterns differed between participants who were asked to assume the role of buyers or sellers of the goods. This observation corroborates an explanation of the endowment effect proposed in query theory.

## Self-referential processing in depressed patients and matched non-clinical controls: An fMRI study

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Patients with depression tend to automatically relate schema congruent (negative) information to the self. Self-referential processing has previously been related to increased brain activity in cortical midline structures. The aim of the current study was to determine the neural correlates of self-referential processing in patients with depression (N=15) and in gender, age and education level matched non-clinical controls (N=15). We used functional Magnetic Resonance Imaging (fMRI) during the presentation of schema congruent and schema incongruent word stimuli. Stimuli consisted of 80 personality trait words that were either a) negative and depression related: e.g. “hopeless”; b) negative and not depression related: e.g., “aggressive”; c) neutral: e.g. “careful” or d) positive: e.g. “happy”. Participants were instructed to passively process the words (passive processing task). We hypothesized that patients with depression show increased activity in cortical midline structures during passive processing of schema congruent (negative and depression related) information compared to non-clinical controls. The data of this study are currently being analyzed and the results will be presented at the TeaP meeting.

## **Adaptation to unconscious conflicts in unconscious contexts**

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We investigated how context-specific conflict adaptation depends on both awareness of the conflict and awareness of the context, and how timing of conflict and context is crucial. In Experiment 1, we used a priming paradigm in which the visibility of the prime was varied and the format of the target represented a context of either low interference (20% incongruent trials) or high interference (80% incongruent trials). By implementing inducing trials and test trials, we controlled for mechanisms of event learning. With visible primes, congruency effects were larger in the low-interference context than in the high-interference context. With masked primes, however, congruency effects were not modulated by the context. In Experiment 2, the format of the prime represented the context. Thus, with masked primes, both conflicting stimulus and context were presented unconsciously. Interestingly, even with masked primes congruency effects were now larger in the low-interference context than in the high-interference context. This indicates that context-specific conflict adaptation processes are able to operate independently of both conflict awareness and context awareness, but that a simultaneous occurrence of context and conflicting stimulus is crucial.

## **The personalization principle in multimedia learning: The influence of dialect**

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The personalization principle states that through addressing a learner personally or formulating multimedia instruction in a personal way the learning outcome is improved. Personalization causes a social reaction: learners refer more strongly to themselves or are more familiar with personalized messages. Based on these explanations, using a regional dialect instead of standard language should also improve the learning outcome. Two hundred and ten Austrian pupils at a lower secondary school viewed a narrated animation concerning computer networks. The students were randomly assigned to one cell of a 2 (formal or personalized) x 2 (standard German or Austrian dialect) between-subjects factorial design. Results confirmed the personalization principle for retention and transfer performance, showing a stronger effect for transfer. This result is discussed as well as the nonsignificant finding for the factor speech and the significant interaction effect between personalization and speech on learners' interest.

## **Fixation-related fMRI analysis in the domain of reading research: Using self-paced eye movements as markers for hemodynamic brain responses during visual letter string processing**

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The present study investigated the feasibility of using self-paced eye movements during reading (measured by an eye tracker) as markers for calculating hemodynamic brain responses measured by functional magnetic resonance imaging (fMRI). Specifically, we were interested in whether the fixation-related fMRI analysis approach was sensitive enough to detect activation differences between reading material (words, pseudowords) and non-reading material (line and unfamiliar Hebrew strings). Reliable reading-related activation was identified in left hemisphere superior temporal, middle temporal, and occipito-temporal regions including the Visual Word Form Area (VWFA). The results of the present study are encouraging insofar as fixation-related analysis could be used in future fMRI studies in order to clarify some of the inconsistent findings in the literature regarding the VWFA. Our study is the first step in investigating specific visual word recognition processes during self-paced natural sentence reading via simultaneous eye tracking and fMRI, thus aiming at an ecologically valid measurement of reading processes. We provided the proof of concept and methodological framework for the analysis of fixation-related fMRI activation in the domain of reading research.

## **It is right here and waiting for you: Effects of food availability on reward system activity during food picture viewing**

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The ongoing obesity epidemic has motivated researchers from different fields to study physiological and psychological determinants of (over)eating. Several functional neuroimaging studies have started to explore the role of food inherent (i.e. calorie-content, palatability) and psychological factors (restrained eating, craving, deprivation). One key aspect of our modern food environments, however, has not been adequately modeled in experimental research: food availability. Food that is immediately available for consumption should exert stronger motivational control over the perceiver than food that is unavailable. A total of 32 healthy participants (16 women) underwent scanning while passively viewing available foods, which they could taste from during scanning and immediately after the experiment and unavailable foods, which were not present at any time during the experiment. Available relative to unavailable food elicited stronger neuronal activation in anterior cingulate cortex (ACC), medial prefrontal cortex (mPFC) as well as left caudate nucleus and left amygdala. Thus, food availability is an important aspect in the neuroscientific research and could play a key role in the necessary redesign of our modern food environments.

## **DRD2-Taqla polymorphism modulates motivational enhancement of interference processing**

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Background: The neuromodulator dopamine (DA) is widely observed to guide cognitive and motor function, but also to signal anticipation of future rewards. Thus it is thought to be a key contributor in generating active motivated behavior. To further analyze this we used the DRD2-Taqla polymorphism (rs1800497), that has previously been linked to individual variability of both prefrontal and striatal function. Methods: We used a modified flanker task, which was added by trials where participants could earn or lose money depending on their performance (motivated trials). 47 volunteers participated in a behavioral experiment and 32 in an fMRI study. Results: Analyzing the behavioral data yielded an interaction effect of DRD2 and motivation. We observed the same interaction when analyzing the fMRI data most interestingly in dorsal anterior cingulate cortex (dACC), which is thought to be a key region for cognitive control, and as a trend in the striatum. Additionally we observed an effect of genotype in the anterior insula.

## **Energy conservation effects in hand grip tasks: The impact of task difficulty on exerted muscle force**

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Motivational intensity theory (Brehm & Self, 1989) postulates that effort mobilization is governed by an energy conservation principle. According to this principle, individuals are motivated to avoid wasting resources and, thus, invest only the energy in a behavior that is required for success. I will present three studies that tested this basic prediction of motivational intensity theory. In all studies, individuals performed an isometric hand grip task under different difficulty levels and could earn a small monetary reward in each trial by exceeding a force standard. In Study 1, participants were randomly assigned to one of four standards (60, 90, 120, or 150 Newton). In Study 2, each participant performed these four force standards in randomized order. In Study 3, participants received either a possible (100 Newton) or an impossible force standard (500 Newton). Supporting the predictions of motivational intensity theory, we found that participants' exerted muscle force—which reflects energy investment (e.g., Boska, 1994)—increased with increasing difficulty if task success was possible. If task success was impossible, individuals disengaged. However, the data also revealed that the exerted force largely exceeded the required force, which conflicts with the idea that individuals invest only the energy required for success.

## The effect of repetitive transcranial magnetic stimulation on visually-guided decisions

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In repetitive TMS (rTMS) magnetic pulses are delivered through the skull at a specific frequency or sequence. It has been suggested that low frequency (<2 Hz) rTMS (LF-rTMS) temporarily inhibits function of the targeted cortex. We tested the effects of LF-rTMS on the occipital cortex. We targeted the cortex involving representations of the lower right visual quadrant. Before and after rTMS (1 Hz, 15 min), speed and accuracy of decisions about the visual characteristics of a stimulus were assessed. We found that TMS facilitated judgments (as indicated by decreased response latencies) in visual quadrants that had not been stimulated by TMS, while the stimulated visual quadrant was unaffected. In all quadrants, response accuracy was unchanged. These results suggest that LF-rTMS modulated intracortical inhibition in the visual cortex, which might play a role in decisions about a visual object's features.

## Constraints of bimanual coordination in motor imagery

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Are constraints of bimanual coordination (faster execution of symmetric than parallel movements) represented during motor imagery (movements are not executed, but imagined as if they are)? Participants executed and imagined tapping alternately with the index and middle finger. This was done concurrently with the left and right hand, either in a symmetric or a parallel pattern. Participants made more taps in the symmetric than in the parallel condition during imagination as well as execution, indicating that constraints of bimanual coordination are represented during motor imagery. Participants made more taps during execution than imagination (reflecting slower movements during imagination). The requirement to inhibit actual movement execution during imagination may be an effortful process which slows it down. Alternatively, during imagination participants may have paid attention to usually unattended aspects of the movement, disrupting automaticity. The latter explanation is corroborated by the finding that the difference between imagination and execution was higher in the symmetric (more automated and less effortful) than in the parallel condition.

## **Do motive-situation congruencies affect effort? A response force study**

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Motives are considered as individual dispositions to value outcomes or goals. Recently it has been discussed that motives do not only refer to certain classes of goals like achievement, power or affiliation but can also be more general dispositions to value outcomes as a reward (approach motives) or as a threat (avoidance motives). In our study we investigated whether general approach and avoidance motivation can be elicited by positive and negative words respectively. On the basis of classical motivation theories we expected that the motivation of participants is higher if the valence of a stimulus is congruent with their motive dispositions. For example, highly avoidance motivated participants should respond with more effort to negative stimuli than to positive ones. To test this hypothesis we instructed participants to press a force key whenever a word appeared on the screen. In accordance with our hypothesis we found that highly avoidance motivated participants responded more forcefully to negative than to positive words. In contrast participants with low avoidance motivation pressed more forcefully to positive than to negative words. However, there was no congruency effect for the approach motive disposition. Potential differences between approach and avoidance effects on response force will be discussed.

## **The compatibility of energy efficiency with pleasure of driving**

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A driver centred approach was chosen for the investigation of energy efficiency in a fully electric battery vehicle. The energy dimension was expanded by the dimension of driving pleasure, because it was assumed that drivers intend to experience pleasure with their vehicles, rather than being mere energy optimisers. For the variation of dynamic driving behaviour, three driving styles (efficient, relaxed and sporty) were defined and parameterised according to four traffic situations, namely deceleration, acceleration, curves and car following. Participants experienced the dynamic behaviours by driving in a driving simulator, in which the full longitudinal control by an adaptive cruise control (ACC) system ensured comparability and repeatability of driving behaviour. Results showed that participants were able to correctly identify the differences between the systems. Inconsistent with the hypothesis, the relaxed driving style turned out to consume the lowest amount of energy. This indicates that the definition of energy efficient driving on the mere basis of predefined separated situations falls short. Considering the compatibility of energy efficiency with pleasure in driving, participants evaluated the relaxed system as the most pleasant system. Therefore, it can be concluded that an energy efficient driving style can be compatible with the experience of pleasure.

## Probing intra-individual variability of TVA parameters in childhood ADHD

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Intra-individual variability (IIV) in timed tasks is a ubiquitous finding in ADHD research. Most reaction time tasks used to measure IIV require a motor response. It has been suggested that children with ADHD may have poor motor control, which might contribute to IIV. The aim of this study was to investigate whether IIV would be observed in two visual attention tasks in which no motor response was involved. For this purpose, 22 children (11 ADHD, 11 Controls) aged between 8–12 (mean 10.5) performed a whole report and a partial report task employing the TVA framework. Despite an elevated number of trials, results indicate that children with the disorder did not differ substantially in terms of accuracy or variation of response in comparison to healthy controls in the whole report task. The partial report task revealed differences in accuracy for distinct locations of presentation of targets and distracters and greater overall variability between the groups. However, increased IIV was found only in one condition out of 16. Taken together, these results suggest that IIV may not be readily observable in tasks where no motor response is required. Results are discussed in reference to theoretical accounts of ADHD.

## The steady state effect: Greater disruption of serial recall by repeated distractors

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The changing state effect refers to the reduction in serial recall of a list of items when task-irrelevant background sound is played during list presentation or subsequently in a retention interval. According to theories claiming that the changing state effect is caused by automatic interference, a sequence of different distractors must always impair serial recall more than a sequence of repeated distractors. By contrast, theories that include a role for attention predict that unexpected changes in the distractor sequence should be particularly disruptive. Consistent with the latter assumption, performance was worse for sentences, which changed unexpectedly into a word repetition than for regular sentences in line with expectations. The disruptive effect of the unexpected distractor repetitions persisted when they were presented in a retention interval, indicating that the impairment concerned the maintenance of the to-be-remembered items as opposed to encoding processes. It also could be demonstrated that the distractor repetitions solely caused more disruption when they violate a previously built up expectation. The results are consistent only with theories of working memory that allow for attention to play a role in the maintenance of information. Implications for theoretical accounts that exclude such a role are discussed.

## **What is in an accent? – The dimensions and boundaries of prejudice toward accented speakers**

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Previous research has shown that accented speakers are often discriminated. In particular they suffer from low competence and low status stereotypes. This picture, however, is less clear when important confounds are controlled for, such as stigmatized views of the speakers' social group and fluency of the accented speech. We found, for instance, that fluent speech with a French accent in Germany or with a German accent in the United States was less or not downgraded on competence-related dimensions (compared to respective native speakers) in job contexts. While these studies may have triggered control mechanisms that let participants to correct their potentially negative reactions, further studies investigated spontaneous associations with concept IATs and auditory IATs (for favored and disfavored accents) to shed light on the "general accent stereotype". Differences between implicit and explicit measures will be discussed as well as mechanisms and boundary conditions for prejudice and the discrimination of accented speakers.

## **Effects of spatial frequencies on the memory advantage for emotional faces**

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A large body of evidence demonstrates that emotional information is retained better in memory than neutral information. In the last decades, studies from cognitive neuroscience indicate that the amygdala plays a central role for this effect. Moreover, in line with the assumption of a 'low' subcortical route, it has been shown that the amygdala reacts preferentially to low spatial-frequency filtered (LSF) information. Given this theoretical background, we conducted four experiments to investigate if the memory advantage for emotional stimuli is modulated by spatial frequency of the information.

In all experiments, participants completed an incidental learning task in which they rated neutral and emotional high spatial-frequency filtered (HSF) and LSF faces according to specific criteria (e.g. gender). After a filler task, participants were administered an old/new-recognition task. The results clearly replicate the memory advantage for emotional stimuli. In line with recent evidence on the interaction of attention, memory and emotion, results concerning the influence of spatial frequency slightly varied depending on the task demands. Overall, however, the memory advantage was more pronounced for LSF emotional information suggesting indeed a contribution of the 'low route' to the effect.



## Experimentelle Überprüfung von Instruktionseffekten auf die Anwendung von Bezugsnormen bei der Leistungsbewertung

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Um zu prüfen inwieweit situative Faktoren die habituelle Bezugsnormorientierung überlagern können, wurde die „Kleine Beurteilungsaufgabe“ (KBA) von Rheinberg (1980) in drei Hörsaalexperimenten (758 MA-LA-Studierende) unter drei verschiedenen Instruktionsbedingungen bearbeitet: Von drei Testergebnissen von Schuler/inne/n sollte entweder wie im Original 1.) „nur das letzte Testergebnis“ bewertet werden oder 2.) „alle drei Testergebnisse“ bzw. 3.) „der Leistungsverlauf“. Alle Probanden bearbeiteten die originale und eine veränderte Version (permutierte Instruktionsreihenfolge, randomisierte Zuordnung der Probanden). Erwartet wurde eine stärkere Anwendung einer individuellen Bezugsnorm (IBN) sowie ein gegenteiliger Effekt für die soziale Bezugsnorm (SBN) unter Instruktion 2 bzw. 3, da in beiden Fällen drei Leistungsinformationen pro Schüler/in berücksichtigt werden sollten. Intraindividuell wurden entsprechend disordinale Interaktionen (Instruktion x Abfolge) erwartet. Unter Instruktion 3 ergab sich das erwartete Befundmuster. Instruktion 2 reduzierte dagegen die Anwendung einer IBN und es zeigte sich ein hybrider Interaktionseffekt: Instruktion 2 zum ersten MZP senkte die Anwendung einer IBN in der nachfolgenden Instruktionsbedingung 1, während Instruktion 1 zum ersten MZP den mindernden Effekt der Instruktion 2 auf die Anwendung einer IBN verkleinerte. Für die Verwendung der SBN zeigten sich keine Auswirkungen.

## The influence of erotic stimuli in posters on skin cancer prevention

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There is plenty of research about the effects of erotic stimuli in advertisements. The results suggest that erotic stimuli increase the attention to and retention of the materials. However, the influence on attitudes and behavioral intentions is less clear. Reverse effects (e.g., the vampire effect) as well as the moderating role of gender and product-model- congruency were found. Erotic stimuli are also used in health communication, even though their effects have not been assessed systematically (Reichert et al., 2001; Struckman-Johnson et al., 1994). In order to close this gap we conducted an online-experiment (2x2-design) in the context of skin cancer prevention. Factor 1 varied the erotic content of the posters (erotic vs. non-erotic), factor 2 was the gender of the main character. The stimulus posters along with nine other campaign posters were presented to 276 participants. Thereafter we assessed free and cued recall, attention, attitude, and behavioral intention as dependent variables. As control variables we assessed the likability of the posters, attitude towards eroticism, involvement, and socio-demographic variables. We found the expected main effects on attention and recall and tendencies in the expected direction for attitudes and intentions; however, the effects of involvement and prior behavior were stronger.

## **Social Simon Effects in the light of dimensional overlap**

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When two participants work jointly on a spatial compatibility go/no-go task, typically a joint spatial compatibility effect (SCE) or Social Simon Effect emerges that is not present when each participant works on the go/no-go task individually. This effect has been commonly ascribed to shared task representations. However, recent research suggests that the SCEs observed in joint but not in individual settings might be due to the spatial response dimension that is highlighted by the seating arrangement of the two co-actors and allows participants to code their responses spatially. For example, no joint SCEs were found when the horizontal seating arrangement of the two co-actors did not overlap with the vertical stimulus arrangement of the task. The present study scrutinizes to which degree a dimensional overlap between the arrangements of stimuli, response keys and seating positions is required to elicit joint SCEs. In a first experiment, we found a joint SCE even in a vertical spatial compatibility task when a vertical seating arrangement was applied. A second experiment tested the role of response key arrangements more explicitly. Results indicated that joint SCEs require the overlap of all three dimensions. Implications for the account of shared task representation are discussed.

## **Perceived costs for the donor and benefits for the receiver in donation decisions**

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In three studies, I show that the combination between perceived costs for the donors and benefits for the receivers predicts donations decisions independently from affective reactions. In the first experiment, participants choose between a low donation helping a woman for a month and a larger donation helping the same woman for one year. Increasing difference between benefits and costs (with benefits larger than costs) predicted participants preference for the larger donation ( $p < .01$ ). Decisions were more difficult and induced more regret when people choose the lower donation ( $p < .01$ ). In the second experiment, participants willingness to donate was predicted by the benefit-cost dimension and affective reactions ( $p < .01$ ). In the third experiment, people with a stronger tendency to think in abstract, rather than concrete, terms were more willing to donate ( $p < .05$ ). The effect of thinking strategy was mediated by both the benefits-costs dimension and affective reactions ( $p < .01$ ). These findings are consistent with work showing that donors evaluate personal costs when deciding how much they are willing to donate (Rubaltelli & Agnoli, 2012) and integrate previous work on affective reactions in donation decisions (Kogut & Ritov, 2005a; Slovic, 2007; Dickert et al., 2011).

## **A causal role for the lateral prefrontal cortex in human social norm compliance**

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Previous studies suggest that brain activity in the lateral prefrontal cortex (LPFC) is involved in processing punishment threats attached to norm violations. In this study we used transcranial direct current stimulation (tDCS) to test the causal functional involvement of the LPFC in behavioral regulation in the context of social punishment threats for norm-violating behavior. Participants completed an economic game in which they chose how to distribute a certain amount of money between themselves and a randomly assigned anonymous second person. Participants received either anodal (increase in excitability), cathodal (decrease in excitability), or sham (no effect) tDCS over the right LPFC site found activated by punishment threats for social norm defection. Decreased LPFC excitability led to an increase in norm-defecting behavior, whereas increasing LPFC excitability resulted in more norm-compliant behavior, compared to sham stimulation. These effects of LPFC tDCS on decisions were specific to a social context, as no such effects were observed in a non-social control experiment. We conclude that LPFC has a crucial causal role in determining the predisposition to comply with social norms and that it is possible to influence human norm compliance with targeted brain stimulation.

## **Investigating random vs. constant foreperiod effects in task preparation under fMRI design constraints**

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Preparation ensures that cognitive operations are optimally configured for future implementation. Besides the nature of the prepared operation, preparation interval length and predictability are known to be additionally relevant factors. Previous fMRI studies used primarily two designs, the partial-trial design and the jittered-interval design, each facing specific constraints regarding interval length and predictability as well the interpretation of results. While the partial-trial design is relatively unconstrained in terms of both factors, it suffers from difficulties in unambiguously interpreting the estimated BOLD activation. The jittered design is restricted to unpredictable interval lengths and requires a wide range of different intervals. Its advantage over the standard partial-trial design is that transient and sustained preparatory processes can be distinguished. Recently, we have proposed an extended partial-trial design that enables a similarly detailed characterization of BOLD dynamics evolving throughout the preparation interval (Ruge, Goschke, & Braver 2009). The advantage over the jittered design is that different interval lengths can be realized both predictably and unpredictably. I will present data from an initial attempt to systematically investigate the impact of interval predictability on preparatory BOLD activation. The results will be discussed with respect to the generalizability of previous fMRI results obtained with different design types.

## Opening the cuebox

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A person's *cuebox* is the set of cues she has available for making an inference. We "open" children's and young adults' cueboxes by asking them about the cues they would use to solve a range of everyday inference tasks. We investigate whether they can select the most informative cue they have available, and how the type of cue—perceptual or nonperceptual—influences this selection process. We find that children use cues that are equally informative but more often perceptual than those used by young adults. When asked to select the most informative cue from their cuebox, children tend to select a perceptual cue, while young adults tend to select a nonperceptual cue. When asked to explicitly state which of two cues is more informative, both children and young adults tend to select a nonperceptual cue.

## Metacognition and attention allocation in prospective memory

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Holding a prospective memory (PM) intention usually interferes with ongoing tasks reflecting an allocation of attention to the PM task. Previous research has shown that attention allocation varies with the cognitive demands of a PM task as well as between individuals. To investigate the source of such variations, we asked participants to predict their PM performance in PM tasks of different demands (Experiment 1). Before PM-task experience, PM-induced interference and predictions were correlated, suggesting that attention allocation was based on expectations about PM demands. Importantly, even participants who misjudged the factual PM-task demands allocated more attention to the task they thought to be more demanding. After task experience, most participants readjusted their expectations and attention allocation in line with the factual PM demands. In Experiment 2, we experimentally induced different beliefs about PM-task demands (high, low) while holding factual task demands constant. As expected, attention allocation varied as a function of expected task demands but these variations were not accompanied by PM-performance changes. The findings suggest that attention allocation of PM is based on metacognitive expectations about PM-task demands which only partly reflect factual task demands. Thereby, incorrect task-demand expectations can lead to inefficient attention allocation.

## **Mood induction as speech motor priming**

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In (psycho-)linguistic research there is an ongoing debate whether the relation between the emotional content and phonological form of words is completely arbitrary or whether there is room for iconicity. For instance, /i/ vowels have been reported – albeit with manifold counter-examples – to be related to positive emotional states and /o/ vowels to negative emotional states. It can be argued that positive mood is associated with smiling involving the contraction of the zygomaticus major muscle, a muscle also involved in the articulation of /i/; an antagonistic muscle, the orbicularis oris, which inhibits zygomaticus major contraction, is involved when articulating /o/. Since many factors affect the distribution of sounds in a language, we performed an experiment in which participants generated pseudowords in different mood, induced by watching film excerpts. Pseudowords generated in a positive mood contained more /i/ vowels whereas pseudowords generated in a negative mood contained more /o/ vowels, thus indicating that mood can prime different speech motor processes.

## **Cognitive and neural correlates of illiteracy: Evidence from a sample of German functional illiterates**

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Functional illiteracy is present if the level of literacy of a person is not adequate for fully effective participation in society. In Germany, approximately 7.5 million adults are considered functionally illiterate.

In our research, we compare cognitive abilities and the organization of neural networks for information processing between a group of functionally illiterate German adults and normally reading controls. The participants typically attended school for nine to ten years. Two studies are reported. The first study focusses on differences in basic auditory processing abilities between functional illiterates and controls. In all of the eight tested auditory processing tasks functional illiterate adults performed worse compared to adult normal readers. In some, but not all of the auditory processing tests, functional illiterates performed worse compared to a sample of dyslexic children.

The second study investigated differences in neural activation in a (visual) rhyme judgement task performed during fMRI-scanning. Functional illiterates showed less activation in several areas including the fusiform gyrus (in and near the so-called visual word form area) and in several prefrontal brain areas.

These findings are discussed with respect to the development of training programs for adult functional illiterates.

## Effects of tDCS on arithmetic problem solving and oscillatory EEG activity

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Research has shown that solving small (3 + 4) or large arithmetic problems (29 + 14) is reflected by differential brain activation, e.g. in the left posterior parietal cortex (LPPC), and distinct oscillatory correlates in the electroencephalogram (EEG).

Based on these findings, we examined the effects of transcranial direct current stimulation (tDCS) applied over the LPPC on arithmetic problem solving (response latency and solution rate) and the event-related synchronization (ERS) / desynchronization (ERD) in the theta, lower alpha and upper alpha frequency bands. Twenty-six participants underwent anodal (30 min, 1.5 mA) and sham tDCS at two sessions. EEG was recorded while the participants solved small and large arithmetic problems.

Statistical analysis revealed that in large problems response latency was decreased, whereas lower alpha ERD was increased after anodal compared to sham stimulation. In small problems, a decreased solution rate accompanied by a decreased (predominantly left-hemispheric) theta ERS after anodal compared to sham stimulation was found.

Taken together, tDCS modulated behavioral performance and oscillatory activity in a problem-specific way. These results suggest that tDCS in combination with EEG constitutes a promising tool to study the neuronal basis of mathematical skills.

## Intuitive use of human-machine-interfaces: A comparative study of children and adults

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Intuitive interaction utilizes stored experiential knowledge (Blackler et al., 2007a). Several theorists focus on the impact of prior knowledge on intuitive interaction (e.g. Hurlienne & Israel, 2007; Baylor, 2001). However, most empirical investigations look at experiential knowledge that was gained through past experience of some product features under investigation (e.g. Blackler et al., 2010). Hence these experiments do not assure that subjects in the non-experiential group cannot build upon some prior knowledge that was not manipulated in the experiment. In the present empirical investigation this paradigm was extended. Now three groups were tested on a simple multi-touch interface: adult participants with and without prior experience and children as absolutely naive users. Results show that there are differences in performance times between these three groups. Children are slower than adults when initiating their interactive behaviour, but there are also differences between adults with prior experience and adults without experience. Hence it can be concluded that prior experience alters intuitive behaviour.

## Investigating cognitive and neuronal changes after working memory training

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In recent years, evidence has accumulated concerning the effectiveness of working memory (WM) training. Not only has it been possible to alter WM functions by training, but training interventions have also been successful in improving performance in untrained tasks taxing diverse other cognitive processes. There are, however, still open questions on which characteristics define the most effective training paradigms. Furthermore, although cognitive changes following training have been observed on a behavioural level, alterations in the underlying neuronal substrate are still obscure. In the present study we investigated these issues by comparing training effects from two different types of WM training on improving executive functions. Training group 1 trained on an auditory and a visuospatial *n*-back task simultaneously (dual training), while group 2 trained on the two tasks separately (single training). Our participants practiced the tasks for 16 days, before and after which they attended MRI scanning and completed tests on untrained tasks tapping executive functioning. Dual training demonstrated positive effects on different aspects of executive functions, including task switching and attentional control. These results are discussed in reference to the effects of single training as well as to the plasticity of the neural networks underlying these functions.

## The role of norms in causal judgment

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How do we decide whether an event is a cause, a background condition, or causally irrelevant? A popular recent approach has tried to unify various findings by arguing that causes are events that deviate from norms (Hitchcock & Knobe, 2009). The nature of these norms varies across theories: Whereas covariation-based theories of causal judgment argue that events that are statistically abnormal tend to be selected as causes, other theories have postulated that even deviations from moral norms may influence cause selection. One problem of previous research studying norms is that the type of norm is frequently confounded with the stage of learning. Whereas the covariation view tends to focus on tasks in which participants acquire new causal knowledge based on statistical information, the moral norm view tends to study cover stories in which the causal relations are well established so that the task reduces to picking one cause out of a set of otherwise equivalent cause candidates. We will present various experiments in which we manipulated learning stage (learning vs. using causal knowledge), type of norm (statistical vs. moral), and test question to better pinpoint the role of different types of norms in the acquisition and use of causal knowledge.

## **In search of the trauma memory: A meta-analysis of functional neuroimaging studies of symptom provocation in Posttraumatic Stress Disorder (PTSD)**

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Posttraumatic stress disorder (PTSD) is thought to be characterized by an exaggerated amygdalar and decreased medial prefrontal activation. However, the proposed circuit falls short of accounting for reexperiencing in the form of recurrent, distressing images and recollections. Two coordinate-based meta-analyses employing ES-SDM (Effect Size Signed Differential Mapping) were carried out, one included 19 studies with 274 PTSD patients and the other 13 studies with 145 control participants who had undergone the traumatic event without subsequent development of PTSD. Comparisons of reactions to trauma-related stimuli with a control condition were submitted to the meta-analyses. PTSD patients showed significant activation of mid-line retrosplenial cortex together with precuneus and pregenual/anterior cingulate gyrus as well as bilateral amygdalae. The midline areas have been implicated in self-referential processing and autobiographical memory. In controls, medial superior frontal gyrus, implicated in empathy reactions, as well as left thalamus and dorsal cingulate gyrus emerged as significantly activated areas. Neither group showed significantly decreased activation. Being involved in associative learning and priming, retrosplenial cortex may have an important function in regard to the intrusive reexperiencing of the traumatic event in PTSD patients. In contrast, individuals who did not develop PTSD following the traumatic event appear to react with empathy to trauma-related stimuli compared to an emotionally neutral condition.

## **Present and past: How the infant mismatch negativity can predict written language abilities in 10-year-olds**

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The Mismatch negativity (MMN) of the event-related potential is a strong tool for investigating auditory processing, especially given its re-test reliability. Since auditory processing abilities can be viewed as prerequisites for successful language development, the infant MMN might suit as an early diagnostic measure for later reading and writing problems. The present study retrospectively investigates the MMN of school children with and without writing problems, who were previously tested at the age of one and five months. At all ages, children were presented with a passive oddball paradigm, investigating their ability of phoneme discrimination.

As predicted, for 10-year-old children with writing problems results reveal diminished MMN responses to deviant phonemes compared to their unimpaired peers. Moreover, for children with written language problems at school, diminished MMN effects could already be observed at five months, but not at one month.

These age differences suggest that the deviant auditory processing arises during a time when infants typically develop language-specific phoneme representations. Taken together, the current study is in line with the phonological deficit hypothesis, proposing that impaired auditory processing serves as one of the main causes of reading and writing problems, and is promising towards the utilization of the MMN as an early predictor for written language abilities.



## Investigating a causal involvement of the supramarginal gyrus for pitch memory using transcranial direct current stimulation

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Functional neuroimaging studies have shown an activation of the supramarginal gyrus during pitch memory tasks. A previous transcranial direct current stimulation study using cathodal stimulation over the supramarginal gyrus reported a detrimental effect on short-term pitch memory performance; indicating an important role of the supramarginal gyrus for pitch memory. The current study investigated a causal involvement of the left supramarginal gyrus for the pitch memory process in nonmusicians by using anodal and sham transcranial direct current stimulation to see whether this has a significant effect on the performance across different pitch memory paradigms (recognition and recall). A face memory task, used as a visual control task, was included to determine whether effects are specific to pitch memory. The results show that the anodal group performed significantly better on both pitch memory tasks but performance did not differ on the face memory task. These findings provide strong support for the causal involvement of the supramarginal gyrus in the pitch memory process. Anodal stimulation over the supramarginal gyrus increased pitch memory performance significantly suggesting that the supramarginal gyrus could be responsible for the storage of pitch information in the memory process.

## The flexible regulation of cognitive control in dual-task performance in conditions of acute psychosocial stress

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In dual-task performance, recent research showed increased between-task interference reflecting more parallel task processing in conditions of acute stress. In the present study, we investigated whether this evidence of increased between-task interference under stress represents a stress-related impairment of task shielding or a resource-saving strategy of favoring a more parallel over a more serial task-processing mode. To test this, 56 healthy participants were exposed to a well-established psychosocial stress-induction protocol (Trier Social Stress Test) or a standardized control situation prior to a dual task. In different blocks, participants were instructed to perform the dual task either in a parallel or in a serial task-processing mode allowing to increase or reduce between-task interference, respectively. After successful stress induction, as indicated by salivary cortisol and  $\alpha$ -amylase, the stress group displayed a flexible instruction-specific adaptation of the amount of between-task interference that did not differ from the control group. The finding that stressed participants can flexibly adopt both, a resource-saving parallel and a resource-consuming serial task-processing mode, speaks against a stress-induced impaired control regulation in dual tasks. Instead, we suggest that stress represents a trigger for a context-sensitive adjustment of cognitive control.

## **The persuasive power of ambivalently stereotyped groups: When competence trumps warmth**

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The stereotype content model (SCM; Cuddy, Fiske & Glick, 2007) specifies two fundamental dimensions of social judgment: warmth and competence. Out-group stereotypes are often ambivalent, combining perceptions of high competence and low warmth or of high warmth and low competence. SCM research has emphasized how such perceptions affect perceivers' emotions and behavior toward stereotyped groups. In our experiment, we shifted this focus toward investigating how perceptions of warmth and competence affect out-groups' persuasive power.

Ninety university students read statements from a product-testing website that were allegedly written by members of one of five natural groups. Two of these groups (housewives and disabled people) represented the high warmth/low competence stereotype, and two groups (career women and lawyers) represented the low warmth/high competence stereotype. Additionally, a high warmth/high competence in-group (students) served as a control. Results indicate that all five groups' warmth and competence were perceived in line with SCM predictions. Importantly, exposure to the high-competence/low warmth (vs. high warmth/low competence) groups caused more positive attitudes toward the target product. Further results relate to heuristic and systematic processing (Chen & Chaiken, 1999) as mediators of the groups' persuasiveness. Discussion will present an integrated view of persuasion models and the SCM.

## **Can your indecent acts become mine? False memories of self-performance from observing others' negative actions**

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Observation of another person's actions can induce false memories of self-performance of these same actions and is referred to as observation-inflation effect (Lindner, Echterhoff, Davidson, & Brand, 2010). Here, we sought to extend the applicability of this ubiquitous source of false action memories from neutral everyday actions (e.g., "Cut off a piece of sewing cotton!") to emotionally meaningful, that is, negative actions (e.g., "Cut off the teddy's head!"). For this purpose, participants first performed or did not perform neutral vs. negative actions. Next, they observed another person perform neutral vs. negative actions, some of which the participants had or had not previously performed themselves. The observation-inflation effect is found when participants later remember performing actions that they have previously only observed. For neutral actions, the observation-inflation effect was significant and greater than for negative actions. However, a significant amount of self-other confusions in action memory persisted even after observation of negative actions. The findings are discussed in the light of research on source memory for emotional stimuli and with regard to the applied consequences of false self-attributions of undesirable actions.

## Fostering learning and transfer by comparing examples

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People, who can solve a problem in one context, sometimes fail to solve a problem presented in a different context, even if the problems' underlying principle is identical. This lack of knowledge transfer is a challenge for school-related learning. Especially, science and mathematics education aims at providing learners with knowledge about principles that is not restricted to specific contexts. Prior research shows that instantiating a principle by two or more concrete examples and prompting their comparison can support transfer. However, it is still unclear whether comparing examples is indeed more successful than other common approaches, such as directly teaching the principles. Moreover, little is known about how to augment the comparison of examples with additional instructional techniques. Both questions were addressed in two separate experiments. In Experiment 1, comparing examples enhanced transfer performance in the area of propositional logic compared to directly teaching generic representations of the principles. In Experiment 2, different ways were tested how to augment the comparison of examples in the area of linear functions. Results show that self-explanation prompts and invention activities can successfully be combined with the comparison of examples. I conclude that these combinations are promising ways to foster knowledge transfer in formal areas.

## Der Einfluss prosodischer und struktureller Eigenschaften auf die Antizipationsleistung bei Äußerungsenden

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Nach dem gängigen Turn-taking-Modell (1) antizipieren Gesprächspartner das Ende eines Sprecher-Turns vor allem über lexiko-syntaktische Kriterien. Verschiedene Studien unterstützen diesen projektionstheoretischen Ansatz durch entsprechende Daten (z.B. 2,3,4). Die der Antizipationsleistung zu Grunde liegenden Parameter sind dabei jedoch nicht auf lexiko-syntaktische Kriterien beschränkt. Auch prosodische Aspekte sind relevant, werden der Lexiko-Syntax aber teilweise untergeordnet (2). Weiterhin wurde der möglicherweise unterschiedliche Einfluss semantischer bzw. syntaktischer Analyse bislang nur unzureichend untersucht.

In der Studie wurde getestet, welchen Einfluss semantische, syntaktische und prosodische Verstöße auf die Antizipationsleistung haben. Dazu wurde ein Reaktionszeitexperiment mit 37 Probanden und 217 auditiv präsentierten Sätzen durchgeführt. Die Aufgabe war, exakt mit dem erwarteten Ende einer Äußerung eine Taste zu drücken. Die Ergebnisse zeigen, dass die hier genutzten syntaktischen und semantischen Verstöße die Antizipationsleistung ähnlich beeinflussen – aber auch, dass die prosodische Information für das Turn-taking durchaus von Bedeutung ist.

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## **Testing cognitive models of ego depletion using a within-subject experimental design**

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The ego depletion hypothesis predicts that engaging in an effortful task that requires self-control decreases the ability to maintain high levels of self-control in subsequent tasks. Little is known about what exactly gets depleted in these tasks though. To further explore the mechanisms underlying the depletion effect, we tested alternative choice models that made different predictions about the underlying cognitive processes. As a basis of this test, 70 participants in an experiment repeatedly chose between pairs of snack foods that required a trade-off between taste and healthfulness, a common task in the ego depletion literature. After an initial set of choices used to establish a base-line, participants were depleted by means of a Stroop task and then completed another set of choices. Contrary to the prediction of ego depletion, the mean proportion of healthful choices before and after the Stroop task did not decrease though. As the number of healthful choices nevertheless decreased for some participants, the proposed cognitive models could be tested on a subset of data. While the results question the generalizability of the ego depletion effect as a general psychological phenomenon, the model we propose may be fruitfully used to further explore this phenomenon in future experiments.

## **Computational modeling and process dynamics of intertemporal choices**

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Temporal discounting denotes the fact that individuals prefer smaller rewards delivered sooner over larger rewards delivered later, often to a higher extent than suggested by normative economical theories. We identify three lines of research studying this phenomenon which aim (i) to describe temporal discounting mathematically, (ii) to explain observed choice behavior psychologically, and (iii) to predict the influence of specific factors on intertemporal decisions. On this basis, we opt for an approach integrating postulated mechanisms and empirical findings from these three lines of research. Our approach focuses on the dynamical properties of decision processes and is based on computational modeling. We present a dynamic connectionist model of intertemporal choice focusing on the role of self-control and time framing as two central factors determining choice behavior. Results of our simulations indicate that the two influences interact with each other, and we present experimental data supporting this prediction. We discuss the advances arising for the integration of different strands of research by computational modeling the decision process dynamics of intertemporal choices.

## **What you present is what you get – the effects of presentation format on information search patterns**

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Information search has received increased attention in JDM research and the benefit of process measures for gaining deeper insight into choice processes is evident. However, it is an open question for many process measures whether they are stable and robust with respect to differences in content and context.

We present two studies that show evidence that presentation format changes information acquisition in multi-attribute decision making tasks. We manipulated whether alternatives were presented in columns, and dimensions in rows or vice-versa. Information search patterns were recorded using MouseLabWeb.

We found an effect of presentation format on the classical measures for search patterns: If dimensions were presented in rows, a more dimension-wise search followed than when dimensions were presented in columns.

Deeper analysis of participants' information search suggests that the difference is mainly due to the reading of information that takes place in the initial stage ('reading stage'). In contrast, search in the second stage ('processing stage') seems not to be influenced. However, the effect in the reading stage produces an overall effect on the strategy measure. This finding has important consequences given that there is not standard of presentation. Research results may thus be incomparable and robustness is compromised.

## **Is familiarity-based remembering modulated by aging? An ERP analysis**

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Dual-process models of recognition memory assume that episodic memory decisions rely on familiarity and/or recollection. Aging literature mostly concurs in showing impaired recollection in older adults, whereas results regarding familiarity vary. The few EEG studies that explore recognition memory in elderly from a dual-process perspective suggest that older subjects' ERP correlates of familiarity is influenced by environmental conditions. According to the environmental support hypothesis, age-related memory deficits are mediated by deficient self-initiated processing and become particularly evident in tasks that do not provide adequate environmental support.

In light of this hypothesis, we investigated the effect of aging on ERP correlates of recognition memory under optimized environmental support: We assumed that a response deadline procedure in combination with perceptually rich and colored stimuli would create a test situation that facilitates familiarity-based remembering.

Within the current paradigm, ERP correlates of familiarity were only observed in older adults who performed well in the recognition test. This finding suggests that only high performing elderly can use environmental support to compensate for memory deficits. We emphasize the importance of taking individual performance differences into account when ERP correlates of recognition memory are analyzed in older adults.

## **System 2 functions in decision making: The impact of executive functions on decisions under risk and ambiguity**

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In decision situations under risk, explicit information about the rules for gains and losses are provided. Therefore, deliberative processes (System 2), especially guided by higher level executive functions, should theoretically be involved in the decision-making performance. In decisions under ambiguity, no explicit information is provided, and performance should theoretically rely on intuitive processing (System 1) unaffected by executive functions. But does the impact of executive functions simply vanish or does it continuously adapt to the amount of the decider's knowledge about rules? In brain-healthy subjects, we compared the roles of different executive functions for decision situations with three levels of knowledge about the rules for gains and losses: high explicit knowledge (decisions with explicit risk information in the Game of Dice Task;  $n=270$ ), medium explicit knowledge (late phase of the Iowa Gambling Task when subjects have constructed rule-knowledge;  $n=161$ ), low explicit knowledge (intuitive learning phase of the Iowa Gambling Task;  $n=161$ ). In structure equation models executive functions (modeled on latent level) predicted decision-making performance less the lower explicit knowledge was. This decrease is in line with continuum views on dual system accounts: Depending on the situation, different amounts of System 1 and System 2 functions may be involved in decision-making.

## **How do morals come – and stay – in the game? Relational models in a repeated public good game**

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Relational models and moral motives (Fiske, 1992; Rai & Fiske 2011) are theorized to shape the behaviour of social interactions, including the regulation of everyday economic exchanges. Yet, the establishment and stability of these models over time has seldom been studied. While the impact of relational models on cooperation in one-shot dyadic games has been experimentally demonstrated, their behavioural impact in the context of repeated interactions in an extended social (group) setting is still to be explored. The present study addressed this gap. In an experimental, multi-turn public good game, 40 groups of 4 participants randomly received a situational framing of either one of two relational models: "market pricing" or "communal sharing". Interestingly and in contrast to findings in one-shot cooperation games, the experimental manipulation had no effect on the individual contributions in the first turn. However, looking at the *total individual* revenue at the end of the game, participants in groups in the "communal sharing" condition obtained more net profit than participants in the "market pricing" condition. These results suggest that relational models help to establish social norms in repeated group interactions, thus facilitating (or hindering) group achievements over the long run. Implications for group collaboration and directions for future research are discussed.

## Disgust regulation via placebo: An fMRI study

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This fMRI study investigated whether placebo treatment can modulate disgust feelings. Disgust-prone women underwent a retest design where they were presented with disgusting, fear-eliciting and neutral pictures once with and once without a placebo (inert pill presented with the suggestion that it can reduce disgust symptoms). The placebo provoked a strong decrease of experienced disgust, which was accompanied by reduced insula activation and decreased effective connectivity in a network consisting of the insula, the amygdala, the anterior cingulate cortex, and the orbitofrontal cortex. Moreover, the placebo increased amygdala-DMPFC coactivation as revealed by psychophysiological interactions. These placebo-induced neural changes were specific for the disgust condition, and were not present in the fear condition. Our findings suggest that placebo use can modulate a specific affective state and might be an option as a first therapy step for clinical samples characterized by excessive and difficult-to-control disgust feelings.

## Mental rotation in visual and haptic object comparison

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We applied the original Shepard and Metzler mental rotation task (1971) in an active touch setting. Two objects, given simultaneously to the participants, were to be classified as identical or mirrored by both haptic and visual exploration. Participants also performed a classical visual mental rotation task. The question was whether the linear increase in RT as a function of angular rotation, typically found for the visual task, will also be found in active touch. Both tasks include perceptual, memory and motor components. The notion of functional equivalence does not sufficiently explain the interlocked mechanisms of sensorimotor control and perceptual processes. If motor processes prolong RT due to overt behavioral processes only additively, individual slopes should show a high degree of correspondence. Our approach considers the role of the visual and haptic working memory and emphasizes the function of anticipatory control of actions. Within-subject comparisons of the frequencies of movements in the visual and haptic information pick-up elucidate the importance of internal sensorimotor models for the process of mental rotation. Results show the importance of considering the particular influences of different memory skills in mental rotation.

## **Awareness in contextual cueing of visual search as measured with concurrent access and phenomenal conscious tasks**

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In visual search, context information from repeatedly presented display configurations can serve as a cue to guide attention to the target (contextual cueing). The current study addresses the question whether information about the target location in repeated displays is explicit by asking observers, after each trial of a masked localization task, about their visual experience of the target and their confidence regarding their search response. In two concurrent experiments, consciousness ratings were measured (1) after learning and (2) during learning of repeated configurations.

The results were that of reliable contextual cueing in both experiments. Additional analyses of individual repeated displays showed that the effect was generated by only a few ( $4 \pm 2$ ) displays. These two results suggest an effect of contextual cueing on attentional guidance, but that it is limited to those displays that were learned throughout the course of the experiment. And, for “cueing” displays, consciousness ratings were increased relative to non-repeated displays. Interestingly, awareness of repeated displays occurred concurrently with contextual cueing already in the first epoch of learning. We argue that (1) single display analysis is necessary to reveal the mechanisms of configural learning and that (2) learned displays can enhance availability of visual information in the global workspace.

## **Blindsight: How thalamus communicates with cortex**

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Blindsight refers to the paradoxical phenomenon occurring in individuals with injury to primary visual cortex (V1): Despite the absence of visual experiences, the capacity to correctly detect visual stimuli is maintained. From a neurobiological perspective, studying this phenomenon is intriguing as it promises to reveal important information on the channels of the visual system that operate independent of V1. For a long time it was believed that blindsight results from a complex subcortical pathway that connects retinal ganglion cells with motion-sensitive neurons in visual association area V5/MT via a relay system through superior colliculus and pulvinar. Our recent fMRI studies in a macaque monkey model of blindsight have enabled us to experimentally challenge this view using systematic manipulation of the thalamus. We found that i) at the cortical level blindsight related activity can be found in areas outside area V5/MT, including areas of the ventral stream thought to contribute to object perception, and ii) at the thalamic level a dependence of blindsight functions on intactness of the lateral geniculate nucleus (LGN). In summary, our results demonstrate the presence of a thalamo-cortical network that operates independent of primary visual cortex and can account for blindsight.



## **Effect of narrative reports about vaccine adverse events and bias-awareness disclaimers on vaccine decisions: A simulation of an online patient social network**

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This study quantitatively examines if and how reading statistical and/or narrative information as typically displayed in online patient networks affects decisions for pharmaceuticals. Previous work suggests that narrative information (e.g. about vaccine-adverse events, VAE) impacts risk perceptions and intentions. We compare the effect of narrative and statistical information about VAE on vaccination decisions and examine if a disclaimer reduces the narrative bias as well as if low numeracy leads to increased use of the narratives. In an online experiment, 458 participants were randomly assigned to a 3 (relative frequency of vaccine adverse events in 1, 7, or 17 of 20 cases)  $\times$  3 type of information (narratives, summary statistics, both)  $\times$  2 (bias-awareness vs. control disclaimer) between-subjects design. Dependent measures were the perceived risk, vaccination intention and subjective numeracy. Higher relative frequency of cases reporting VAE decreased the intention to get vaccinated. This relation was mediated by increased risk perception. The type of information moderated the contents' impact: summary statistics had the smallest impact, while narrative information was more influential and the presence of both types of information had the greatest impact on risk perception. Individuals who received the bias-awareness disclaimer were less influenced by the patient network.

## **Indirect measures in forensic psychology – an empirical overview and applied implications**

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In forensic contexts validity is of paramount importance. Decisions based on forensic assessments have far-reaching consequences for testees as well as members of society in general. Therefore, self-report data are particularly problematic. The search for less transparent and deliberately controllable measures has sparked research interest in implicit and/or indirect measurement paradigms. Especially in the domain of deviant sexual interest in children (DSI) a substantial body of such measures has undergone first validation studies involving forensic populations. This talk gives a short overview of different indirect DSI measures focusing on the most robust paradigms. Apart from reviewing relevant effect sizes a short introduction into terminological distinctions, methodological considerations, and implicit assumptions about implicit measures concerning their usefulness in applied forensic contexts is given. Hereby, the social-cognition literature on this topic is emphasized and implications for future research on indirect measures of DSI are outlined.

## Enforcing double dissociations between measures of priming and awareness (or anything else)

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Unconscious perception can be demonstrated by establishing an experimental manipulation that leads to opposite effects in an indirect measure of visual perception and a direct measure of visual awareness. Such a double dissociation (e.g., between priming and identification of a masked prime) rules out that both effects are controlled by only a single source of conscious information. Importantly, it requires none of the restrictive assumptions needed for demonstrating that a masked prime is “invisible” [Schmidt & Vorberg, 2006, Perception & Psychophysics, 68, 489-504]. Here a psychophysical procedure is demonstrated that enforces double dissociations between masked priming and prime visibility by experimentally inducing qualitatively different time-courses of visual masking. Participants respond to visual targets preceded by masked primes, and the intensity of the mask is systematically coupled to the prime-target SOA so that prime visibility either increases or decreases with SOA. A double dissociation is produced when motor priming effects keep increasing with SOA no matter whether prime visibility increases or decreases. Such “enforced double dissociations” between priming and awareness are demonstrated for response priming and Eriksen paradigms. The technique can be applied to explore double dissociations in arbitrary fields under tight experimental control.

## Good gestalts in an enforced dissociation paradigm

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The grouping principle of *good gestalt* or *prägnanz* states that stimulus features are combined such that the result is maximally simple, well-structured, and regular. We investigated the ability of *prägnanz* cues to activate fast motor responses as a function of visual awareness. We simultaneously presented two central masked prime triangles (one inverted). Participants responded to peripheral target triangles (one inverted) that followed the primes with varying stimulus onset asynchronies (SOA). Primes and targets triggered the same (consistent) or other (inconsistent) response. The participant was asked for the position of the (inverted) target triangle that was either on the same or other side as the (inverted) prime triangle. Primes were occluded by two to four overlapping shapes such that the visual system had to rely exceedingly on the *prägnanz* principle to extract the triangle shapes. Importantly, masking strength and SOA were coupled so that prime visibility either increased or decreased with SOA. Observed compatibility effects increased with SOA when masking decreased at the same time. However, compatibility effects were not modulated by SOA when masking increased. We discuss the implications for our understanding of the visual processing on the basis of *prägnanz* cues.

## **Working memory performance fluctuations in elementary school: Predictors of day-to-day and within-day fluctuations**

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The role of working memory (WM) in the school context so far has been investigated only at the between-person level, i.e., addressing presumably stable differences between children. As studies with adults show, however, WM capacity can also vary systematically from day to day or across occasions within days. The FLUX Project aims at quantifying such fluctuations and investigating their antecedents and consequences. In the present study, 110 3<sup>rd</sup> and 4<sup>th</sup> graders were assessed on several blocks of one numerical and one figural-spatial WM updating task across four weeks for three sessions per day (at beginning of school, end of school, and in the afternoon) using smartphones. Additionally, self-reports were collected at each occasion and a subsample carried accelerometers to continuously measure physical activity. Multilevel models show that reliable fluctuations at the block-to-block, occasion-to-occasion, and day-to-day time-scale exist, as well as individual differences in the amount of such fluctuations. Predictors at the between-person level (e.g., fluid intelligence and personality traits predicting interindividual differences in the amount of fluctuations) as well as at the within-person level (e.g., intraindividual couplings of variables like motivation, affect, sleep, and physical activity with fluctuations of WM performance) are explored using structural equation multilevel models.

## **Event-related potentials associated with age differences in context updating**

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The updating and maintenance of context information is highly important for the flexible control of behavior and age-related declines in cognitive control tasks have been linked to failures in updating context representations. We assessed context updating with the AX-Continuous-Performance-Task (AX-CPT) in which correct responses to probe stimuli were either dependent or independent on the preceding cue. An EEG approach was applied to examine the neuronal correlates of age-related differences in context updating, particularly to separate early updating processes (as measured with the P2) from task-reconfiguration (indexed by the P3b) and task-maintenance processes (reflected in the Contingent-Negativity-Variation, CNV). Our behavioral data are in line with age-related decrements in context updating as we found longer latencies and higher error rates on context-dependent than -independent trials for older than younger adults. The ERP-data showed no context effect in the early P2 or age differences therein. Age-related effects were found in the P3b: larger amplitudes were elicited for context-dependent than -independent trials only in younger adults. The CNV was larger for context-dependent than -independent trials but this effect did not vary with age. In sum, our results suggest that age differences in updating context representations were primarily associated with failures in task-reconfiguration processes.

## **How sadness influences event-based prospective remembering – A phase-specific approach**

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First studies suggest that negative mood influences prospective memory performance (Kliegel et al., 2005; Rummel et al., 2010), but the direction of the effect is still under debate. Thus, the present study aims to further examine the relation between mood and prospective memory. Based on the process model of prospective memory (Kliegel et al., 2002) sad mood was inducted with the help of pictures during the encoding, delay or intention initiation phase. Results suggest differential effects as a function of phase and are discussed with respect to conceptual and applied perspectives.

## **The relationship between language and speaker attitudes – Insights from a new scale**

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Although languages per se and speakers of languages are clearly distinguishable attitude objects, language attitudes are often not differentiated from speaker attitudes. Accordingly, a number of instruments exist to measure attitudes towards speakers, but systematic and differentiated instruments to assess attitudes towards languages are lacking. We therefore developed a new scale –the *Attitudes towards Languages (AToL)* scale, which assesses language attitudes on three dimensions: value, sound and structure. The instrument was developed based on the evaluation of three languages (German, English, French) and two language varieties (Bavarian, Saxonian) in German samples. It emerged that value is a superordinate factor, while sound and structure are unrelated subordinate factors. The three-factor structure of the AToL scale was replicated in the major languages of five different countries (England, France, Italy, Spain, Serbia). Across studies, we found specific relational patterns of the AToL dimensions with speaker attitudes (sound – warmth; structure – competence). Additionally, we obtained experimental evidence, which demonstrates that the influence of language attitudes on speaker attitudes is stronger than vice versa. Finally, a study employing the AToL scale in the marketing context serves to discuss the importance of language attitudes for applied contexts.

## The influence of social exclusion on the willingness to share morally questionable material on the internet

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The problem of social exclusion particularly occurs in places where people with different cultures, classes, religions, and personalities meet (e. g. school, university, Internet)(Lareau & Horvat, 1999). It can lead to consequences like aggressive behaviour towards neutral persons (Twenge, Baumeister, Tice, & Stucke, 2001). One such aggressive behaviour can be the dissemination of material that exposes or hurts other persons via the Internet. The present study deals with the question whether social exclusion leads to an increased sharing of morally questionable material on the Internet. 70 participants aged 18-53 ( $M=23.46$ ,  $SD=6.17$ ) were examined. As experimental manipulation of social exclusion the Cyberball game was used. Affective changes elicited by the manipulation were also assessed. Afterwards nine morally non-questionable and nine morally questionable pictures showing physical violence or exclusion were presented. Participants were asked to rate how probably they would share those pictures on the Internet (from 0 to 100%). Results show that no significant differences between the conditions occurred. However, changes in negative affect were significantly related to the probability of sharing morally questionable material. Our results indicate that exclusion only has an indirect influence on the willingness to share morally questionable material through changes in negative affect.

## Diversity influences hypothesis selection in sequential diagnostic reasoning: A process tracing study

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Sequential diagnostic reasoning describes the process of finding a best explanation for a given set of observed symptoms. When choosing explanations for sequentially presented symptoms, symptom diagnosticity, described as the specificity of a single symptom for a certain diagnosis, plays an important role. Kim and Keil (2003) proposed that for one candidate hypothesis the diversity of symptoms also influences hypothesis selection. Two symptoms are diverse if the causal chains leading to them differ. In order to test diversity in diagnostic reasoning with more than one candidate hypothesis, we varied the degree of symptom diagnosticity and diversity in a reasoning task from memory. Participants ( $N = 41$ ) were sequentially presented with four symptoms and had to choose which of four candidate hypotheses best explains the data. Eye-movements were recorded to trace the reasoning process (Renkewitz & Jahn, 2012). When a diverse and a diagnostic explanation were equally supported by the material, participants preferred the diverse explanation among the diagnostic alternatives. Eye movements varied as a function of the chosen hypothesis. The causal relation between symptoms and explanation plays an important role in sequential diagnostic reasoning with four hypotheses. Eye-tracking is a valuable tool for observing memory-based reasoning processes of symptom integration.

## Reappraising the influencing power of backward masked words

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The myth of manipulating people without them being aware has a long tradition within and outside the scientific community. One of these phenomena that has led to a controversial debate is the claim that time-inverted messages could enter someone's cognitive system to control thinking, feeling, or behavior. The results of our study show that the forward meaning of time-inverted single words has an influence on people's evaluations of these sounds. Contrary to former studies, we found that participants' evaluations of sounds of backward speech were influenced by the semantic content of the messages. Furthermore, participants' evaluations of backmasked messages were also influenced by sound symbolism. The results demonstrate that people's evaluations can be influenced by applying time-inverted messages.

## Neural correlates of emotional interference during cognitive processing in borderline personality disorder

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*Background:* Previous studies of cognitive alterations in Borderline Personality Disorder (BPD) have yielded conflicting results. Given the emotional lability and deficient emotion regulation in BPD patients, it seems conceivable that short-lasting emotional distress might exert temporary detrimental effects on cognitive performance in BPD. *Methods:* Here we used functional magnetic resonance imaging (fMRI) to investigate how task-irrelevant emotional stimuli (fearful faces) affect performance and fronto-limbic neural activity patterns during attention-demanding cognitive performance in female, unmedicated BPD patients relative to age-matched healthy controls. In a modified flanker task with fearful faces as distracters in the background, participants had to respond to a target stimulus flanked by congruent or incongruent stimuli, ignoring the emotional background pictures.

*Results and Discussion:* Patients showed an atypical response pattern of the right amygdala and increased activation of both the rostral and the dorsal anterior cingulate cortex (rACC, dACC) during emotional interference in the incongruent flanker condition. Moreover the ACC response was negatively correlated with trait anxiety in the patients, but not in the healthy controls. As trait anxiety also correlated positively with reaction times, we suggest that anxiety might adversely affect compensatory mechanisms of emotion regulation in BPD patients.

## **SNARC struggles – instant adjustments of spatial-numerical associations**

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Numerical magnitude is mentally associated with spatial location: Small numbers are typically responded to faster with left (than with right) motor responses and high numbers with right (than with left) responses, the SNARC effect. We investigated to which extent this relationship is subject to short-term variations. Participants carried out a parity judgment task, in which the task-irrelevant numerical magnitude did or did not correspond to the required motor response. The SNARC effect was reduced following trials with non-corresponding rather than corresponding responses. This observation and more fine-grained analyses suggest that numerical magnitude is flexibly decoupled from spatial codes, specifically when it had turned out to be detrimental for task performance.

## **Redundancy gain for responses to semantic features of individual words**

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Participants usually respond faster to redundant than to single target information. Previous research has shown that this gain in reaction time (RT) is not limited to responses to proximal stimulus features but can also be observed for responses to illusory redundant percepts. The present study examined whether a redundancy gain also occurs when target-information must be retrieved from semantic memory. In a go/nogo task, participants were asked to respond with a key-press to an individual written word (e.g., elephant) based on its associated color (e.g., gray) and category (e.g., animal). For each participant, one of three colors (gray, brown, or white) and one of three categories (animal, food, or object) were defined as targets. Each word was associated with two targets (redundant-targets condition), one target and one non-target (single-target conditions), or two non-targets (nogo condition). Mean RT was shorter in the redundant-targets condition than in the faster single-target condition. Hence, the present study provides first evidence that redundancy gain can even occur when target-information must be retrieved from semantic memory.

## **Preattentive grouping in visual selection**

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The efficiency to find a target object in a visual scene depends on the features of the target, but also on the structure of the background scene. Dissimilarity between target object and surrounding context elements usually increases search efficiency, and so does similarity between context elements themselves. In several experiments we investigated the role of context similarity in visual selection. In a first series of experiments we varied the spatial configuration of the same context elements and examined behavioral search efficiency as well as the neural processes involved in processing the same target when surrounded by context arrangements of varying homogeneities. Results showed evidence that contextual grouping and local target detection both contribute in parallel to perform the visual search task. In a second experimental series we studied the temporal dynamics of attentional selection and context grouping. Similar context configurations as in the first experimental series were used and combined with a selective attention task. Results showed that context grouping precedes attentive selection and has a strong impact on the way visual attention is deployed in the scene.

## **The effects of psychosocial stress on selective attention: Investigating negative priming**

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It has long been argued that stress leads to increased selective attention (e.g., Chajut & Algom, 2003; Easterbrook, 1959). If this were the case, then empirical markers of selective attention, such as negative priming, should be increased. Negative priming denotes the fact that reaction times are slowed down when the target in the current trial has been a distractor in a previous trial, relative to when the target has not occurred before (e.g., Tipper, 1985; Fox, 1995). In the present study, a group of subjects was put under psychosocial stress using the 'Trier Social Stress Test' procedure (Kirschbaum, Pirke & Hellhammer, 1995), and subsequently performed a negative priming task. These subjects showed increased category-based negative priming relative to a control group who was not put under stress. Somewhat surprisingly, we only found category-based negative priming, but no stimulus-based negative priming, in both groups. This might be due to the particular paradigm used, which involved a categorization task. The results are discussed in the context of current theories on how stress modulates cognitive control processes.



## Test order effects within a computer test battery in high stakes assessment: Varying objective personality tests and cognitive ability tests

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An experiment is presented to address the problem of test order effects in high stakes assessment. While no significant effects were found by changing the order of different personality questionnaires (Eisenhauer, 2008), significant effects were demonstrated with regard to the variation of the order of ability tests (Czarnolewski et al., 1997; Eiselt, 1991; Földényi et al., 1999). Moreover, it was shown that cognitive ability tests may influence test results of personality questionnaires (Hambros, 2002) and objective personality tests (Khorramdel & Frebort, 2011) when administered first. Extending the findings of Khorramdel & Frebort (2011), the current study again varied objective personality tests and cognitive ability tests within a computer test battery. Objective personality tests were applied to measure working styles (decisiveness, exactitude, grade of objective, frustration tolerance and achievement motivation), resilience and self-management abilities; cognitive ability tests were applied to measure reasoning, verbal intelligence, numeric intelligence and memory. 70 applicants who applied for a manager trainee programme within the Austrian Federal Railway were tested within a real selection procedure. The results of this experiment are presented with regard to the findings of Khorramdel & Frebort (2011), and the largely unconsidered combination of test or task orders in assessments is discussed.

## Risk attitudes are influenced by music-induced incidental emotions

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Affective processes are increasingly understood as an integral part of decision making under risk. Even incidental emotions that arise from factors unrelated to the decision have been reported to affect behavior. We investigated the influence of music-induced incidental emotions on risk attitudes in a within-subject design. The conditions differed in the kind of music being played to subjects (happy and sad music, simple tone sequences, or no music). In each condition, subjects then completed a repeated pairwise lottery-choice task. Risk attitudes were analyzed by estimating the degree to which the riskier lottery was chosen and by estimating subjects' coefficients of relative risk aversion in the different conditions. With regard to our experimental manipulation, we observed changes in subjective emotion ratings immediately after the musical stimulation that decreased over time. Concerning risk attitudes, we found evidence in favor of an effect of incidental emotions. Participants showed lower risk aversion after listening to happy music than after listening to sad music. Our results also indicate a decreasing effect of music-induced emotions on decision making over time, mirroring the subjective emotion ratings. Implications for future research will be discussed.

## Does prospect theory capture psychological processes?

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Prospect theory is often regarded as an “as-if” model, devoid of psychological content (e.g., Gul & Pesendorfer, 2008). At the same time, prospect theory has been used to examine individual differences with the claim that it allows to measure and characterize people on psychological constructs such as probability sensitivity, outcome sensitivity, and loss aversion (e.g., Pachur, Hanoch, & Gummerum, 2010; Glöckner & Pachur, 2012). The question whether individual differences, measured by prospect theory, reflect individual differences in information processing has never been tested. Our goal was to conduct such a test by combining computational modeling based on cumulative prospect theory (CPT) with tracking pre-decisional information search.

We presented students with 91 binary-outcome gamble problems twice, within an interval of three weeks, using MouselabWeb (Willemssen & Johnson, 2011) and recorded how participants’ acquired information about the gambles.

We find that parameters from CPT and process tracing are relatively stable over time. Mapping CPT parameters onto process tracing parameters indicates positive correlations for, e.g., the relative number of acquisitions of negative to positive outcomes with lambda. Finally, people with high numeracy search more within gambles and pay more attention to outcomes than people with low numeracy.

## More than average: Effects of attractiveness and distinctiveness on the learning of faces and its associated ERPs

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Faces that are averaged across multiple images often look more attractive than single instances. The “averageness hypothesis” therefore attributes attractiveness of faces to their averageness (as opposed to distinctiveness). Contrarily, the “contrast hypothesis” assumes higher distinctiveness for high attractive faces (see DeBruine et al., 2007).

Actually, ratings of attractiveness and distinctiveness of highly attractive models (instead of averaged faces) were positively correlated. In a learning study, we recorded event-related potentials (ERPs) to investigate effects of attractiveness and distinctiveness on face learning. Participants learned non-attractive & non-distinctive (A-/D-), non-attractive & distinctive (i.e., caricatured; A-/D+), and attractive & distinctive (A+/D+) faces. In a subsequent familiarity task on learned and novel faces, we found fastest hits for A+/D+ and fastest correct rejections for A-/D+. More negative N250 amplitudes were observed for both groups of distinctive faces, an effect that already began in the time range of P200. LPC was larger for attractive and distinctive faces. From N250 onwards, an additional, long-lasting negativity for learned attractive faces emerged.

Taken together, the findings support the contrast hypothesis, even during early visual processing, and indicate that the effects of high attractiveness go beyond those of distinctiveness, underlying the role of attractiveness as an important biological signal.

## There's more behind it: Interactions of depth order and numerosity in transparent motion

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When a cloud of moving dots contains two motion directions, observers see two transparent surfaces behind each other. It is unknown how this ambiguous depth order is resolved and how it affects the perception of the two surfaces. Thus we investigated how motion direction, perceived depth order and perceived numerosity interact in transparent motion. We presented two overlapping random dot kinematograms (RDK) with motion directions separated by 45°. The RDKs were presented either at the same or at different disparities and we manipulated the distribution of dots to the two RDKs in ratios from 0.2 to 0.8. Observers had to indicate the direction of the RDK containing more dots or the direction of the RDK perceived in the back.

In the absence of disparity, directional biases for numerosity and for depth order judgments were correlated: directions that were more likely to be perceived in the back, were also more likely to be perceived as more numerous. When the RDKs were presented at different disparities directional biases vanished, but numerosity was overestimated for the RDK in the back and underestimated for the RDK in the front. These results indicate that the numerosity is overestimated for motion in the background.

## Unconscious, incongruent primes initiate invalid motor actions

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The theory of event coding states that movements are initiated based on event files, which integrate action and stimulus codes. Reaction-time tasks showed that prior presentation of incongruent stimuli impedes movement initiation and increases reaction times. We asked whether incongruent, unconscious primes would not only increase reaction times, but initiate false movements. To this end, 20 participants had to execute a choice-reaction task. Target pictures showed a basketball player passing the ball past the left/right side of the participant. Participants reacted by executing a 'blocking movement' to the corresponding side. The shift of the participants' centre of mass (COM) was measured. Target pictures were preceded by prime pictures depicting the same player with congruent or incongruent gaze direction and/or pass direction (2x2 design). Incongruent primes resulted in an initial shift of the COM in the false direction. The size of this false shift was measured 320 ms after the target presentation. Results showed a significant main effect of pass congruency,  $F(1,19) = 55.02$ ,  $p < .001$ , and a significant main effect of gaze congruency,  $F(1,19) = 123.00$ ,  $p < .001$ . The false shift was stronger if pass direction and/or gaze direction were incongruent. This result demonstrates that unconscious, incongruent primes initiate invalid movements.

## **Counter-regulation triggered by emotion inductions: Positive/negative affective states elicit opposite valence biases in affective processing**

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We investigated whether counter-regulation in affective processing can be triggered by typical emotion inductions. Counter-regulation means a preferential attention allocation to stimuli which are opposite to the current affective-motivational focus (Rothermund, Voss, & Wentura, 2008). In the present study we measured automatic attention allocation to valent stimuli in the context of positive and negative affective states. To assess valence biases we compared the detection of positive vs. negative words in a visual search task (Experiment 1) or interference effects of positive and negative distractor words in an Emotional Stroop Task (Experiment 2). Imagining a hypothetical emotional situation (Experiment 1) or watching romantic vs. depressing movie clips (Experiment 2) increased attention allocation to stimuli that were opposite in valence to the current emotional state. The finding of counter-regulatory incongruence biases in the context of emotions is important for the assumption that counter-regulation reflects a basic mechanism underlying implicit emotion-regulation.

## **Compensating tendencies in penalty kick decisions of referees in professional football: Evidence from the German Bundesliga**

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Using a large representative data base (12902 matches of the german top professional football league) we show that the number (441) of 2-penalty matches is larger than expected by chance, and that among these 441 matches there are considerably more matches in which each team is awarded one penalty than would be expected on the basis of independent penalty kick decisions. Additional analyses based on the score of the match before the penalty is awarded and on the timing of the penalties suggest that awarding a first penalty to one team raises the referee's penalty evidence criterion for the same team, and lowers the corresponding criterion for the other team, a form of "retributive (in-)justice".

## **Darstellung dynamischer Systeme – die Wirkung multimedialer Simulationen auf die Performanz in Stock-Flow-Aufgabe**

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Probleme im Verständnis komplexer Dynamiken in zahlreichen Zusammenhängen haben mitunter weitreichende Konsequenzen, wie gesellschaftliche Diskussionen zu Themen wie z.B. Staatsverschuldungen oder Klimawandel deutlich machen. Wichtige Bestandteile komplexer Dynamiken lassen sich durch sog. Stock-Flow-Systeme abbilden, die sich auf nur drei Größen reduzieren lassen: Zufluss, Abfluss und Bestand. Ungeachtet der Einfachheit solcher Systeme zeigen Versuchsteilnehmer wiederholt recht schlechte Leistungen in Stock-Flow-Aufgaben (e.g. Cronin, 2007; Ossimitz, 2002; Phuah, 2010; Schwarz & Sedlmeier, in prep.; Strohecker, 2010). Eine Möglichkeit diese Leistung zu verbessern, könnte die Nutzung animierter und multimedialer Anzeigen sein, wie bisherige Untersuchungen im Stock-Flow-Kontext (Brockhaus & Sedlmeier, in prep.) bzw. aus der Mathematikdidaktik (Vogel, Girwidz & Engel, 2006) nahelegen. Folgerichtig untersuchte die aktuelle Studie die Wirkung animierter Computersimulationen und spezifischer multimedialer Anzeigen (Supplantation) auf die Performanz in Stock-Flow-Aufgaben. Daten aus einer stark mathematisch vorgebildeten Stichprobe deuten auf differenzierte Wirkungen der Darstellungsformen bzgl. Geschlecht und Mathematikkenntnisse hin. Die Ergebnisse werden im Lichte bisheriger Befunde und perspektivischer Forschungsvorhaben diskutiert.

## **Entwicklung und Evaluation des HMIs eines Ein- und Ausfädelassistenten**

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In dem Forschungsprojekt FAMOS – Galileo for Future AutoMOtiveSystems wurde ein Assistenzsystem zum Ein- und Ausfädeln auf die / von der Autobahn entwickelt. Das Human-Machine-Interface (HMI) des Assistenzsystems umfasst eine visuelle Anzeige im Fahrzeugcockpit, eine visuelle Anzeige am Außenspiegel und akustische Signale. Da die Fahrsituation und die Fahraufgabe komplex sind, wurden die Signale identifiziert, die das Verhalten möglichst effektiv beeinflussen können. Die Anzeige der Angemessenheit der gefahrenen Geschwindigkeit und das Vorhandensein von Gefährdungspotentialen bilden zwei zentrale Darstellungsprinzipien. Akustische Informationen dienen der Signalisierung spezifischer Situationen, beispielsweise dass ein Fahrstreifenwechsel gefahrlos möglich ist. Das HMI wurde in zwei Studien im Fahrsimulator untersucht und anhand objektiver und subjektiver Daten evaluiert. Es zeigt sich, dass das System sicheres Fahren unterstützt und die Probanden den Aufbau und die Funktionalität positiv bewerten.

## **Age and individual differences in visual working memory capacity and filtering efficiency: Filtering on the basis of location**

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It is well known that the capacity of working memory (WM) varies across individuals and declines with age. There is already evidence that the ability to prevent irrelevant information from being stored in WM is responsible for the individual variation. According to the inhibition-deficit theory (Hasher & Zacks, 1998), inhibition works less efficient in older adults leading to the age-related decline. In accordance to this theory, older adults showed a deficit in ignoring irrelevant information. However, in contrast to the individual differences, this age-related deficit stemmed from a delay in efficient filtering, seen in different time courses of filtering in event-related potentials (ERPs). Aim of this study was to examine whether age effects in terms of delayed filtering still appear with an easier selection criterion. Young and old participants performed a change-detection task, where they had to filter out irrelevant information on the basis of location. While performing this task, ERPs were recorded and served as an online measurement of how much irrelevant information were actually stored in visual WM. In addition, we investigated time courses of filtering. We observed age and individual differences, which we will discuss with respect to their origin.

## **I remember what you did: Recall of simulated action plans**

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Evidence suggests that motor plans are not generated from scratch for each movement, but features of recently generated plans are recalled and used for subsequent movements. This study investigated whether the observation of an action is sufficient to trigger plan recall processes. Height matched dyads performed an object manipulation task under various conditions. One participant grasped a plunger from a home platform (90cm high) and transported it to a target platform (50cm, 70cm, 90cm, 110cm, or 130cm high, home-to-target moves). After bringing the hand back to the side, either the same (intra-individual condition) or the other participant (inter-individual condition) returned the plunger to the home platform (target-back-to-home moves). In general, grasp heights were inversely related to the heights of target platforms for the home-to-target moves. For the target-back-to-home moves, participants grasped the plunger close to where they had grasped it during the home-to-target moves, irrespective of condition (intra- vs. inter-individual). These findings not only provide further evidence that participants mentally simulate observed actions, but that these simulated action plans are recalled and used for subsequent own actions.

## Social interaction divergently affects testosterone and progesterone

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**Background:** Compared to being part of a social group, social exclusion can represent a massive psychosocial stress situation in daily life. The present study examined the impact of social exclusion compared to inclusion on hormones as well as subjective affect ratings. **Methods:** Eighty subjects (40 females) participated in two independent behavioral experiments. We applied a social exclusion as well as an inclusion version of a virtual ball tossing game with two putative “other players”.

**Results:** Social exclusion led to a decrease in positive mood ratings, but increased anger ratings. By contrast, social inclusion did not affect mood ratings, but decreased sadness ratings. Both manipulations did not affect cortisol levels. Testosterone significantly decreased after being excluded in both genders, but increased after inclusion only in males. Progesterone increased after both conditions in females, but not in males.

**Discussion:** Our results suggest that social rejection does not trigger a classical stress response. The testosterone decrease after social exclusion in both genders, as well as the increase during inclusion in males can be interpreted within the framework of the biosocial status hypothesis. The progesterone increase reflects a generalized affiliative response during social interaction in females.

## **Task sharing can change the fate of task irrelevant information: Evidence from the picture-word interference paradigm**

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In two experiments we employed the joint version of the picture-word interference paradigm to investigate whether and to what extent task sharing modulates individual's performance. Participants were required to name a target picture while ignoring a distractor word that could be either semantically related or unrelated and written in two different formats: upper-case (MOUSE) in Experiment 1 and alternated-case (mOuSe) in Experiment 2. In both experiments, participants performed the task first individually (baseline) and then co-acting with an alleged partner who was thought to read the distractor word. Results showed that, compared with a control condition in which participants continued to perform the task individually, the social manipulation reduced significantly RTs. More interestingly, task sharing eliminated the typical semantic interference effect (i.e., slower naming times for semantically related picture-word pairs) but only when alternated-case distractor words were used (in Experiment 2). These results can be explained by assuming that the belief of co-acting with another person leads participants to ignore the distractor words because another person is in charge of them. Such a division-of-labor strategy allows preventing the competition with the alternative response but it is effective only when written word recognition is delayed by case alternation.

## **Staying focused: Implementation intentions can reduce the attentional bias of compulsive buyers**

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This research examines affective arousal and an attentional bias toward shopping-related stimuli as processes that underlie the tendency for compulsive buying. In addition, we examined whether implementation intentions can help compulsive buyers to shield themselves against distracting stimuli in shopping situations. Pupil diameter (as measure of affective arousal) and focus of attention were assessed with an eye tracker during a visual attention task ( $N = 67$ ). The results show that compulsive buyers experience stronger affective arousal in shopping situations than noncompulsive buyers. The results also support the hypothesis that implementation intentions can help compulsive buyers to focus on their shopping goal. Without intervention, compulsive buyers were less able to focus on a focal product and were more easily distracted by other products than noncompulsive buyers. Compulsive buyers who formed implementation intentions could focus their attention better than those who did not form implementation intentions.



## **Transfer of contextual cueing in full-icon display remapping**

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Invariant spatial context can expedite visual search, an effect that is known as contextual cueing. However, disrupting learned display configurations abolishes the effect. In current touch-based mobile devices, such as the iPad, icons are shuffled and remapped when the display orientation is changed, which may hamper usability. In the present study, we examined the transfer of contextual cueing in four different methods of display remapping. We used full-icon horizontal displays for training and both horizontal and vertical displays for testing whether the cueing transfers to vertical displays. The results showed transfer of contextual cueing, but only with the local invariant and the central invariant remapping methods. We take the results to mean that predictability of target locations is a crucial factor for the transfer of contextual cueing and thus icon remapping design for mobile devices.

## **Empathy and self-other distinction over the life-span: Behavioral and neurophysiological evidences**

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Successful social interactions require the capacity of understanding affective and emotional states of others. Humans tend to understand the states of others in relation to their own, but such a self-projection mechanism can result in biased social judgments if confusion between self and others subsists. Recently, we showed that empathic judgments of another person's emotions are indeed systematically biased towards the participant's own current emotions if they are incongruent to those of the other person; and that the size of the bias is associated with variations in neural activity of dedicated brain regions (Silani et al., under revision). In this presentation, I will describe how egocentrically biased judgments change across the life span, showing that the presence of the bias follows a quadratic curve with increasing age. Adolescents and elderly people are in fact less able to disengage from their own emotional perspective compared to mid-aged participants, resulting in more biased judgments of other's affective state, because shifted towards their own emotions. The findings are discussed in light of the maturation and decay of specific functional networks in the brain.

## **Does logic feel good? Probably not! Refuting claims of a fluency mediated intuitive logic**

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Recent research on syllogistic reasoning suggests that the logical status (valid vs. invalid) of even difficult syllogisms can be intuitively detected via differences in conceptual fluency between logically valid and invalid syllogisms when participants are asked to rate how much they like a conclusion following from a syllogism (Morsanyi & Handley, 2012, JEP:LMC). These findings are at odds with most theories on syllogistic reasoning which posit that detecting the logical status of syllogisms requires effortful and deliberate cognitive processes. In a series of experiments we replicated effects of logical status on liking ratings for syllogisms, but showed that these are eliminated when controlling for possible confounds. The results of Morsanyi and Handley reflect differences in mean liking for the presented conclusions rather than effects of logical status itself.

## **Do finger counting postures influence number processing speed in adults?**

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Recent studies suggest a close link between number processing and manual actions such as finger counting (Domahs et al., 2010; Fischer & Brugger, 2011). The present study aimed to provide evidence for cognitive interference between symbolic number processing and motor representations of finger counting postures. Participants were instructed to classify visually presented digits while performing canonical or non-canonical finger counting postures. Some of these postures corresponded with the presented numbers. The seemingly irrelevant execution of certain finger movements activated the mental representation of specific numbers and resulted in a significant classification time advantage. Interestingly, this facilitation effect for congruent posture – number pairs was predominantly found in participants who use the respective postures in their individual number displaying behaviour.

## **Displaced revenge: Can revenge be satisfactory if it aims at a different target?**

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Acts of revenge and retribution often lead to the escalation of intergroup conflicts. Revenge is not always directed against the initial provocateur in these situations, but may also be directed against other members of the offender's group. Our research investigates the motivational roots underlying such acts of "displaced revenge" and the circumstances under which these can be satisfactory for the avenger. Building upon the theoretical framework of "vicarious retribution" (Lickel, Miller, Stenstrom, Denson, & Schmader, 2006), we argue that the degree of outgroup entitativity (i.e., perception as a coherent unit) is important in that regard. In two online studies we found evidence that people experienced less negative affect and more satisfaction after taking revenge on an outgroup member not directly involved in the initial event, when the group was manipulated to be high in entitativity compared to low. The distinct roles of different facets of outgroup entitativity were further investigated in a laboratory experiment. We manipulated whether the target of displaced revenge belonged to a group of individuals displaying either superficial entitativity based on trivial similarities or collective entitativity based on shared behavioral dispositions and mutual interaction. Results will be discussed against the background of the emergence of intergroup conflicts.

## **Aftereffects in the perception of vocal emotion caused by unimodal, bimodal, and crossmodal adaptation**

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The perception of emotions is often suggested to be multimodal in nature (Young et al., 2011), and bimodal as compared to unimodal (auditory or visual) presentation can lead to superior emotion categorization (Collignon et al., 2008). Contrastive aftereffects in emotion perception have been shown for faces (Fox et al., 2007) and for auditory affective vocalization (Bestelmeyer et al., 2010), when adaptors were of the same modality. By contrast, crossmodal aftereffects in the perception of emotion have not been demonstrated yet. In three experiments we investigated the influence of voices as well as dynamic facial videos on the perception of emotionally ambiguous voices morphed on an angry-happy continuum. Contrastive aftereffects were found for unimodal (voice) adaptation conditions, in that test voices were perceived as happier after adaptation to angry voices, and vice versa. Bimodal (voice + face) adaptors elicited even larger contrastive aftereffects, whereas crossmodal (dynamic face) adaptors elicited significant aftereffects in male, but not in female participants. Our results support the idea of contrastive processing of emotions, and show for the first time crossmodal adaptation effects under certain conditions, consistent with the idea that emotion processing is multimodal in nature.

## The effect of harmonic context on the perception of pitch class

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Octave-related tones belong to the same pitch class (PC) and exhibit strong perceptual similarity. Very little research has been published on the influence of harmonic context on the perception of PC equivalence. We analyzed the effect of harmonic context on the accuracy rates and reaction times of musicians' and non-musicians' judgments of PC equivalence by sequentially presenting two tones, either in the absence of harmonic context or within a harmonic context of common major and minor chord progressions.

We found that the presence of a harmonic context decreased the accuracy and speed of recognition of PC equivalence, but only for musicians. Moreover, when tones belonging to the same PC were placed in the same context, judgments of PC equivalence were faster and more accurate than when tones were placed in a different context. When tones belonging to a different PC were placed in the same context, judgments of PC equivalence were slower and less accurate than when tones were placed in a different context. These findings suggest that tones and contexts are perceived as a gestalt: PC equivalence judgments are facilitated when both contexts and tones are the same, or both contexts and tones are different.

## Goal framing influences automatic approach and avoidance behaviors

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On a motivational level, behaviors can be categorized according to whether they serve the purpose of approaching or avoiding objects or states. Similarly, goals can be framed as either the pursuit of a potential gain, or the avoidance of a potential loss. Although there is abundant evidence that goal framing impacts the preference for approach/avoidance-focused deliberate strategies, very few studies (e.g. Förster, Higgins, & Idson, 1998) investigate whether goal framing also affects automatic approach/avoidance behaviors.

We used a modified Manikin task to investigate whether gain vs. non-loss goals influence approach/avoidance behaviors when perceptual feedback on distance regulation is provided and on a trial-by-trial basis. Participants had to either move a Manikin towards or away from a target that signaled either the possibility to win points, or the danger of losing points. This goal framing was randomized across trials. Participants were faster to approach gain-targets and faster to move away from loss-targets. Consequently, our results provide evidence that goal framing automatically affects behavioral tendencies which serve distance regulation, even when the goal framing is realized on a trial-by-trial basis. Implications for theories of approach/avoidance motivation will be discussed.

## Modelling the effect of literacy on multimodal interactions during spoken language processing in the visual world

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Recent empirical evidence suggests that language-mediated eye gaze varies across individuals and is partly determined by their level of formal literacy training. Huettig, Singh & Mishra (2011) showed that unlike high-literate individuals, whose eye gaze was closely time locked to phonological overlap between a spoken target word and items presented in a visual display, low-literate individuals' eye gaze was not tightly locked to phonological overlap in the speech signal but was instead strongly influenced by semantic relationships between items. Our present study tests the hypothesis that this behaviour is an emergent property of an increased ability in the case of high-literates to extract fine grained structure (e.g. phonemes) from the speech signal, with low-literates more reliant on coarse grained structure (e.g. syllables). This hypothesis was tested using an emergent connectionist model, based on the Hub-and-spoke models of semantic processing (Dilkina et al, 2008), that integrates linguistic information extracted from the speech signal with visual and semantic information within a central resource. We demonstrate that contrasts in fixation behaviour similar to those observed between high and low literates emerge when the model is trained on either a speech signal segmented by phoneme (i.e. high-literates) or by syllable (i.e. low-literates).

## Information accessibility as a boundary condition of automatic decision making

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The idea of automatic decision making that approximates normatively optimal decisions without necessitating much cognitive effort is intriguing. Whereas recent findings indeed support the notion that such fast, automatic processes explain empirical data well, little is known about the corresponding boundary conditions. We investigated the role of information accessibility and thus focused explicitly on the impact of information acquisition on information integration processes. In a probabilistic inference task, the standardized *matrix* employed in prior research was contrasted with a newly created *map* presentation format and additional alterations of both presentation formats. Across three experiments, a robust information accessibility effect emerged: Automatic decision making was more prevalent in the *matrix* (with high information accessibility), whereas sequential decision strategies prevailed when the presentation format demanded more information acquisition effort. In addition, findings showed that not the presentation format *per se*, but the extent of information search induced by a format drives this effect.

## Attending to items and sets in working memory: How do retro-cues improve memory retrieval?

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Focusing attention on a single representation or a subset of representations currently maintained in working memory (WM) produces a benefit: when a retro-cue indicates which WM content is relevant for an upcoming recognition task, responses are faster and more accurate. We tested predictions of two explanations of the retro-cue benefit: *removal* and *refreshing*. The *removal* hypothesis states that non-cued items are removed from WM, thereby (1) reducing memory load and (2) freeing capacity. The *refreshing* account states that the cued item is strengthened compared to non-cued items, a mechanism that (3) can be flexibly shifted between multiple cued items, but (4) has to be shared between them. In line with predictions 1 and 2, retro-cues reduced memory load, thereby freeing capacity to encode new information (Exps. 1 and 2). Experiment 3 tested flexible re-allocation of attention by proving a second retro-cue in some of the cued trials. In line with prediction 3, one- and two-cue trials produced similar performance, at least when the cues occur in quick succession. However, disconfirming prediction 4, the number of to-be-refreshed items didn't affect the retro-cue benefit (Exp. 4). This pattern of findings suggests that removal and refreshing are mechanisms contributing to the retro-cue benefit.

## Reading competence, eye movements, and the perceptual span of German first, second, and third graders

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With instruction and practice reading becomes more fluent and accurate. How are these changes reflected in beginning readers' eye movements? This has been mainly investigated for native English speakers; results indicate decreases in fixation frequency and duration and regression probability, and increases in saccade amplitude. Does this suggest increases in the perceptual span, indicating that more characters can be processed during a fixation? We conducted a sentence-reading experiment with 135 German school children from grade one to grade three, using the moving-window paradigm; characters were only visible within a gaze-contingent moving window. First, we analyzed eye movements with different window sizes compared to a no-window condition on individual and grade level. Second, we correlated eye-movement data with test scores for reading fluency (Rapid Automatized Naming Test, RAN; one-minute word-reading and pseudo-word-reading tests of SLRT II) and reading comprehension (ELFE 1-6). Results indicate that reading rate (words per minute; WPM) linearly increases with grade, accompanied by a decrease in the number of fixations per word and the gaze duration. As expected, window-size effects were smallest for first graders, suggesting that the perceptual span increases with reading competence. Reading rate correlated positively with SLRT and ELFE scores and negatively with RAN times.

## Implicit attitude measurement using the affective priming paradigm: A SWOT analysis

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Ever since the affective priming paradigm was introduced by Fazio et al. (1986), it has been the preferred tool for studying the conditions under which attitudes can be activated. More recently, the affective priming paradigm is increasingly used as a means to capture individual differences in implicit attitude activation. Despite several reports attesting to the predictive validity of affective priming measures (strengths), I will demonstrate that the affective priming paradigm does not (yet) meet standard psychometric requirements (weaknesses). I will also argue, however, that attempts to deal with this shortcoming can generate new hypotheses about the processes that drive affective priming measures (opportunities). Finally, I will discuss a number of issues that may prevent the use of the affective priming paradigm in a routine fashion in applied settings (threats).

## Perfectionism and performance monitoring in a force-production task

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Perfectionism is a trait reflecting the individual motivation to show error-free performance in all kinds of situations. We investigated response-related error processing based on the two dimensions of the perfectionism model of Gaudreau and Thompson (2010), where *concern over mistakes* (CM) reflects the tendency to equate errors with personal failure and the expectation of negative consequences like a bad evaluation by others, whereas *personal standards* (PS) represents the demand of very high standards for oneself and the importance of these standards to evaluate one's own performance. In a force-production task, we investigated the response-related monitoring activity in terms of medial-frontal negativity (MFN). The participants (N=84) showed an increase of MFN amplitude after strong responses compared to weak responses. This effect was independent of the response accuracy, which is in line with the assumptions of the force-unit monitoring model of MFN (Armbrecht, Gibbons, & Stahl, 2012). Participants with high CM but low PS showed the largest MFN amplitude after weak force production but the lowest in the high-force condition. These findings support our previous results that the performance monitoring activity was affected differently by the two perfectionism dimensions. The two-dimensional perfectionism model was corroborated by the present results.

## **Energy investment reveals handgrip task difficulty**

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According to motivational intensity theory (Brehm & Self, 1989), energy investment is proportional to task difficulty as long as success is possible and energy investment is justified by success importance. If success is impossible, energy investment is low. Past research tested this prediction using measures (e.g., cardiovascular reactivity) that only indirectly reflect energy investment. The presented experiment aimed to test Brehm's prediction using a direct measure of energy investment: exerted force during an isometric handgrip task. Participants (N=20) performed four difficulty conditions of a handgrip task in a within persons design. In each trial, participants could earn a monetary reward by exceeding a force standard. Depending on the respective difficulty condition, the standard was set to 50, 100, 150 (possible conditions), or 500 Newton (impossible condition). The task contained five blocks, each one including five trials of each force standard. The first four blocks served as practice period; exerted force during the fifth block constituted our main dependent variable. As predicted, exerted force or energy investment, respectively, increased with task difficulty as long as success was possible, and was low when success was impossible. This result extends previous empirical research by demonstrating that energy investment is determined by task difficulty.

## **The role of impulse control and dorsolateral prefrontal cortex in the development of strategic social decision-making**

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Human social exchange is often characterized by conflicts of interest requiring strategic behavior for their resolution. Little is known about the ontogeny of strategic social behavior. In adults, strategic behavior is critically subserved by dorsolateral prefrontal cortex (DLPFC), a region which matures late in human development. We therefore postulated an age-related increase in strategic social behavior as a result of increased age-related functional recruitment of brain regions mediating this behavior, notably DLPFC. We addressed this by means of one behavioural (N = 146; age range: 6.9-14.4 years) and an additional MRI study (N = 28; age range: 6.9 – 13.1 years). In both studies children made decisions in the context of two economic games, which provided a measure for strategic behavior. Additionally, we obtained measures of impulse control, fairness understanding, intelligence and risk preferences. We observed an age-related increase in activity of left DLPFC when making strategic decisions, which was strongly mediated by an age-related increase in impulse control. Further we found that age-corrected cortical thickness of IDLPFC was significantly associated with strategic behavior and impulse control. In sum, we could show that late-developing cortical structures critically subserve impulse control, a function that is required to successfully implement strategic social behavior.



## Rapid evaluation of error significance during performance monitoring

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The continuous monitoring for errors in ongoing behavior is crucial for achieving goal-directed performance. To adaptively adjust behavior in response to an error, it is not only necessary to detect the occurrence of an error but also to evaluate its significance for future behavior. Although evidence for such an evaluation has been provided, little is known about the speed and flexibility of this process. In the present study, we used event-related potentials to investigate whether error significance influences early correlates of performance monitoring under conditions where significance had to be evaluated during task execution. In two experiments, participants responded to the location of a target stimulus while ignoring two simultaneously presented distractor stimuli that were associated with different amounts of monetary loss. While behavioral responses to low-loss and high-loss distractors were equally frequent, the error-related negativity, a negative deflection peaking immediately after error responses, was larger if the error was associated with a higher loss. This suggests that information about error significance is evaluated during task execution, which implies a rapid and flexible evaluation process.

## Impulsivity and individual differences in the recruitment of task-switching networks

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The ability to flexibly switch between tasks varies strongly between individuals. Previous studies suggest more efficient processing in task switching for individuals with lower dopamine D2 receptor (DRD2) density, which has been associated with impulsivity in psychiatric disorders. In the present fMRI study, we directly tested the association between impulsivity and task switching in a large healthy sample ( $n = 120$ ) to address the question whether self-reported impulsivity is associated with more efficient task-switching performance.

Subjects performed a cued task-switching paradigm (>/< five vs. odd/even decisions) and filled out questionnaires about their self-perceived impulsivity. The fMRI data show that high impulsive individuals are characterized by lower activity in task-switching-related regions in lateral and medial prefrontal cortex at comparable behavioral performance levels, thus indicating greater processing efficiency. Functional connectivity patterns of the left Inferior Frontal Junction (IFJ) reveal further impulsivity-related differences: high impulsive individuals show greater task-switching-related connectivity with task-specific regions in the angular gyrus whereas the IFJ is coupled more strongly with the striatum during task switching in low impulsive individuals. These data provide converging evidence for a beneficial effect of impulsivity for cognitive flexibility and suggest different neurocognitive mechanisms depending on trait impulsivity.

## **The contribution of conceptual and perceptual similarity to the social Simon Effect**

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Recent studies suggest that the social Simon Effect (SSE) is larger the higher the similarity between two co-acting individuals. In the present study we investigated the contribution of two different types of similarity to the SSE: conceptual and perceptual similarity. We manipulated conceptual similarity by partnering the participant in a social Simon Task with a co-actor whose response button was either controlled intentionally or unintentionally. Perceptual similarity was varied by having pairs of participants wear clothes of either the same or different color. We found a larger SSE in conceptually similar conditions as compared to conceptually dissimilar conditions. This pattern was reversed for perceptual similarity. Our results suggest that both types of similarity affect the SSE suggesting that higher order conceptual processes as well as low-level perceptual processes contribute to the SSE.

## **Modality-specific effects on crosstalk in task switching – Evidence from modality compatibility**

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The present study aimed to examine modality-specific influences in task switching. To this end, participants switched either between modality compatible tasks (auditory-vocal and visual-manual) or incompatible tasks (auditory-manual and visual-vocal). In addition, auditory and visual stimuli were presented simultaneously in each trial, so that selective attention was required to process the task-relevant stimulus. The tasks followed a pre-instructed sequence of double alternations (AABB), so that no explicit task cues were required. The results show that switching between two modality incompatible tasks increases both switch costs and congruence effects compared to switching between two modality compatible tasks. We suggest an explanation in terms of ideomotor “backward” linkages between anticipated response effects and the stimuli that called for this response in the first place. According to this generalized ideomotor idea, the modality match between response effects and stimuli could either facilitate or hinder task performance to the degree that representations of the two tasks and response modalities need to be sustained in task switching.

## The development of grasp posture planning in 6 to 10 year old children

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The end-state comfort (ESC) effect postulates that grasping actions are planned to avoid awkward final body postures. The development of such anticipatory behaviour and its limiting constraints are of current interest. As such, we investigated the development of grasp in two studies in which we had 6-10 year old children to grasp a horizontally-oriented dowel and place the right or left end of the dowel into a target disk.

Our data indicate that grasp planning increases over the developmental spectrum, and reaches adult levels around the age of 8. Grasp planning is also related to cognitive representations, such that children with well-structured grasp representations are more likely to satisfy ESC, regardless of age. Our results also suggest that grasp planning is influenced by the goal-directed and the habitual selection systems, and is mediated by initial precision demands. Based on our findings, we postulate that grasp planning develops as children learn to anticipate consequences of their actions, which manifests around 8 years of age. Although ESC is a primary movement constraint, we argue that grasps are planned to consider other factors, such as the need for control at time points that require the greatest degree of movement control.

## „Sie nähern sich einer Kreuzung mit Bordstein – noch 30 Meter.“ – Anforderungen an Assistenz für blinde Fußgänger

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Mobilität ist auch für Blinde zentral für ihre Lebenszufriedenheit. Durch Infrastruktur (z.B. Leitlinien), Hilfsmittel (z.B. Blindenstock) und Trainings (z.B. Mobilitätstraining) wird versucht, Blinde zu unterstützen. Dies ist besonders relevant bei der Überquerung von Kreuzungen, die nur teilweise mit entsprechenden Signalgebern ausgerüstet sind, die aber teilweise schlecht zu hören sind und wo die Orientierung sehr große Aufmerksamkeit erfordert. Im Rahmen des Projekts INMOBS wird eine App entwickelt, die bei der Kreuzungsquerung assistieren soll. Um diese an die Anforderungen der Nutzer anzupassen, wurde eine Feldstudie mit 10 Blinden durchgeführt, die jeweils eine für sie leichte und schwierige Kreuzung überquerten, wobei sie mit Hilfe der Methode des lauten Denkens beschrieben, was sie gerade taten und welche Informationen für sie jeweils hilfreich wären. Die Analyse zeigt die unterschiedlichen Phasen der Kreuzungsquerung, wobei jeweils unterschiedliche Aufgaben durchzuführen sind (z.B. Auffinden des Signalmasts bei der Annäherung) und unterschiedliche Informationen benötigt werden (z.B. Anzahl der Fahrstreifen bei Querungsbeginn). Diese Ergebnisse dienen als Grundlage dafür, um eine zeitliche Sequenz der Unterstützung zu definieren, bei der in verschiedenen Phasen unterschiedliche Informationen vermittelt werden oder abgerufen werden können.

## **Do endorser's unwanted attributes transfer? The importance of product use in meaning transfer**

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Celebrity endorsement can be effective but backfires if negative information about the celebrity becomes available. Importantly this has only been shown for prospective consumers. The effect on existing consumers is unknown. We posit that actual consumers will be motivated to block the transfer of negative information to a product with which they are associated. In an experiment we tested whether different types of information about David Beckham are equally transferred to a product presumably endorsed by him (a perfume). Depending on condition participants were either wearing the endorsed or an unendorsed perfume. This yielded a 2 (positive vs. negative information) x 2 (endorsed vs. unendorsed product) design. After receiving information about the endorser and spraying on the perfume, participants described the scent, provided their attitudes, and their purchase intention. Results of a 2x2 ANOVA revealed that only positive information transferred and influenced attitudes and intentions. Negative endorser information yielded similar evaluations to those given by participants using an unendorsed product. Results indicate that self-protection mechanisms may hinder transfer of unwanted attributes for existing consumers. The widely held belief of the harm induced by negative information about an endorser may be exaggerated.

## **The neural bases of affect-poor vs. affect-rich risky choice**

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We developed a paradigm to compare decision-strategies as a function of whether outcomes are affect-rich or affect-poor. Behavioral and fMRI results suggest that qualitatively different choice processes underlie risky choices in the two domains: Risky choices in an affect-poor domain were best modeled by a compensatory strategy (prospect theory), whereas risky choices in an affect-rich domain were best described by a non-compensatory strategy that neglects outcome probabilities (minimax). We used fMRI to investigate the neural underpinnings of this apparent differences in strategy use. The patterns of neural activation corroborate the conclusion of the model comparison for behavioral data that risky choices in affect-rich and affect-poor tasks are based on qualitatively different decision mechanisms: Posterior cingulate gyrus and supramarginal gyrus where generally involved in decision making, but the posterior cingulate gyrus was more active in affect-rich and the supramarginal gyrus more active in affect-poor choices. Moreover, the left lateral orbitofrontal cortex was sensitive to the probability of monetary outcomes but not to outcome probabilities in affect-rich choices. Whereas affect-poor choices seem to be based on calculated reward expectations, affect-rich choices seem to be driven by the emotional value associated with the different outcomes.

## Productivity increase options and distorted decisions: How to improve intuitive judgments and decision?

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*Purpose:* To investigate unaided decisions concerning productivity improvements predicted to be suboptimal and to explore how biases can be counteracted. *Method:* Scenario problems with independent parameters in booklets. Participants' decisions and quantitative judgments were dependent variables. *Summary:* Although there are many formal measurement systems, intuitive judgments of productivity are important because screening of options and preliminary decisions influence final decisions, attitudes and opinions formed by managers, politicians, policy makers and the general public. Participants considered two options of productivity increases in a company and decided how to invest in order to maximize overall productivity. The results of three studies show biases in choices and judgments. When productivity was increased from an initial low production speed, the gain (e.g., manhours needed) was underestimated in comparison to gains obtained by a productivity increase from an initial high production speed.

## Controlling the uncontrollable: Faking effects on implicit measures

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The exploding development and use of implicit measures in psychological research is often explained by two main benefits of the indirect measurement approach: First, implicit measures promise to provide access to those aspects of the self that are not introspectively accessible and thus, cannot be reflected in self-report measures (cf., Strack & Deutsch, 2004). Second, unlike self-reports, implicit measures have been assumed not to be susceptible to self-presentational tendencies or socially desirable responding (e.g., Fazio, et al., 1995). From an applied angle, the latter argument becomes particularly relevant: Uncontrollability would be a strong and desirable feature of an implicit measure making it almost ubiquitously applicable, even in contexts in which respondents are willing to invest much time and effort in learning how to fake the measurement outcome as may occur in legal and forensic contexts, in selection and placement contexts, and so forth. A review of the experimental research on the fakeability of the most often used implicit measures (IAT, evaluative priming, AMP), including new data from our laboratory, will show that under certain conditions faking can affect both the overall mean and the predictive validity of implicit measurement outcomes. Consequences for applied settings will be discussed in-depth.

## **Retrieval-induced forgetting of motor sequences in an implicit memory test**

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Recently, we had provided first evidence that memory for motor sequences can be affected by retrieval-induced forgetting (Tempel & Frings, in press). We further investigated if inhibitory processes involved in the solution of interference between several motor sequences might have caused it. Participants first learned sequences of two-finger-movements. Half of the movements consisted of fingers of the left hand, half consisted of fingers of the right hand. Subsequently, they performed retrieval-practice on half of the movements of one hand. In a final implicit memory test, the non-retrieved subset of movements of the retrieval-practiced hand was performed worse than movements of the other hand. The occurrence of retrieval-induced forgetting in an implicit memory test strongly supports an inhibitory account.

## **On the decision to explore new alternatives: The coexistence of under- and over-exploration**

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The decision whether to explore new alternatives or to choose from familiar ones is implicit in many of our daily activities. How is this decision made? When will deviation from optimal exploration be observed? The current paper examines repeated exploration decisions in a multi-alternative task. In each trial, participants could choose a familiar option (the status quo) or a new alternative (risky exploration). The observed exploration rates were more sensitive to the frequent outcome from choosing new alternatives than to the average outcome. That is, exploration decisions reflect underweighting of rare events: Over-exploration was documented in "Rare Treasures" environments, and insufficient exploration was evident in "Rare Disasters" environments. Additionally, the results reveal a decrease in exploration of new alternatives over time even when it is always optimal, and some exploration even when it is never reinforcing. These results can be captured with a distinction between "data collection" and "outcome-driven" decision modes. Under the data collection mode, the decision maker collects information, to be used in future choices. Under the outcome-driven mode, the decision maker relies on small samples of previous experiences with familiar vs. unfamiliar alternatives. The predictive value of a 2-parameter "explorative sampler" quantification of these assumptions is demonstrated.

## **Gender effects on trial: Do women focus on the context of a crime more than men?**

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The present research works towards an explanation of gender differences in judgments of violent acts. Women usually demand stronger punishment of violent crimes than men do. Additionally, female (vs. male) offenders receive more lenient sentences. However, attempts to explain such effects can be found very rarely and potential interactions between the gender of judges, offenders, and victims have been widely neglected. In the present experiment, participants read a fictitious story about a female (vs. male) offender killing several female (vs. male) victims. Afterwards, participants were asked to provide judgments of the offender and the crime on various dimensions. A 2 (female vs. male offender) x 2 (female vs. male victims)-ANOVA revealed that female (vs. male) offenders received more lenient sentences. Going beyond this replication of previous studies and taking into account participants' gender, there were virtually no effects for male participants on any dependent variable. At the same time, female participants judged female (vs. male) offenders differently regarding guilt and punishment. Interestingly, the victims' gender did not affect female or male participants' judgments. The implications for practical applications, for example considering the combination of a witness's and an offender's gender when judging the credibility of a testimony are discussed.

## **Adaptation to interval-event correlation is due to specific temporal expectancy, not to partial repetition costs**

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When, in a speeded binary choice response task, targets are unevenly distributed over short and long warning intervals, responses are faster for frequent than for infrequent interval-target combinations. This effect has commonly been regarded as evidence for specific temporal expectancy: Participants learn that targets are temporally predictable, and schedule their expectancy and preparation accordingly. However, the effect could alternatively be due to partial repetition costs: Frequent interval-target combinations occur less frequently after trials with either different interval or different target, than infrequent combinations do. To disentangle the learning and the partial repetition cost account, we devised a binary choice task with two different warning intervals. For one group, intervals and targets were consistently correlated throughout the experiment. For another group the interval-target correlation was inverted after some blocks. According to the specific temporal expectancy account, this inversion should cause performance costs due to relearning of correlations. In contrast, according to the partial repetition cost account, both groups should not differ in overall performance. Results provided clear-cut evidence in favor of the specific temporal expectancy explanation: Responses were significantly slower in the group with inverted correlations. We conclude that the adaptation to interval-target correlations is due to specific temporal expectancy.

## Being empathic *and* self-disclosing might be too much: A study on the interplay of self-disclosing and empathic language on person perception in online forums

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People exchange information and seek advice from peers more and more online. In written computer mediated communication (CMC) cues to intentions and attitudes of interlocutors are lacking, thus, word choice and linguistic expression become central in gathering information about the sender of information. There is broad evidence for effects of self-disclosing and empathic behavior on person perception in face-to-face communication. In CMC, however, less is known on how valid recipients assess a senders' personality based on the given information. How sensitive do recipients react to specific language cues in a forum discussion?

Participants (n = 213) rated how self-disclosing and empathic a forum user is, based on his forum message in a 2 (self-disclosing language yes versus no) x 2 (empathic language yes versus no) between subjects design. Results show that recipients are able to link language cues correctly to the underlying characteristics when presented solely. The interaction effect points to problems in keeping track of what information was included in the message: Self-disclosure was rated lower when self-disclosing and empathic language was used compared to the condition that provided only self-disclosing information. Implications for person perception in CMC will be discussed.

## Minimality criteria in spatial belief revision

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Agents frequently receive evidence that is inconsistent with their presently held beliefs. In such situations, agents typically revise their beliefs, selecting from a number of possible revisions that would be sufficient to reestablish consistency. In the case where an agent's beliefs concern spatial relations, belief revision has been fruitfully treated as a problem of deciding which features of an initially constructed spatial mental model to *modify* and which to *retain*. A normative claim about (spatial) belief revision maintains that agents should prefer model revisions that are *minimal*. Recent studies have characterized model revisions that modify the position of the fewest objects as being minimal, and have thereby rebutted the claim that subjects generally prefer minimal model revisions, showing instead that agents have a strong preference for revisions that modify the position of an object *x* while retaining the position of an object *y*, in cases where the agent's new evidence is a relational statement of the form '*xRy*'. Using similar relational reasoning tasks as previous studies, we present new results that show that agents conform to a different minimality criterion, which characterizes a revision as minimal when it modifies the fewest possible (operationally defined) *critical features* of a respective model.



## Measuring planning competencies in childhood: Instructed vs. explored information

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Planning and Problem solving abilities are seen as core-competencies (Klieme et al. 2005). Following the research question of comparing learning effects from exploration and instruction on planning abilities, a new paradigm had to be found: the ZOO GAME. Within the ZOO GAME approach the participant has to transform a well-defined problem from a beginning state to a goal state by using a special set of complex rules (Fritz & Hussy, 2000). In a further step the instructional phase has been replaced by an exploration scenario. This design of different pre-phases leads to a comparable planning phase. Two studies (N = 138 and N = 177) have been arranged in eleven primary schools of North-Rhine Westphalia. Comparing the dispersions of planning span between the learning groups a high significant difference is given,  $\chi^2(4, n = 138) = 26.01, p < .001$  with an effect power of  $\eta^2 = .43$ . Under the «exploring» condition the numbers of best planners as well as the numbers of worst planners double. It becomes apparent that exploration leads to better results in planning behavior concerning the effectiveness of good planners. These facts lead to the assumption that exploration generates a different quality of knowledge.

## Evaluation eines situationsabhängigen Abstandshaltesystems für Elektrofahrzeuge im Hinblick auf Energieverbrauch, Sicherheit und Komfort

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Durch die Erweiterung eines ACC zum Efficient Cruise Control (ECC) wurde ein Assistenzsystem realisiert, welches auf Streckencharakteristika wie Kurven und Verkehrszeichen durch eine Anpassung der Geschwindigkeit reagiert. Ziel ist ein effizientes Fahrverhalten für Elektroautos. Anhand von Pilotstudien wurden effiziente Fahrstrategien identifiziert und in das System integriert. Das ECC wurde in einer Fahrsimulation mit N=16 Probanden in Bezug auf seine Effizienz und die Beeinflussung anderer Verkehrsteilnehmer evaluiert. Dabei erwies sich das ECC mit einer Energieersparnis von 26.5 % gegenüber einer manuellen Fahrt (ohne Instruktion besonders sparsam zu fahren) und 16.5 % gegenüber einer Fahrt mit ACC als ähnlich effizient wie das manuelle Fahren unter einer sparsamen Instruktion. In einem zweiten Versuchsteil fuhren die Fahrer in einer Mehrfahrer-Fahrsimulation jeweils zu viert gemeinsam auf einer Strecke. Ein Einfluss des ECC auf den Energieverbrauch nachfolgender Fahrzeuge wurde nicht nachgewiesen. Gründe hierfür könnten die geringe Stichprobengröße sowie ein in diesem Versuchsteil generell effizienteres Fahrverhalten beim manuellen Fahren gewesen sein. Einige Befunde zu einer überraschenden Hindernissituation deuteten auf typische Automationsproblematiken wie eine reduzierte Aufmerksamkeit bei der Nutzung des Systems hin.

## Using TMS to treat smoking addiction: Changes of acute effects over time

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Transcranial magnetic stimulation (TMS) has been proposed to be a useful tool in the treatment of addiction. However, mixed findings have been reported concerning the effects of TMS of the dorsolateral prefrontal cortex (DLPFC) on cigarette craving – with only some studies reporting decreased craving. The aim of the present study was to investigate the acute effects of a single TMS session on cue-induced cigarette craving. In a sham-controlled within-subjects design (N=13) we applied high frequency repetitive TMS to the left DLPFC (or to a vertex control region) for 12min, and assessed effects on cigarette craving over a 35 minutes post-stimulation period. Craving ratings were obtained by a cue-induced craving paradigm before TMS and 5min, 20min and 35min after stimulation. We found that cue-induced cigarette craving was significantly decreased after real TMS, but not after sham TMS. However, the difference between real and sham TMS was smallest immediately after stimulation and most prominent at 35min after stimulation. Thus, our findings indicate that the acute effects of TMS on cigarette craving seem to take time to unfold rather than being present immediately following stimulation. This might partially explain the heterogeneous findings in previous studies, which did not always control for timing effects.

## Jeden Tag 120 Fahrer im Versuchsbetrieb – Was sagen die Fahrer dazu? Evaluation einer gruppenbezogenen Versuchsdurchführung im Rahmen des Forschungsprojekts sim<sup>TD</sup>

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Im Rahmen des Forschungsprojekts „Sichere Intelligente Mobilität – Testfeld Deutschland“ (sim<sup>TD</sup>) führen im Rahmen des Feldversuchs über die Dauer von sechs Monaten bis zu 120 Fahrer täglich Versuche zur Überprüfung von Car-2-X-Technologien. Hierunter fallen z.B. Funktionen, die auf eine Fahrzeug-Fahrzeug Kommunikation zurückgreifen (z.B. Gefahrenwarnungen wie Warnungen vor Stauenden oder Hindernissen) bzw. auf einer Fahrzeug-Infrastruktur Kommunikation basieren (z.B. Ampelphasen- oder Verkehrszeichenassistenten). Ziel dieser Versuche war u.a. die Überprüfung, inwiefern diese Technologien einen positiven Beitrag zur Verkehrssicherheit und -effizienz leisten. Nach jeweils zwei Monaten Versuchsdauer wurde das Fahrerkollektiv komplett ausgetauscht.

Die Organisation und Steuerung eines solchen Großversuchs stellt eigene Anforderungen sowohl an die Versuchsleiter als auch an die Versuchsfahrer dar. In diesem Beitrag soll aufgezeigt werden, welche Form der Fahrerbetreuung gewählt wurde (z.B. Umsetzung von Schulungen und Briefings, Tools zur Versuchssteuerung und Routenführung, Vorgehen zur Datenübertragung vom Fahrzeug zur Datenbank) und wie die Fahrer das gewählte Vorgehen über die Versuchsdauer hinweg beurteilten. Hierzu wurden regelmäßige Fahrerbefragungen durchgeführt, in denen die Fahrer (neben den Urteilen zur Nutzerakzeptanz) Probleme und Fragen im Versuchsaltag äußern konnten. Ausgehend hiervon werden Empfehlungen für die Ausgestaltung weiterer Großversuche im Fahrbereich gegeben.

## Pathological buying – a behavioral addiction? Response patterns of pathological buyers in a cue reactivity paradigm

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Pathological buying is characterized by excessive preoccupations towards shopping. Purchases exceed actual requirements and shopping behavior continues even if individuals repeatedly experience negative consequences. Goods acquired are often stowed unpacked, given away or even discarded. The classification of this pathological behavior is currently discussed controversially. In this study, a cue-reactivity paradigm often used in addiction research, was applied to pathological buyers and matched controls. As indicators of cue-reactivity, subjective ratings (arousal and urge to buy), and skin conductance responses towards shopping- and neutral pictures were measured. Additionally, craving for shopping was assessed before and after cue presentation. Preliminary results show that pathological buyers exhibit higher cue reactivity reactions towards the shopping cues compared to control participants. Pathological buyers rated shopping cues as more arousing, reported a greater urge to buy, and showed elevated phasic responses in electrodermal activity. Moreover, higher craving reactions in pathological buyers were ascertained after cue presentation. Reactions towards neutral control pictures did not differ between groups. The findings indicate that cue-reactivity and craving are important processes underlying the development and maintenance of pathological buying. Moreover, the results need to be discussed with their relevance for the classification of pathological buying as a behavioral addiction.

## Beeinflusst das Lesen von Handlungswörtern nachfolgende motorische Reaktionen?

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Entsprechend der Theorie einer verkörperten Kognition (engl. embodiment), ist begriffliches Wissen eng mit den sensorischen und motorischen Hirnsystemen verknüpft. Neuere Studien belegen, dass beispielsweise Begriffe, die eine hohe akustische Merkmalsrelevanz aufweisen (z.B., Telefon), Bereiche des auditorischen Kortex, Begriffe mit einer hohen Handlungsrelevanz (z.B., Hammer) dagegen Bereiche des Motorkortex aktivieren. Ziel dieser Studie war es nun herauszufinden, ob die Aktivierung des motorischen Systems durch Handlungswörter eine funktionale Relevanz hat und nachfolgende motorische Reaktionen beschleunigt, auch wenn kein Zusammenhang zwischen Handlungswort und Reaktion besteht. Hierzu wurde den Probanden zunächst für kurze Zeit ein Handlungs-/Kontrollwort (Begriff mit niedriger Handlungsrelevanz; z.B., Mosaik) visuell präsentiert. Danach folgte eine Ziffer zwischen zwei und neun, woraufhin sich die Probanden so schnell und genau wie möglich per Tastendruck entscheiden sollten ob es sich dabei um eine gerade oder ungerade Zahl handelt. Sowohl Reaktionszeiten als auch ereigniskorrelierte Potentiale zeigten signifikante Unterschiede, wonach das Lesen von Handlungswörtern mit einer Aktivierung im motorischen Kortex und einer dadurch erhöhten Handlungsbereitschaft einhergehen. In Übereinstimmung mit der Theorie der verkörperten Kognition bedeutet dies, dass handlungsbezogene, begriffliche Repräsentationen im motorischen System eine funktionale Bedeutung haben und Verhalten beeinflussen können.

## A TVA-based test of the prior-entry hypothesis

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When two stimuli are presented within a certain interval to a subject whose attention was guided to one stimulus, the attended one is perceived as earlier compared to the unattended stimulus. This phenomenon of prior entry is typically ascribed to attentional facilitation and can be induced by a peripheral cue in temporal order judgment (TOJ) tasks. It is assumed that the processing time is shortened and the attended stimulus arrives earlier at some post-attentional stage, which then is mistaken for earlier stimulus appearance. However, strictly speaking classic TOJs do not allow this conclusion and their interpretation is limited to a relative statement. This means it could also be the unattended stimulus being inhibited leading to a “posterior entry” or a combination of acceleration and attenuation which is hinted by recent studies. Here we performed an assessment of this situation based on absolute processing speed parameters with the methods of the TVA (Theory of Visual Attention). In a combined paradigm we relate classic TOJ measures with TVA parameters and indeed find enhancements and attenuation of processing speed. Furthermore, our results suggest that the link between processing speed and order perception is not as direct as previously suggested.

## The contribution of spectral and temporal speech information to vowel length discrimination: A mismatch negativity study

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Phoneme perception is critical for learning to read. In German, correct vowel length perception is important for mapping phonemes onto letter sequences representing long vs. short vowels, which is a meaningful distinction in German. In naturally occurring speech, vowel length is signalled by both temporal and spectral information. We used event-related brain potentials and the mismatch negativity (MMN) paradigm ( $n = 20$ ) to investigate the contribution of different perceptual features to vowel length discrimination. We compared natural (i.e., spectrotemporal) vowel length differences with (artificially modified) stimulus pairs varying only in temporal or spectral characteristics. All conditions, i.e., spectrotemporal, temporal, and spectral vowel length differences produced a reliable MMN over central electrode sites, indicating that each speech cue in isolation is sufficient for the perception of vowel length. However, MMNs in the temporal and spectral conditions had greater amplitudes than the MMN in the spectrotemporal condition. This leads to the counter-intuitive interpretation that vowel length differences are less efficiently detected when more relevant information is present in the speech signal. However, the speech processing system is highly tolerant against variability in the speech signal, which may lead to weaker mismatch responses in natural as compared to artificial stimuli.

## **Dimensionality of the perceptual space of achromatic surface colors**

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Lightness (the perceived achromatic color) of a surface is influenced by perceptual processes like contrast induction as well as cognitive processes like interpretation of a scene. The experiments presented here aim at a better understanding of how cognitive processes are involved in the perception of lightness and how many perceptual dimensions we use to represent achromatic colors. The hypothesis is that one of these dimensions is introduced by interpretations of a complex stimulus situation. Stimuli of increasing complexity were presented in a room with controlled illumination in order to determine which context effects influence lightness. The presented stimuli were simple gray patches in the first experiment, classic infield-surround configurations in the second experiment, and infield-surround configurations with articulated backgrounds that either induced transparency or not in the third experiment. Subjects performed same/different judgments in all experiments. Discrimination probabilities were analyzed using Fechnerian scaling followed by metric MDS to find the number of dimensions of achromatic color space. Results show that subjects use one perceptual dimension for stimuli without surround and two dimensions for more complex configurations.

## **On the emotional valence of remembering**

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Both common sense and psychological research suggest that being in a sad mood stimulates reminiscence. For example, it was shown that people retrieve happy memories to repair negative moods and that processing familiar stimuli induces positive affect. However, it remains an open question whether recall from episodic memory is associated with positive affect in general. This question was investigated in two IAT experiments. It was ensured that remembered and new information did not differ in valence and that old-new judgments were based on memory retrieval rather than on feelings of familiarity. The results showed that people responded faster when remembered information shared a response key with positive words than when remembered information shared a response key with negative words. Thus, the experiments revealed that the process of remembering in itself is positive in valence.

## **A similarity-based explanation of valence asymmetries in impression formation and person memory**

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Negative information seems to have advantages in impression formation and person memory. For example, negative traits seem to influence impressions of persons more heavily (Asch, 1946) and people seem to remember negative behaviors better (Skowronski & Carlston, 1987). These advantages are often attributed to differential diagnosticity of negative information. For example, in morality related areas, negative information is more diagnostic, while in ability related areas, positive information is more diagnostic. Here, we propose a simpler principle: Negative information is weighted more heavily and remembered better because it is more distinct (i.e., less similar) to other negative information compared to positive information's distinctiveness. We tested this hypothesis in three experiments: Participants evaluated targets on positive and negative dimensions (impression formation) and remembered target persons' traits. As predicted by a similarity-based account (1) impression formation on positive vs. negative dimensions led to more coherent impressions on positive dimensions (as indexed by Cronbach's alpha), and (2) in a signal detection analysis, negative information was remembered better (as indexed by SDT's  $d'$ ), but there was a response bias towards positive information (as indexed by SDT's beta). Together the results support a general similarity principle in impression formation and person memory.

## **What influences helping behavior more? The responsibility of the person in need, the dangerousness of the situation or family relationships?**

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There are many reasons why people would need help in a particular situation. A person could be responsible herself for being in a plight or not. This study sought to examine several factors that could influence the willingness to help others in a difficult situation: responsibility of the person in need, dangerousness of the situation and whether the person is a sibling or not. This question was examined in a sample of 290 students at a lecture at the University of Regensburg. The results revealed that people are in general more willing to help siblings than acquaintances independent of whether they are responsible or not. Furthermore, the more dangerous a situation is (e.g. if the person could die) the more individuals are inclined to take action. No interactions could be observed. It thus seems that people's willingness to help others is primarily driven by family relationship, then by the dangerousness of the situation and lastly by the responsibility of the person in need.

## Priming of fixations during recognition of natural scenes

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Eye fixations allow the human viewer to perceive scene details with high acuity foveal vision. If fixations drive visual memory for scenes, a viewer might repeat his/her previous fixation pattern during recognition. However, visual salience alone could account for any similarities between two successive fixation patterns by attracting the eyes in a stimulus-driven, task-independent manner. In our eye tracking experiments we tested whether the viewer's aim to recognize a scene fosters fixations on details that repeat from learning to recognition. Furthermore, we checked whether task-related re-fixations outweigh the influence of stimulus-driven (task-independent) salience. During recognition but not during free-viewing our participants showed a pronounced preference for previously fixated details. We also investigated whether participants remembered the visual input that they fixated during learning better than salient but non-fixated visual input. Previously fixated details from learned scenes were discriminated from novel, hitherto not presented details better and faster than non-fixated but highly salient details from learned scenes. Our experiments support the hypothesis that fixated details of natural scenes are primed for re-fixation during subsequent recognition of a familiar scene.

## **Spezifische neuronale Signaturen kognitiver Subtypen von Entwicklungsdyslexie: Eine fMRT Studie zur phonologischen Verarbeitung bei kindlicher Leseschwäche mit und ohne phonologisches Defizit**

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Die neurobiologische Basis und die Existenz kognitiver Subtypen von Dyslexie sind in der Literatur weitgehend akzeptiert. Als neuen Ansatz untersucht die vorliegende Studie, ob sich dyslektische Kinder (N=31; Durchschnittliches Alter: 9,8 Jahre) mit und ohne zugrundeliegendes phonologisches Defizit, zusätzlich zu der Performanz auch hinsichtlich ihrer Hirnfunktion voneinander unterscheiden lassen. Die Studie nutze eine auditiv präsentierte phonologische Entscheidungs- und Kontrollaufgabe. Die Gesamtgruppe der Dyslektiker zeigten im Kontrast zu normallesenden Kindern (N=13) gesteigerte Aktivierungen im rechten Cerebellum (Lobule IV). Das Cerebellum scheint eine zuverlässige Unterscheidung zwischen leseauffälligen und leseunauffälligen Kindern treffen zu können. Der direkter Vergleich zwischen den Dyslexiegruppen zeigte subtypenspezifische Aktivierungssteigerungen für die Dyslektiker mit phonologischem Defizit im linken Gyrus frontalis inferior (Areal 44: phonologische Segmentierung), im linken SMA (Areal 6), im linken Gyrus precentralis (Areal 6) und in der rechten Inselregion gefunden. Dyslektiker ohne phonologisches Defizit zeigten hingegen Aktivierungssteigerungen im linken Gyrus supramarginalis (Areal PFCm; phonologisches Arbeitsgedächtnis) und im linken Gyrus angularis (Areal PGp). Aufgrund der individuellen kognitiven Profile der beiden Dyslexiegruppen, kann man unterschiedliche Verarbeitungsstrategien bei einer phonologischen Aufgabe vermuten. Die Ergebnisse der Studie zeigen deutlich, dass sich kognitive Subtypen von Dyslexie nicht nur auf der Verhaltensebene, sondern auf Hirnfunktionell voneinander unterscheiden.



## The value of paying attention

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When acting in a dynamic environment we continuously trade-off the costs and benefits of attending to different things. Valued-based attention thus helps us allocate our limited cognitive resources to the most important things around us. Parallel work on humans and animals has hinted at the underlying behavioural and neurophysiological mechanisms: altering rewards has been found to analogously modulate both the speed and accuracy of specific responses and the firing rate of single neurons. Here we study attentional effects of changing monetary rewards in an unspeeded, accuracy-based paradigm. Using a Theory of Visual Attention (TVA; Bundesen, 1990), we investigate how specific components of attention are modulated as a function of reward magnitude. Specifically, we test the hypothesis that higher rewards speed up the encoding of information into visual short term memory. The observed behavioural effects are normatively linked to the neurophysiological level by the neural interpretation of TVA (NTVA; Bundesen, Habekost & Kyllingsbæk, 2005). Finally, we use our findings to inform an extension of TVA incorporating effects of valued-based attention.

## Attentional sharing does not affect interval timing, but the secondary task does

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When a secondary task is presented during the reproduction of a temporal interval, the produced duration is lengthened as a function of the secondary task's onset time. The early-locus hypothesis states that this location effect is caused by the decreased buildup of temporal information while attention is directed to detecting the onset of the secondary task. However, an alternative, late locus account is that the secondary task itself causes a proportional loss of temporal information. Although both accounts explain the typical location effects, predictions are diametrical for unexpected no secondary task trials. Here we report on behavioral and EEG experiments in which a secondary task was sometimes absent. Trials with secondary tasks showed the location effect, with longer produced durations for later onsets. Interestingly, trials without a secondary task did not deviate from baseline performance, suggesting that the location effect is driven by the secondary task itself. The increased amplitude of the N1 auditory component evoked by the secondary task corroborates this view, since larger N1 amplitudes have been associated with stronger disruptions of ongoing processing. Both experiments thus support the late locus account, questioning the validity of the oft-cited shared-attention explanation of the location effect.

## **Bounded emotion and pro-social behaviors: Collapse of affect in donation and non-donation tasks**

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Research on giving has found that people tend to give more to one child than to many children (i.e., singularity effect). A central psychological mechanism proposed to account for this finding is compassion collapse suggesting that as the number of victims increase people lose their feelings of empathy, sympathy and compassion. Earlier studies have indeed shown that ratings of affect tend to covary with, and mediate, the singularity effect. In this paper we present a series of studies aiming to investigate if compassion collapse is a general affective phenomena. We use a paradigm where participants either view 1, 3, or 9 affect-inducing pictures and then rate the intensity of their currently experienced emotion. Based on emotion theories we predicted that people would experience the strongest and most intense emotions to a single picture and as the number of pictures increased emotion intensity would drop. Across 10 studies we conducted in Sweden and the USA we find strong support for affect collapse ± the intensity of affect is strongest for a single affect-inducing stimulus and decreases as the number of stimuli increase. These findings suggest that our inability to feel for the many is an inherent property of our affective system.

## **Domestication and tolerance: How can dogs and wolves use conspecific- and human-given cues?**

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It has been proposed that, convergent to humans, domestic dogs were selected for increased tolerance and cooperativeness, in contrast with wolves. The dog-wolf differences found initially, however, resulted from comparing pet dogs and zoo wolves, most likely confounding developmental and evolutionary effects. In the current study we tested wolves and mixed-breed dogs that had been raised under identical conditions at the Wolf Science Center ([www.wolfscience.at](http://www.wolfscience.at)), and had been intensively socialized by humans and dogs that then acted as social partners in our experiments. We compared whether dogs and wolves can gain information from the cues of these partners similarly. By testing in two different contexts whether they can follow others' gaze, we aimed at identifying differences in the cognitive abilities as well as emotional attitudes of the two groups. Our results showed that, in line with earlier findings, dogs can better locate hidden food based on human hand-cues than wolves do. However, because wolves can use conspecific gaze in the same way, we argue that the necessary tolerance to share food in this context is present in the wolf. On the other hand, dogs have difficulties in locating food based on others' gaze, demonstrating that this situation dogs interpret in a more agonistic way than wolves do.

## ERPs dissociate semantic and syntactic processing in scenes

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In sentence processing, semantic and syntactic violations elicit differential brain responses in ERP recordings: An N400 has been associated with issues of semantic content, while a P600 marks syntactic structure. Does the brain register similar distinctions in scene perception? To test this, participants viewed “semantic inconsistencies” created by including objects that are incongruent with a scene’s meaning like a fire-hydrant in the kitchen. They also viewed “syntactic inconsistencies” in which an object violated structural rules, like a fork misplaced on the kitchen chair. Compared to consistent controls, semantic inconsistencies produced negative deflections similar to the “N390/N400 scene congruity effect” (Ganis & Kutas, 2003; Mudrik, Lamy, & Deouell, 2010). In addition, we observed a late positivity for our syntactic inconsistencies, which might resemble the P600 found for syntax manipulations in sentence processing. Interestingly, extreme syntax violations such as a floating toast, showed an initial increase in attentional deployment, but failed to produce the late positivity we observed for more modestly mislocated objects. We therefore conclude that 1) different neural populations are active during the semantic and syntactic processing of objects in scenes and 2) impossible placements of objects may be categorically different from the syntactically inconsistent placements that produce a P600.

## Which dish would you choose – A Viennese or an Upper Austrian? Consumer choice based on contingency inferences

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Sound choices require consumers to determine whether there is a contingency between category and outcome. For instance, consumers have to learn whether the origin of a dish (Vienna vs. Upper Austria) predicts taste (delicious vs. modest). Often, the affordances of proper contingency assessment are not met. Rather than revealing if the proportion of delicious dishes is higher for Viennese than upper Austrian food, information environments provide us with independent information, i.e., the proportion of Viennese dishes and the proportion of delicious dishes. Thus, rather than assessing a contingency, they have to infer it from available information.

In the present talk, we elaborate on consumer choice based on heuristic contingency inferences (i.e., pseudocontingencies). Participants were provided with stated (Exp. 1 & 2) or experienced (Exp. 3) base rates of categories (e.g., brands) and outcome (e.g., quality). Throughout the experiments, participants chose the frequent category if the frequent outcome was desirable but the infrequent category if the frequent outcome was undesirable. Effects of systematic base rate variation indicate that though logically unwarranted, contingency inferences are smart with respect to combinatorial reasoning.

## **Temporal changes in anticipated user experience and usability evaluation of mobil applications**

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Dynamics of user experience (UX) have been increasingly focused in research and design of interactive systems over the last few years (Law et al., 2009, Karapanos et al., 2008). Recent studies concentrate on time related aspects, such as the rate of exposure to a system, and how they influence UX in different phases of usage (Pohlmeyer, 2011). The present study investigates the influence of mere-exposure (Zajonc, 1969) on judging the instrumental qualities (Hassenzahl, 2003) of graphical user interfaces in the pre-use phase. In a laboratory setting, 32 participants evaluated two versions of an application for local transportation. Subjective data (usability ratings) and objective data (reaction times and EMG) were recorded. All our results were in line with the hypotheses of the experiment. For example, subjective usability judgments were not constant over time, but influenced by the rate of exposure. Consequently, researchers as well as engineers should be aware of the dynamic character of UX when investigating, describing and designing it.

## **Neural mechanisms of top-down control in contour grouping**

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Human observers tend to group oriented line segments into full contours if they follow the Gestalt rule of 'good continuation'. It is commonly assumed that contour grouping emerges automatically in early visual cortex. In contrast, recent work in animal models suggests that contour grouping requires learning and thus involves top-down control from higher brain structures. Here we explore mechanisms of top-down control in perceptual grouping by investigating synchronicity within EEG oscillations. Human participants saw two micro-Gabor arrays in a random order, with the task to indicate whether the first (S1) or the second stimulus (S2) contained a contour of collinearly aligned elements. Contour compared to non-contour S1 produced a larger posterior post-stimulus beta power (15-21 Hz). Contour S2 was associated with a pre-stimulus decrease in posterior alpha power (11-12 Hz) and in fronto-posterior theta (4-5 Hz) phase couplings, but not with a post-stimulus increase in beta power. The results indicate that subjects used prior knowledge from S1 processing for S2 contour grouping. Expanding previous work on theta oscillations, we propose that long-range theta synchrony shapes neural responses to perceptual groupings by either up- or down-regulating lateral inhibition in early visual cortex.

## Evaluation von C2X-Technologie am Beispiel des Forschungsprojekts sim<sup>TD</sup>: Vergleichende Bewertung verschiedener Befragungsmethoden

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Zur Erfassung von Probandenurteilen werden mannigfaltige Befragungsmethoden diskutiert. Jede dieser Methoden geht mit spezifischen Vor- und Nachteilen einher (De Bono, 1989; Frey & Fontana, 1991; Nölke, 1998). Durch eine Verschränkung unterschiedlicher Befragungsmethoden wird es schließlich möglich, die Komplexität des Erlebens und Verhaltens von Probanden umfassend abzubilden.

Aus diesem Grund wurden auch im Forschungsprojekt „Sichere Intelligente Mobilität – Testfeld Deutschland“ (sim<sup>TD</sup>) verschiedenartige Methoden zur Fahrerbefragungen eingesetzt. Im Rahmen dieses Feldversuchs fuhren bis zu 120 Fahrer täglich über die Dauer von sechs Monaten, um die technische Umsetzung von Car-2-X-Technologien sowie deren Wirkung auf die Fahrzeugführung zu beurteilen. Nach jeweils zwei Monaten Versuchsdauer (sog. Versuchsblock) wurde das Fahrerkollektiv komplett ausgetauscht. Die umgesetzten Fahrerbefragungen reichten von punktuellen Face-to-Face Befragungen (Gruppeninterviews nach einer Schulung zu Versuchsbeginn sowie unmittelbar vor Abschluss der jeweiligen Versuchsblöcke) über regelmäßige Paper-Pencil Befragungen (Fragebögen zur Systembewertung über mehrere Wochen hinweg) bis hin zu alltäglich durchgeführten sog. Online-Befragungen während der Fahrt (Frage wird automatisch auf einem externen HMI während der Fahrt dargeboten).

In diesem Beitrag soll das methodische Vorgehen zur Befragung der Versuchsfahrer vorgestellt und beispielhaft Ergebnisse der verschiedenen Befragungsmethoden gegeneinander gestellt werden. Abschließend soll das im Rahmen von sim<sup>TD</sup> umgesetzte Befragungskonzept zusammenfassend bewertet werden.

## Wann ist links abbiegen gefährlich? Ein Fahrsimulatorexperiment

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Abbiege- und Einbiegeunfälle sind im innerstädtischen Bereiche 26% aller tödlichen Unfälle. Eine besondere Herausforderung für Fahrer scheint in diesem Zusammenhang das Linksabbiegen an X-Kreuzungen zu sein. Bislang ist für viele Unfallsituationen beim links abbiegen unklar, wie diese eigentlich geschehen und welche Rolle die visuelle Aufmerksamkeit und Entscheidungen in Abhängigkeit von der speziellen Verkehrssituation spielen. Ausgehend von Unfallanalysen werden im Rahmen des Projekts UR:BAN in einem statischen Fahrimulator Eigenschaften der Umwelt und des Verkehrs systematisch variiert und deren Einfluss auf Blick- und Fahrverhalten untersucht. Dazu wurden einfachste Abbiege- manöver (ohne Gegenverkehr) bis hin zu hoch komplexen Situationen untersucht (unterschiedliches Verhalten des Gegenverkehrs, unterschiedlich querende Fußgänger oder Radfahrer). Untersucht werden 24 Personen, davon 12 weiblich. Bei den erhobenen Fahrdaten werden insbesondere die zeitkritischen Manöver (z.B. bei welcher Zeitlücke des Gegenverkehrs fährt der Fahrer los) ausgewertet. Diese Studie trägt damit einerseits dazu bei, die psychischen Prozesse bei der Entstehung von Unfällen besser zu verstehen. Andererseits dienen die so erarbeiteten kritischen Situationen die Grundlage für die Entwicklung von Fahrerassistenzsystemen im urbanen Kreuzungsbereich.

## **Intuitive response = emotionally charged? It doesn't seem so**

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Although a generally accepted definition of intuition is still missing, there seems to be consensus that intuitive judgments can be considered emotional or affective as compared to deliberate ones (e.g., Kahneman, 2003). Starting from the conception that an emotional signal comprises an arousal and a valence component, we measured skin conductance responses (SCR) as a signal for arousal and reaction times in an affective priming task as a signal for valence effects when participants worked on a semantic coherence judgment task (Bowers et al., 1990) either in an intuitive or a deliberate condition (instructed, within-subject design). In the semantic coherence judgment task, participants had to judge whether or not three clue words were coherent in the sense that they were weakly related to a common fourth concept. Our results show that the mode of processing (intuitive/deliberate) did not differently affect reaction times in the affective priming task but did so concerning the skin conductance measures, yet, in a direction opposite to the prediction of a dual-systems view.

## **Transfer effects after training specific functional categories of working memory capacity**

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Each of three groups of participants intensively trained one specific functional category of working memory capacity: storage-processing (complex span), relational-integration (combination tasks), and supervision (task switching). Cognitive abilities were measured by a broad test battery we administered before, immediately after, and six months after four weeks of computer-based training. Training groups were compared to an active control group practicing visual matching tasks. Linear mixed-effects models accounting for individual differences and differences between tasks measuring the same construct were used for the evaluation of transfer effects. We found distinct transfer effects for the three experimental training groups: storage-processing training yielded improvements in novel, non-trained working memory and reasoning tasks, and supervision training led to increased performance in new switching and reasoning tasks. No such broad transfer occurred for the group practicing relational-integration. Transfer effects observed correlated positively with gain in the tasks trained, and the effects were still present 6 months after the training intervention. The effects found in this study provide a simple explanation for the mixed results of previous studies: Different aspects of working memory vary in their degree of malleability.

## **Exploration-exploitation across tasks reveals little evidence for a common factor**

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The need for exploration is ubiquitous. For most of us, not a day goes by in which we do not search for parking spots, online news, or names from memory. However, exploration can be costly. For instance, exploring new options reduces the possibility to exploit known options. In the present work, we investigated whether people show a general tendency to explore or exploit that can be captured across situations. For this, we examined individuals exploration-exploitation behavior across three computerized tasks: a foraging task involving sequential search for fish in several ponds, a sequential choice task involving choosing a candidate from a pool of applicants, and a multi-armed bandit task. Structural equation modeling revealed that there was no general factor underlying exploration in all tasks, even though exploration was highly consistent within each task. Furthermore, measures of cognitive abilities were not related to exploration, but self-reported risk taking was related to more exploration in the foraging and sequential choice tasks. The results suggest that while there is no general tendency for exploration, risk preferences may influence exploration across tasks.

## **The effect of global and local attention on learning in a contextual cueing experiment**

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Finding relevant information is vitally important for efficient and safe behaviour. Given that the location of relevant objects is often related to the context in which they appear we can generally make use of repeated contexts to help us find what we are looking for. Repeated contexts allow us to find relevant information more easily. Learning such contexts has been proposed to depend upon either global processing of the repeated contexts, or alternatively processing of the local region surrounding the target information. In this study we measured the extent to which observers were by default biased to process at a global or local level. The findings showed that the ability to use context to help guide their search was strongly related to an observer's local/global processing bias. Locally biased people could use context to help improve their search better than globally biased people. Overall the current study suggests that our attentional bias can facilitate object localization within familiar environments and that in particular a local perspective is advantageous.

## Detecting logical patterns in sequential learning

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Logical hypotheses, like ‘class X has the features A AND B’, need not to hold deterministically, but may hold probabilistically. We investigated the idea whether people have reasonable degrees of belief (subjective probabilities) about the validity of noisy-logical hypotheses. Judging a logical connective to be more probable than another connective referring to its superset (e.g.,  $P(A\&B) > P(A\vee B)$ ) is traditionally (according to a frequentist interpretation of probability) a fallacy (cf. the conjunction fallacy debate). As non-standard probability measure of noisy-logical predication, we used Bayesian pattern logic (BL, von Sydow, 2011). In two new experiments we were concerned with the sequential learning of several patterns and the judgment which of several connectives are most probable. We investigated the sequential learning of logical relationships and the probability judgments about (partly nested) logical connectives. In one of the experiments we varied the external frequency of a feature by simultaneously learning (a theory of confirmation would predict an effect here). This actually had an effect, but was mediated by a distortion of the subjective frequency representation. Given participants’ subjective frequencies the results were broadly in line with the idea of pattern probabilities.

## Diffusion model analyses for slow decisions: Is the model useful for research on judgment and decision making?

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Diffusion model analyses allow disentangling cognitive processes underlying speeded binary decisions. Parameters are estimated from response time distributions that map specific components like the speed of information processing, response thresholds for the two different responses, and the duration of non-decisional processes. This separation of different cognitive components of decision making makes the model a powerful tool to test psychological hypotheses. Typically, diffusion models are applied to data from cognitive paradigms that comprise several hundred (or thousand) trials of a task providing fast responses with latencies below 1500 ms. In the present project, the applicability to research questions from the field of judgment and decision making is explored. In this field, it is often impossible to use large numbers of trials, and decisions will often take notably longer than one or two seconds. In two experiments, using a numerical estimation task and an impression formation task, participants worked through two blocks of 80 trials each with response times of around 5 to 10 seconds. The diffusion model was able to fit data from most participants, and model parameters were successfully validated.



## Role of transcranial direct-current stimulation in the human endowment effect

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According to neoclassical economic theory ownership should not influence preference and valuation. However, many behavioral studies consistently showed that this is not the case. People typically value an item they own more than an identical item that is available for purchasing. In other words, people require more compensation to give up their possession than they would pay to obtain it. Experiments on this phenomenon called “Endowment Effect” have shown that the average selling prices are typically more than twice as high as average buying prices.

We used Transcranial Direct Current Stimulation (tDCS) of the right prefrontal cortex (PFC) to investigate the effects on the willingness to accept/willingness to pay (WTA/WTP) discrepancy. The WTA/WTP ratio was significantly higher after anodal tDCS than after cathodal tDCS. In addition, the reaction time was significantly longer in the cathodal tDCS condition than in the anodal and sham tDCS conditions. Our findings suggest that the right PFC plays a functional role in producing the endowment effect.

## Explorations into the antecedents, appraisals, and feelings of being-moved (and related emotional states)

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To examine the emotional states described by terms like being moved (*bewegt sein*), being touched (*berührt sein*) and being stirred (*gerührt sein*) we conducted an exploratory study using the Geneva Appraisal Questionnaire. 227 students gave short descriptions of a moving, touching or stirring event, either from their own life or conveyed by media. They also rated the described event on several questions regarding appraisals and feeling qualities. The obtained descriptions revealed that the predominant situations in which students felt moved, touched or stirred were relationship events and critical-life events (especially death and birth). Analyzing the rating data showed that in moving situations sadness and joy were the predominantly experienced emotions. Finally, examining the descriptions of media conveyed events led to the conclusion that a post-hoc distinction of this category into real media-transmitted events and artistic fictional events might be useful. Comparing these three event categories (own-life, real media-transmitted, and artistic fictional) we found a data pattern that reflects the so-called paradox of taking pleasure in negative emotions. This finding indicates the relevance of the aesthetic reception situation for the paradox and hints at a role for being moved (and similar emotional states) in an explanation of this paradox.

## Effects of social relevance and empathy in human memory formation

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Little is known on how social factors influence human memory formation. Two possible factors may play a role: if an encoded item is of social (vs. personal) relevance, and the level of empathy of the person who encodes. Here, we report results from a memory study that investigated these factors within a framework of a new social decision-making paradigm (Wagner et al, 2012, *Frontiers in Emotion Science*). Subjects chose in each trial between one of two lotteries, with the outcome of the chosen lottery (win or loss) either assigned to the self (personal relevance) or to a poor child in need of medical treatment for which a local charity organization was collecting donations (social relevance). Trait empathy of the subjects was assessed by the “Saarbrücker Persönlichkeitsfragebogen zu Empathie” (SPF). After the task, subjects underwent a surprise recognition memory test for the numbers previously shown as lottery gains or losses. High-empathy subjects showed generally better memory performance than low-empathy subjects. Moreover, empathy interacted with social relevance in that specifically in high-empathy but not low-empathy subjects real outcomes were better remembered than potential (non-realized) outcomes for personally relevant conditions, while potential outcomes were better remembered than real outcomes for socially relevant conditions.

## The difficulty of letting go: Moderators of the deactivation of completed intentions

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The recently described intention deactivation failure (Walsler, Fischer, & Goschke, 2012), reflected in aftereffects of completed prospective memory (PM) intentions in terms of performance decrements on repeated PM cues of old intentions, raises the question about the mechanisms underlying the deactivation process. In the present study, we investigated if the deactivation of completed intentions is a resource-demanding process. To this aim, we manipulated the task demands between intention completion and measurement of intention aftereffects. Aftereffects of completed intentions were found when sufficient resources were available (control condition), but were reduced when resources were sparse (working memory load condition). In addition, in a condition in which participants were asked to reflect upon the to-be-deactivated PM cue, aftereffects were increased exclusively for participants low in self-reported action control. Together, results are not consistent with the assumption of a resource-demanding intention deactivation process. Rather, findings support the assumption that representations of completed intentions can be overwritten by new demanding working memory task representations.

## The influence of learning and task on adaptation-related aftereffects for faces

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In previous studies on face perception, we showed that priming (P) and adaptation-related aftereffects (AEs) could be induced within one paradigm and that similarity and ambiguity play a role in determining which effect emerges. Here the role of ambiguity was tested further. We created two continua from quadruplets of unfamiliar faces (identities A, B, C, D), spanning three identities each (A-B-C, B-C-D) by stepwise morphing. After learning the faces A and C, we tested P and AE for the A-B-C continuum. We observed contrastive AEs for B (ambiguous for the decision) but not for A or C (unambiguous). At least one day later, the same subjects learned faces B and D. This re-learning phase was followed by tests of P and AE for the B-C-D continuum. We again observed contrastive AEs but only for C (ambiguous for the decision) but not for B or D (unambiguous). Therefore, learning and the given task determined whether AEs were induced or not for the same stimuli present in both sessions (B-C). Our results replicate AEs in the perception of previously unfamiliar faces and suggest the influence of ambiguity on the occurrence of AEs, irrespective of the physical image.

## New approaches towards the measurement of mental fatigue

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Prolonged periods of mental activity lead to “mental fatigue”, a drain of cognitive resources that is among other factors responsible for severe traffic accidents and other potentially adverse incidents. Mental fatigue leads to problems in working memory and focusing attention, it provokes lapses and distractibility in information processing that results in inadequate behavior. Most studies on physiological markers of mental fatigue focus on electrophysiology (EEG) and eye movements. EEG research has identified increased activity in the alpha band as the core marker for mental fatigue, however, the cognitive mechanisms reflected in this measure are still unclear. In a series of highly controlled long time experiments we can show that alpha activity plays only a marginal role in marking mental fatigue as long as participants are not sleepy. However, frontal theta, a measure that is highly related to executive control, shows discrete relations to functional changes during prolonged mental activity. We can demonstrate that parameters of theta activity might be useful in tracking states of mental fatigue long before subjects become sleepy. Such an approach allows to investigate the decline of mental resources in real working environments. Attempts to apply this approach by using mobile EEG equipment will be demonstrated.

## A new approach to the evaluation of witness statements

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Commonly, there is no objective criterion to determine the truthfulness of witness statements. Furthermore, witnesses often contradict each other. Even though there are usually several witnesses at a crime scene, research on predictors of their truthfulness is restricted to the investigation of the individual witness. Thereby, systematic interrelations between the statements of the witnesses that may provide information about each individual's competence are neglected. To analyse these interrelations we suggest a formal model based on Consensus Theory. The model enables the estimation of the true answer key based on the answer patterns of independent witnesses. Furthermore, Consensus Theory provides estimates of the competence of individual witnesses.

In several experiments, we tested the applicability of Consensus Theory to witness statements. Our results suggest that Consensus Theory is superior to the majority rule, which ignores interrelations between witness statements. Participants watched videos of a crime and answered yes-no-questions. The participants' competence was manipulated via video quality or a distraction task. Estimates of their competence derived from Consensus Theory correlated more highly with their true competence than the confidence ratings they provided themselves. Hence, considering several witnesses seems to be a promising approach to evaluating the truthfulness of witness statements.

## Wie unterscheiden sich ältere und junge Unfallfahrer hinsichtlich der Unfallursachen?

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Die beiden Altersgruppen der älteren und der jungen Fahrer werden in der Diskussion von Verkehrsunfällen immer wieder als besonders risikoreiche Gruppen genannt. Dabei werden vor allem die relative Häufigkeit der Unfallbeteiligung sowie die amtlichen Unfallursachen betrachtet. Auf welchem Ursachenmechanismus die Unfälle genau basieren, lässt sich jedoch mit diesen Angaben nicht näher bestimmen. Eine detailliertere Sichtweise auf den tatsächlichen Unfallhergang ermöglicht daher die Arbeit der AARU Verkehrsunfallforschung. Im Rahmen des interdisziplinären Forschungsprojekts werden Verunfallte interviewt und es können auf Grundlage dieser subjektiven Informationen sowie den objektiven Informationen aus der technischen Rekonstruktion der Unfälle fundierte Schlüsse hinsichtlich des tatsächlichen Unfallhergangs und der entsprechenden Unfallursachen gezogen werden. Auf der Datenbasis von über 500 umfassend analysierten Unfällen aus der AARU Datenbank, in der für Unfälle seit 2002 Unfallursachen gemäß der 5-Step Methode vergeben werden, werden die Unterschiede von älteren und jungen Unfallfahrern detailliert betrachtet. Ein Ergebnis dabei ist, dass die jungen Unfallfahrer zwar häufiger aufgrund überhöhter Geschwindigkeit verunfallen, dies aber nicht auf bewusst riskantes Fahrverhalten zurückgeführt werden kann, sondern die Unerfahrenheit dieser Altersgruppe eine Fehleinschätzung der eigenen Geschwindigkeit bzw. des Fahrerverhaltens zur Folge hat.

## Two perceptually different processing stages of the Delboeuf illusion

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In the Delboeuf illusion, a central circle is perceived as smaller when it is surrounded by a large circle as when it is surrounded by a small circle ("distance effect"). We used traditional psychophysics and a priming experiment to compare late and early stages of processing of the illusion. In both tasks, we parametrically varied the radius of the outer circle and its thickness. The latter relates to the Ebbinghaus illusion, in which the illusory percept depends on inducer size ("size effect"). Traditional psychophysics showed (1) no size effect but (2) a distance effect that was subject to *quantitative* modulation. The central circle was always perceived as larger as its actual size and this effect increased with decreasing radius of the outer circle. The priming paradigm showed (3) also no size effect but (4) a distance effect that was subject to *qualitative* modulation. Depending on the thickness of the outer circle (small, medium, large) we found different priming effects (strong, small or reversed). We conclude that early and late processing stages are based on different perceptual interpretations and that the Delboeuf illusion is not a special case of the Ebbinghaus illusion.

## Effects of gonadal hormones on fear learning and quasi-intrusive aversive memories investigated in a naturalistic fear conditioning experiment

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Fear conditioning constitutes an established experimental paradigm to study acquisition and maintenance of fear and various studies have highlighted deficits in fear conditioning processes in patients with anxiety disorders such as posttraumatic stress disorder (PTSD). PTSD is furthermore characterized by intrusive aversive memories which can be conceived as conditioned reactions to cues associated with the trauma. Due to the higher vulnerability of women to anxiety disorders, gonadal hormones such as estradiol and progesterone are discussed as a potential moderating factor in fear learning and emotional memory. We developed a fear conditioning task using aversive film clips as unconditioned stimuli and investigated healthy women taking oral contraceptives as well as naturally cycling women during their early follicular or luteal phase. Saliva samples were collected to assess estradiol and progesterone levels, skin conductance response and ratings were measured during the conditioning task, and aversive memories were assessed subsequently. Preliminary results indicate that women with lower levels of estradiol show reduced extinction learning and report more aversive memories about aversive film clips subsequent to the laboratory study. These results suggest that gonadal hormones may be an important factor moderating emotional responding and memory processes occurring in anxiety disorders such as PTSD.

## **An online service to help manage primary research data**

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Funding agencies increasingly often require data management plans to be included with research grant applications. Such plans should describe how research data generated by the project will be managed and disseminated, and they are evaluated by the reviewers of the grant proposal. In addition, there is a growing demand among scientific disciplines for creating a scholarly structure that acknowledges and rewards data producers: Research data should be recognized as a principal research output of scientific effort. Over the past two years the 19 members of the DataCite initiative collectively have assigned more than a million digital object identifiers to data sets. The cross-linking of peer-reviewed scientific publications and associated datasets is the principal goal of the EU's FP7 OpenAIREplus. Publishing and sharing data means new challenges and duties for psychologists engaged in empirical research. Data management is time-consuming as instruments and tools facilitating data management are rare. The Leibniz Institute for Psychology Information (ZPID) has developed a Web-based tool that supports the coding, description, metadata generation and long-term preservation of research data. The tool can be used for self-archiving purposes. Optionally, data can be transferred to PsychData, the institutional archive for primary research data in psychology.

## **Training of working memory – A meta-analysis**

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Introduction: Deficits in working memory (WM) cause severe impairments in everyday life functioning (Johansson & Tornmalm, 2011), so WM is of high relevance in rehabilitation. A meta-analysis was carried out to analyze the efficacy of WM trainings and identify influencing factors. Method: The databases PubMed and PsycINFO were searched systematically for WM training studies published in English language until august 2012. Additionally a manual search was conducted. Inclusion criteria were (a) report of transfer effects to untrained tasks, (b) at least two training sessions and (c) presence of a control group (except for patient studies that were allowed to be one-armed but no case reports). A total of N = 53 studies with N = 2702 subjects were analyzed. Results: Healthy subjects as well as patient groups benefited from WM training showing significant, long-lasting near transfer effects to untrained WM tasks with small to medium effect sizes. Additionally WM training caused stable far transfer effects with small effect sizes to executive functions and everyday life functioning. No or only unstable effects were found for the domains of attention/processing speed, long-term memory and reasoning/intelligence. Training duration and adaptivity are important determining factors for training efficacy.

## Evidence from writing process data on copying strategies of 4th and 2nd graders

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The ability to copy text efficiently is an important prerequisite of many school-related tasks. Beyond some evidence emphasizing the role of available working memory resources for copying (Grabowski, Weinzierl & Schmitt, 2010), the true nature of cognitive strategies for efficient copying still remains largely unclear. In two experiments writing process data of fourth (N=65) and second graders (N=79) was analyzed to show whether linguistic processing leads to a more efficient usage of working memory during copying. A 2x4 mixed model design was used to compare slow and fast writers while they copied four different symbol systems varying with respect to their linguistic codability (text, numbers, consonant strings, geometric symbols). We found longer chunks of successively copied characters between two writing pauses with faster writers, and when materials were copied that allow for better linguistic processing ( $p < .001$ ), indicating that linguistic codability supports chunk formation in working memory. Significant interactions between copying speed and symbol system were found in both grades ( $p$  between .03 and .001) with larger effects for second graders, suggesting an ongoing improvement of chunking strategies during primary school. The findings help clarifying the role of working memory for efficient copying strategies and their development in primary school.

## Welche Lesefehler sind spezifisch für Neglectdyslexie? Wortbenennung bei Neglectpatienten und gesunden Kontrollprobanden

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Linksseitiger visuell-räumlicher Neglect, meist nach rechtshemisphärischer Läsion, geht oft mit Neglectdyslexie (ND), einer Lesestörung, einher. Beim Wortlesen zeigen Patienten mit ND viele linksseitige Auslassungen und Ersetzungen von Buchstaben. Die Fragen, durch welche Lesefehler ND spezifiziert werden kann und welche Lesefehler auch von gesunden Kontrollprobanden produziert werden können, sind bisher noch nicht ausreichend geklärt worden. Diese Studie analysiert quantitativ und qualitativ Lesefehler beim Wortlesen von 18 Neglectpatienten und 11 gesunden, altersangepassten Kontrollprobanden. Die Schwierigkeit der Wortleseaufgabe wurde bei allen Probanden durch individuell ermittelte Darbietungszeiten so angepasst, dass beide Versuchsgruppen gleich viele Lesefehler produzierten. Die Ergebnisse zeigen: Die Anzahl von Ersetzungen ist in beiden Gruppen gleich groß und vermutlich auf die in beiden Gruppen allgemein reduzierte Leseleistung zurückzuführen. Hingegen werden Auslassungen von Buchstaben bei Neglectpatienten signifikant häufiger beobachtet als bei gesunden Kontrollprobanden. Lesefehler sind bei ND am häufigsten links im Wort mit einem nach rechts abnehmenden Fehlergradienten. Die Ergebnisse der Kontrollprobanden replizieren einen typischen, umgekehrt u-förmigen Fehlergradienten mit vorwiegend wortmittigen Fehlern. Auslassungen und linksseitige Fehler mit abnehmendem Fehlergradienten sind daher eindeutig spezifisch für ND. Im Rahmen von gängigen Wortverarbeitungsmodellen gehen wir davon aus, dass die ND-spezifischen Auslassungen und linksseitigen Fehler durch sublexikalische, serielle Prozesse bei der Wortverarbeitung zu erklären sind.

## **The temporal profile model: A general model of simultaneity perception?**

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Perception of simultaneity is important for many areas of human life. For instance, simultaneity is an important temporal cue to decide whether information is coming from the same source or not. However, most theoretical models equate simultaneity perception with a lack of temporal order perception. Inconsistent with these theoretical models, there is an increasing amount of empirical evidence indicating that simultaneity and temporal order perception are due to different mechanisms. For instance, attention influences simultaneity and temporal order perception in different ways. The temporal profile model (Stelmach & Herdman, 1991) is one of the few models which can explain these findings. Contrary to other models it assumes different mechanisms for temporal order and simultaneity perception. Since the TPM is developed in the context of visual prior-entry research it is an interesting question whether the TPM is suitable as general model of simultaneity perception or not. For this aim we extended the TPM for a broader range of situations. New hypotheses are tested with data from simultaneity and temporal order judgments. The results indicate that the temporal profile model can be regarded as useful general model of simultaneity perception.

## **Unfolding art experience in the museum**

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Although art is appreciated in different contexts, empirical research in psychological aesthetics has mainly been conducted in the laboratory. This has undoubtedly contributed to experimental control and rigor, but also to the neglect of contextual factors influencing the affective and cognitive processes involved in aesthetic experiences. To examine this effect of context on art appreciation we compared aesthetic experiences in the museum and laboratory. Three groups of participants viewed artworks from an art exhibition in the museum and/or the laboratory on two consecutive sessions. Their aesthetic experiences were measured via self-reports and its indirect effects on memory. The order of the viewing context (Museum/Lab, Lab/Museum, Lab/Lab) differed between groups. Our results reveal that artworks were liked more, elicited a higher sense of understanding, and were more arousing, positive and interesting in the museum than in the laboratory. These effects were found for both groups that viewed the artworks in the museum, regardless of whether they did so before or after the laboratory session. Additionally, viewing artworks in the museum enhanced free recall and recognition of artworks. Future research should focus on specific factors that contribute to this effect of museum context on aesthetic experience.



## Driver and driving behavior of elderly drivers on motorways

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The share of elderly drivers and the mileage driven by them will considerably increase in the next years (OECD, 2001; Berry, 2011, MiD, 2008, EC, 2011). Whereas the problems elderly drivers have at complex junctions are rather well understood (Braitman et al., 2007; Mayhew et al., 2006), little is known about specific problems of elderly drivers on motorways (Thompson et al., 2012). To bridge this gap, driving experiments were conducted on motorways (total length 20 kilometers) with three groups of elderly drivers and a younger comparison group, each consisting of approximately 25 participants. Prior to the test drive, each participant completed various tests to assess sensory, cognitive and motor capacity. The analysis of the data revealed that elderly drivers, when changing lanes and overtaking, did look back significantly less than the comparison group. Furthermore, we found no evidence for compensatory additional looks to mirrors or a decrease in speed. The strongest predictor regarding this behavior was chronological age, variables denoting functional age did not contribute to explain this behavior. The results reveal elderly people's problems on motorways and suggest that they could specifically benefit from additional trainings or blind-spot assistance systems.

## Congruency ratio-based modulation of early distractor processing: An ERP study of the temporal flanker task

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In choice reaction tasks, performance is usually better when a distractor stimulus (feature) is associated with the same response as the target stimulus (i.e., congruent condition) compared to when target and distractor are associated with different responses (i.e., incongruent condition). This congruency effect tends to be reduced when the ratio of incongruent to congruent trials is increased, suggesting conflict-induced focusing of attention on target information. To investigate the effects of conflict adjustment on distractor processing, we administered a temporal flanker task, in which the distractor occurs in advance of the target, allowing us to examine distractor-related ERPs in the absence of concurrent target processing. To control stimulus-specific sequence effects we excluded all trials associated with stimulus or response repetition from the analyses. In line with previous findings, the congruency effect was reduced under conditions of an increased incongruent/congruent ratio. This was accompanied by a reduction of the distractor-elicited N1 as well as a less pronounced CNV and less pronounced LRP bias regarding the response hand associated with the distractor, during the flanker-target interval. These results suggest early attentional selection and modulation of preparatory usage of distractor information as means of conflict adjustment.

## **Forest or trees? The role of attention in re-representing instructed tasks**

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Previous research showed that instructed task rules determine how humans represent and perform a task, sometimes even preventing learning and use of regularities not mentioned by instructions. The present experiments explored when participants would re-represent a task in a way not encouraged by instructions. We were interested in whether and when participants would use an irrelevant but correlated stimulus dimension for responding. Compound global-local letters served as stimuli. In Exp. 1 participants were either required to respond to the identity of the global letters or to the identity of the local letters. Different sets of letters served as global and local stimuli. Only one set was mapped to responses by instructions, but specific global letters consisted of specific local letters on most trials. In Exp. 2 participants responded to the position of compound letters in a reference frame. Again, unmentioned to the participants, global and local letters allowed for alternative ways to determine the correct response. Results show that, after practice, participants used global irrelevant letter identity, but not local irrelevant letter identity, for responding. These results suggest that salient irrelevant stimulus features lead to shifts of attention and thus promote re-representation of instructed task rules.

## **Beyond good and bad – facets of automatic processing of emotional words and texts**

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Social-cognitive research has adapted a series of experimental paradigms to explore various facets of the automaticity of evaluation, thereby typically using pictures or words as stimuli. Most typical is a restriction to a simple good-bad dichotomy, often accompanied by the assumption that early, unintentional, potentially unconscious processing is rather undifferentiated. I will briefly present three lines of research that challenges this assumption: (1) Presenting masked emotional faces as primes in a modified evaluative priming design yields emotion-specific priming effects for emotional words. (2) Varying valence and relevance (i.e., whether a word reflects something good or bad for the trait-holder – e.g., intelligent, lonely – or something good or bad for the social environment of the trait-holder – e.g., tolerant, mean) of prime and target adjectives in a masked evaluative priming design suggest that automatic processing of affective information conveys not only the positive-negative differentiation, but also the relevance type (3) In a semantic priming design with emotional text scenarios as primes and emotion words as targets, emotion-specific priming effects were found; most important, effects were stronger if scenarios were given in a form addressing the participant (“You are ...”) compared to a third-person perspective, thereby indicating processing of scenarios beyond “pure” semantic comprehension.

## Mind-body interactions in affective decision-making

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Previous research has suggested that decision-making is influenced by body signals from the periphery or the central representation of the periphery. In two studies we explored the impact of conscious perception of somatic feedback (interoceptive awareness) using the Iowa Gambling Task (IGT) that examines decision-making under ambiguity. In study 1, we were able to show that participants with high interoceptive awareness made significantly more advantageous and fewer disadvantageous choices. In study 2, we used event-related functional magnet resonance imaging (fMRI) to examine the impact of interoceptive awareness on neural responses preceding decision-making. The results show a positive relationship between the degree of interoceptive awareness and selection related activity in the right anterior insula and the left postcentral gyrus. Neural activity within the right anterior insula was associated with decision-making performance only in individuals with high but not in those with low interoceptive awareness. These findings support the role of somatic feedback in decision-making processes. They indicate that the right anterior insula endorses a representation of somatic markers and that these are more strongly processed with increased interoceptive awareness.

## Eating is in the eye of the beholder

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According to theoretical models biased attention for food cues is related to craving and food (over)consumption. In three studies we assessed attention biases towards food cues by eye-movement recordings. Results of all studies indicated that everyone has an attention bias for food. Yet, overweight/obese individuals show a distinctive pattern of attentional bias for food that was associated with craving: Overweight participants directed their first gaze more often towards food pictures than healthy weight individuals, but subsequently showed reduced maintenance of attention on these pictures. The initial orientation bias towards food was positively correlated with food intake for overweight participants (study 1). Restrained and unrestrained eaters with a healthy weight did not differ in their attention allocation towards food (study 2). Manipulation of the expectancy to consume chocolate did not influence chocolate cravers' attention bias towards chocolate cues or chocolate intake (study 3). After a craving induction, chocolate cravers showed an attention bias for chocolate cues and consumed more chocolate irrespective of the expected availability of chocolate. These results indicate that attention biases towards food are related to craving and are potentially associated with overweight and excessive food consumption.

## The role of gaze direction and vision in tactile distractor processing

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Previous research has shown that vision and proprioceptive feedback influence tactile selection. Yet, it remains unclear whether selection is affected at the perceptual level or at the level of response-compatibility. We investigated how gaze direction and vision contribute to distractor processing in a tactile variant of the Flanker task ( $N = 22$ ). Participants simultaneously received one of four complex vibrotactile patterns on each hand while one hand was placed outside of the gaze direction and occluded from view. Participants identified the vibrotactile patterns presented either to the occluded or to the non-occluded hand while ignoring the patterns presented to the other (irrelevant) hand. The proportion of correctly classified targets increased significantly with perceptually congruent distractors, but only when the distractors were presented to the non-occluded hand. Thus, gaze direction towards and vision of the irrelevant hand facilitated tactile target identification when the distractors were perceptually congruent to the target. Yet, gaze direction and vision did not affect tactile target identification when the distractors were perceptually incongruent but response-compatible. These results suggest an exclusive influence of gaze direction and vision on tactile selection at the perceptual level, highlighting the importance of investigating cross-modal effects even in presumably uni-modal tasks.

## Modulation of early auditory processing by visual symbolic information in dyslexia

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Dyslexic and control first-grade school children were compared in a Symbol-to-Sound matching test based on a non-linguistic audiovisual training, which is known to have a remediating effect on dyslexia. Visual symbol patterns were to be matched with predicted sound patterns. Sounds incongruent with the corresponding visual symbol (thus not matching the prediction) elicited the N2b and P3a event-related potential (ERP) components relative to congruent sounds in control children. Their ERPs resembled the ERP effects previously reported for healthy adults with this paradigm. In dyslexic children, N2b onset latency was delayed and its amplitude significantly reduced over left hemisphere whereas P3a was absent. Moreover, N2b amplitudes significantly correlated with the reading skills. ERPs to sound changes in a control condition were unaffected. Although both groups accomplished the task successfully remarkable group differences in brain responses suggest that normal-reading children and dyslexic children recruit (partly) different brain mechanisms during the task. We propose that abnormal ERPs in dyslexic readers indicate a deficit resulting in a widespread impairment in processing and integrating auditory and visual information and contributing to the reading impairment in dyslexia.

## Neural markers of age-related reserve and decline in visual processing speed and visual short-term memory capacity

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Attentional performance is assumed to be a major source of general cognitive abilities in older age. The present study aimed at identifying neural markers of preserved and declined basic visual attention functions in aging individuals. For groups of younger and older adults, we modeled general capacity parameters, *visual perceptual processing speed C* and *vSTM storage capacity K*, based on Bundesen's formal 'Theory of Visual Attention', and recorded ERPs of the same participants. First, in both age groups, parameters were correlated with the same distinct ERP markers of *C* and *K*, respectively, and significantly differed between higher- and lower performing individuals: N1 responses were smaller for participants with higher as compared to lower processing speed. Amplitudes of the contralateral delay activity were enhanced for participants with higher relative to lower storage capacity. Second, only in older adults, performance in both parameters was related to two further distinct ERP correlates: older participants with higher relative to lower processing speed showed larger anterior N1 amplitudes and older participants with higher relative to lower storage capacity exhibited a right-central positivity, indicative of compensatory recruitment of additional neural resources in high-functioning older individuals.

## Visual search with central scotoma – A simulation study

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**Aim:** The main objective of the present study was to investigate whether and how visual feature search changes with progressive central vision loss (CVL). Dependent upon the progress of CVL, two alternative forms of adaptation in visual search patterns were hypothesized.

**Method:** Subjects with three grades of simulated central scotomata (none, mild, severe) participated in a visual search experiment with four levels of difficulty and three levels of item number. Reaction times and eye movements were analyzed to examine the efficiency, systematicity and seriality of visual search.

**Results:** Participants with a mild scotoma showed a similar visual search pattern to those with no scotoma. With increasing difficulty, both groups searched less systematically and more serially. In contrast, participants with a severe scotoma displayed the expected adaptation to CVL. Although they also searched less systematically with increasing difficulty, they did not increase seriality.

**Conclusion:** Participants with central scotomata implemented different visual search strategies dependent upon the progress of CVL. Whereas subjects with a mild scotoma displayed a similar visual search pattern to the control subjects, participants with a severe scotoma searched with a constantly large search area. Implications for AMD patients were discussed.

## **Assessing and changing relatively automatic processes in addiction**

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The persistence of addiction has been attributed to automatically triggered cognitive processes including action tendencies, attentional biases, and memory associations. Interventions have been developed to directly manipulate these processes and their resulting cognitive biases: Cognitive Bias Modification (CBM). Participants repeatedly perform tasks that are in some way incompatible with the automatic process at work. Evidence is accumulating that CBM is effective, for instance, reducing relapse rates a year after an intervention for alcoholism (attentional re-training: Schoenmakers et al., 2010; approach-bias re-training: Wiers et al., 2011). We recently replicated the clinical effect of the approach-bias re-training now with mediation of the clinical outcome by the change in automatic approach tendencies. We were also able to show that patients with a strong approach bias profited most from the CBM intervention.

Our findings suggest, however, that experimental procedures optimal for training (i.e., irrelevant feature paradigms) lack the psychometric properties typically needed for behavioral prediction. We therefore suggest two alternatives when the (research) focus is on prediction: First, relevant feature measures may be used (e.g., IAT, SRC), although these measures do not correlate with irrelevant feature measures. Second, novel analysis methods may help to unravel effects of CBM.

## **No evidence for age categorization based on out-group defining facial features**

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Participants are more accurate at remembering both own- versus other-race and own- versus other-age faces (own-age bias, OAB). Such effects have been explained by an early categorization mechanism on the basis of the detection of out-group defining facial features, resulting in reduced individuation of out-group faces. This suggestion is supported by visual search task experiments, in which other-race target faces were detected faster among own-race distracters than vice versa. The present series of experiments tested a categorization account for the OAB. In young adults, we found that prototypical old and young target faces (created by digital image morphing) were detected equally fast among distracters of the respective other age, but images depicting real young faces were detected faster among old distracters than vice versa. This advantage for young targets was neither affected by spatial low-pass filtering nor by picture-plane inversion of the faces. Finally, older participants demonstrated no advantage for searching either young or old faces. Overall, none of our experiments provided evidence for a possible search advantage for other-age faces. Our data therefore do not support an explanation of the OAB based on the efficient detection of out-group defining features.

## Unterschiede im zeitlichen Ablauf des Turn-Takings bei auditiven und audio-visuellen Dialogen

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Menschliche Kommunikation erfolgt über unterschiedliche Kanäle und ist sehr effizient. So verlaufen Telefongespräche anscheinend genauso flüssig wie Unterhaltungen von Angesicht zu Angesicht ohne dass es zu größeren Überlappungen oder Pausen zwischen den einzelnen Redebeiträgen (Turns) kommt. Dennoch wurden in verschiedenen Studien Unterschiede im Ablauf des Sprecherwechsels (Turn-Taking) zwischen auditiven und audio-visuellen Konversationen gefunden. Die Methoden waren jedoch teilweise sehr unterschiedlich und die Ergebnisse widersprüchlich. In einigen Studien verlief der Wechsel mit Sichtkontakt effizienter, in anderen verlangsamte er das Turn-Taking. Zudem ist unklar, ob dieser Effekt auf einen höheren kognitiven Aufwand oder nonverbale Kommunikationsanteile zurückzuführen sind. Ziel dieser Studie war es daher, mit modernen Methoden experimentell zu untersuchen, ob visuelle Informationen die zeitliche Koordination des Turn-Takings beeinflussen.

Dafür wurden natürliche Gespräche unter zwei Bedingungen aufgezeichnet: In der ersten Bedingung konnten sich zwei Versuchspersonen während der Kommunikation nur hören (Telefon), in der zweiten Bedingung zusätzlich auch sehen (Sichtkontakt). Die Ergebnisse zeigten, dass Sprecherwechsel mit Sichtkontakt längere Pausen und eine größere Streuung aufweisen. Der höhere kognitive Aufwand bei der Interpretation visueller Signale kann die große Streuung der Daten alleine nicht zufriedenstellend erklären. Wahrscheinlicher ist, dass die Unterschiede vor allem auf den Austausch nonverbaler Informationen und andere soziale Interaktionen zurückzuführen sind.

## Analyse von Naturalistic Driving Data – Straßenklassen- und fahrmanöverspezifische Betrachtung als neuer methodischer Ansatz

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Die in den letzten Jahren an Bedeutung gewinnenden Forschungsmethoden der Naturalistic Driving Study bzw. des Field Operational Tests ermöglichen es Forschungsfragen im realen Feld nachzugehen (Hanowski, Olson, Hickman & Dingus, 2006; Wege, Will & Victor, 2012). Hierbei werden mit besonderer Messtechnik ausgestattete Fahrzeuge Personen überlassen, die diese im Alltag nutzen. Da die gefahrenen Strecken keinerlei Einschränkungen unterliegen, erhält man sehr realitätsnahe Daten, was die externe Validität der Untersuchungsmethode steigert. Aufgrund der Größe der anfallenden Datenmenge und der unkontrollierten situativen Randbedingungen sieht man sich mit Problemen bei der Datenaufbereitung und -analyse konfrontiert, die sich bei kontrollierten Fahrversuchen nicht stellen. Um die aus der Fahrsituation entstehende Varianz zu minimieren, ist eine Selektion vergleichbarer Situationen meist unumgänglich.

Mit den im Projekt euroFOT von N=51 BMW-Fahrern gewonnenen Daten wurde die Auswirkung von Nebenaufgaben auf das Fahren untersucht. Im Rahmen der Analyse wurde zunächst straßenklassenspezifisch (Autobahn, Überland, Innerorts) ausgewertet. Zudem wurden einzelne Fahrmanöver (freie Fahrt, Folgefahren) in der Auswertung getrennt betrachtet. Diese Auswahlkriterien führen zu einer Verringerung der Streuung in den Daten und ermöglichen es Effekte, wie bspw. die von Nebenaufgaben auf das Fahren, leichter zu quantifizieren und zu analysieren. Die zur Anwendung gekommenen Methoden werden vorgestellt und anhand exemplarischer Ergebnisse bewertet.

## **Sequentially presented answer options prevent the use of testwiseness cues in continuing medical education multiple-choice tests**

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Multiple-choice (MC) is one of the most valid and hence, popular testing formats for the assessment of knowledge. Testwiseness – that is, the ability to find subtle cues to the solution by scrutinizing all available answer options – threatens the validity of MC tests, however. Discrete-option multiple-choice (DOMC) has recently been proposed as an alternative testing format (Foster & Miller, 2009). In DOMC testing, answer options are presented sequentially rather than simultaneously, a procedure that may allow for a better control of testwiseness. Test questions in continuing medical education (CME) programs aimed at developing and maintaining the competence of professionals in the medical field have been criticized for being susceptible to testwiseness strategies (Rotthoff, Fahron, & Scherbaum, 2008). We found evidence that a sequential presentation of the answer options reduced the use of testwiseness cues in a CME test. The DOMC answering format was thus shown to allow for a better control of testwiseness than traditional MC testing. It seems worthwhile to further explore the usefulness of this new testing procedure.

## **The aesthetic paradox in processing literary vs. expository texts**

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This research project is founded on the „aesthetic paradox“ (Christmann, Wimmer & Groeben, 2011): The positive evaluation of aesthetic objects despite of their cognitively demanding processing. This conflict is resolved by the assumption that recipients adopt an aesthetic reception attitude (expectation that aesthetic objects are potentially ambiguous) when dealing with works of art, which fosters deep processing and enables a satisfactory processing result. The aesthetic paradox was investigated using the example of processing literary vs. expository texts. The following question/hypotheses were derived and explored in a sequence of 3 studies: 1) Which (para-)textual features activate an aesthetic reception attitude? 2) Recipients adopting an aesthetic reception attitude apply polydimensional processing criteria, whereas under a factual attitude, reading is subjectively assessed according to monodimensional processing criteria. 3) Polydimensional text processing is associated with less negative evaluation of cognitive load than monodimensional text processing. The design was partly experimental (study 1), partly quasi-experimental (studies 2 and 3). Each study combined a qualitative method of data collection (semi-standardized interview) with a quantitative approach of data analysis (chi-square-tests, ANOVAs, linear regressions). Results indicate that 1) narrativity is critical for generating an aesthetic reception attitude; hypothesis 2) was fully corroborated, but hypothesis 3) was not confirmed.



## „Jetzt!“ – Situative Einflüsse auf den optimalen Zeitpunkt eines Gefahrenwarnassistenten

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Fahrzeug-Fahrzeug- und Fahrzeug-Infrastruktur-Kommunikation (Car2X-Kommunikation) erlauben in naher Zukunft wesentlich frühzeitigere Warnungen als fahrzeugeigene Sensorik. Solche Warnungen könnten allerdings unverständlich oder störend sein, möglicherweise sogar vergessen werden, da Fahrer die Verkehrssituation noch nicht als Gefahr erleben. Wann sind frühzeitige Gefahrenmeldungen also optimal und welche Rolle spielt dabei die Fahrsituation?

Um diese Fragen zu beantworten, wurde eine Fahrsimulatorstudie durchgeführt, bei der die optimalen Zeitpunkte für zwei Stufen (*Information* und *Vorwarnung*) einer frühzeitigen Car2X-Warnung in einem Landstraßenszenario mit zähfließendem Verkehr ermittelt wurden. Variiert wurde hierbei die Kritikalität der Situation (zähfließender Verkehr mit 25 km/h und 50 km/h) und die Ablenkung des Fahrers (Fahren ohne und mit Nebenaufgabe) in einem 2x2-faktoriellen Messwiederholungsdesign mit 24 Probanden (12 Frauen, 12 Männer;  $M = 26.6$  Jahre,  $SD = 7.2$  Jahre).

Es zeigt sich, dass in der kritischeren Situation jeweils frühere Zeitpunkte gewünscht wurden als in der weniger kritischen. Ablenkung beim Fahren verändert den optimalen Zeitpunkt bei der Vorwarnstufe, bei der dies geprüft wurde, dagegen nicht. Für beide Stufen scheint insgesamt eher wichtiger zu sein, wie viel Zeit für eine Reaktion benötigt wird. Es empfiehlt sich damit eine Anpassung an die Kritikalität der Situation. Untersuchungen zu weiteren Gefahrenarten sind notwendig, um dies auf andere Warnsysteme übertragen zu können.

## I screwed up ... and I meant to. On committing and processing of intentional errors

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Committing errors is something that we encounter every day and such errors affect subsequent behavior. But what happens if an error is committed on purpose? To this end, we investigated distinct behavioral correlates of committing and processing of those errors. We show Intentional Errors take longer to commit than simple errors, but post-error slowing occurs equally for both, errors that are made by mistake and errors that are committed intentionally. We further try to control for the impact of task-switching. This suggests that Intentional Errors are processed very much similar to errors that are made by mistake. An error is an error is an error.

## **Inducing impaired attention within the seductive detail effect: Do already distracted learners suffer more?**

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Based on the Cognitive Theory of Multimedia Learning (CTML) our research explored an attention-related explanation regarding the seductive detail effect. This effect results from inserting interesting but irrelevant details which impair understanding and the processing of core contents in relevant instructional materials. We especially focused on the hypothesis stating that learners with already impaired attention suffer more from inserting seductive details than learners with unimpaired attention. An experimental study with 53 students (2x2-factorial, multivariate design) was conducted and the presence of seductive details (via seductive text passages) and impaired attention (via displaying distracting system releases like a Windows Update information pop-up) were manipulated. Effects of these independent variables on the dependent variables retention performance, transfer performance and learning time were measured. Results showed a significant extension in learning time when inserting seductive text passages. Moreover, the initial attention level significantly moderated the relation between attention distraction and retention performance. Nevertheless, neither retention nor transfer performance decreased significantly by inserting seductive details or inducing impaired attention, and no significant interaction between these experimental factors was revealed.

## **Dude, calm down! De-escalating driving anger using in-car anger regulation prompts**

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Aggressive driving is cited as a major cause for road accidents. Previous research has singled out driving anger as a key antecedent for aggressive driving behaviour. However, research on the regulation of the drivers' emotional state is scarce. In an ongoing simulator experiment we explore the relationship between anger regulation prompts from a driver assistance system and driving anger. The simulated drive was designed to elicit driving anger by inhibit drivers' progress and comprised a traffic jam, a tailgater, a slow driving car in front with sections of unimpeded driving in between. Depending on experimental group, anger regulation prompts were either designed to distract drivers' attention from the anger eliciting aspect of the event or to change drivers' anger provoking appraisal of the event. At 9 predefined route sections participants were asked about their amount of experienced event-specific anger. Driving parameter and heart rate were measured during the whole simulated drive. Preliminary results indicate that a technical system such as a car may be able to modify driving anger. This study contributes to our understanding of driving anger by highlighting the relevance of in-car anger regulation prompts in de-escalating driving anger.

## The effects of disfluency on social distance

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Metacognitive experiences of disfluency have been shown to increase estimations of spatial and conceptual distance (Alter & Oppenheimer, 2009; Oppenheimer & Frank, 2008). Based on Construal Level Theory's perspective that distances are interchangeable and have bi-directional effects (Liberman, Trope, & Stephan, 2007), the current studies tested the novel hypothesis that disfluency may enhance social distance. To do so, target-related and -unrelated instantiations of visual (dis)fluency were employed by using social targets and fonts varying in fluency. In line with expectations, experiences of disfluency (vs. fluency) produced perceptions of greater self-other dissimilarity, both for explicit (Study 1) and rather implicit similarity judgments (Study 2). A further set of studies aimed at demonstrating a downstream of social consequences. Resource allocation has been conceptualized as a behavioral indicator of social distance. Consistent with our reasoning of fluency increasing social distance, participants allocated fewer resources to targets under disfluency (vs. fluency; Study 3). Participants were also better at perspective taking (Study 4) and showed less informational conformity with peers under disfluency (vs. fluency; Study 5). Neither mood, nor perceived task-enjoyment or -difficulty accounted for these findings. Overall, the research sheds light on how social distance can be exacerbated by a previously unaddressed psychological factor.

## How big is the forest, how big is the tree: The SNARC effect in hierarchically organized numerical stimuli

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Number magnitude is known to determine the spatial allocation of attention but few is known about the impact of number magnitude on the width of attention focus. In the present study, processing of number magnitude processing in hierarchically organized Arabic numbers was examined in magnitude classification and parity decision tasks. In both tasks, a stronger SNARC effect was observed in the local dimension than in the global one. The SNARC effect was more pronounced when the magnitudes of global and local dimensions were incongruent. This suggests a competition for attention resources between global and local stimulus dimensions that is present even when number magnitude is fully irrelevant for the task. These results suggest that the rate at which magnitude is extracted from global and local Arabic numbers is comparable. Results are largely compatible with a double-route model of the SNARC effect.

## Online product reviews and the description-experience-gap

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People can access distributional information in at least two ways, in terms of convenient summary descriptions or in terms of sequential search through individual instances sampled from the distributions. In the former case they make *decisions from description*, in the latter they make *decisions from experience*. Recent investigations in risky choices have demonstrated a robust and systematic description-experience gap: Specifically, when people make decisions based on experience, rare events tend to have less impact than they deserve according to their objective probability. We show with data from a laboratory experiment that this description-experience gap generalizes from choices involving monetary gambles to consumer choices involving online consumer ratings. We further show that the same causes that have been identified in risky choice contribute to a description-experience gap in consumer choice—reliance on relatively small samples of information and overweighting of recently sampled information (recency).

## Motor planning in children: The ontogenetic development of a phylogenetic trait

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We examined the development of the end-state comfort (ESC) effect in an object manipulation task that has been used to show the effect in non-human primates (Weiss et al., *Psychological Science*). Seventy-five participants of four age-groups (preschool children, two groups of primary school children, and adults) were tested in the cup transport task. This required them to reach for a plastic cup that was vertically suspended in an apparatus, take out the cup by its stem, rotate the object, and retrieve a small toy animal from the cup's inside. Depending on the cup's initial orientation (upright vs. inverted), ESC could be reached by grasping the stem either with a thumb-up or thumb-down grip. Almost all participants reached for the cup with a thumb-up grip when this resulted in a comfortable end position (i.e. thumb-up posture). When a thumb-down grip had to be selected, none of the preschool children, 12 % of the younger primary school children, 58 % of the older primary school children, and 87 % of the adults finished the action comfortably. Accordingly, a developmental pattern was observed for an otherwise phylogenetic trait, with the critical age for the ESC effect to emerge being 6 to 8 years.

## On the representation of vocal age and gender

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Aftereffects of adaptation have revealed both selective and common coding of facial signals including identity and expression or gender and age. By contrast, dependencies in the processing of non-linguistic features in *voices* have rarely been investigated. Here we study bidirectional cross-categorical aftereffects of adaptation to vocal age and gender. Prolonged exposure to young (20 yrs) or old (70 yrs) male or female voices biased perception of subsequent test voices away from the adapting age (Exp. 1) and the adapting gender (Exp. 2). Vocal age aftereffects (VAAEs) were reduced but significant, when voice gender changed between adaptation and test relative to gender-congruent adaptor-test pairings (Exp. 1). This suggests that the VAAE relies on both, gender-specific and common age representations for male and female voices. Conversely, voice gender aftereffects (VGAEs) were not modulated by age-congruency of adaptor and test voices (Exp. 2). Instead, young voice adaptors generally induced larger VGAEs than old voice adaptors. This suggests common neural coding of gender in young and old voices with young voices being particularly efficient adaptors. This may be due to a more pronounced sexual dimorphism in young voices. In sum, our findings suggest that high-level processing of vocal age and gender are partially intertwined.

## Processing load during speech perception in noise – insights from pupillometry

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Pupillometry provides an objective method for measuring cognitive load (listening effort) during speech perception in adverse listening conditions.

We assessed the influence of cognitive ability and external factors like stimulus type, stimulus modality, intelligibility level, and masker type on the pupil response by combining and comparing the results of 4 studies. Five groups of young ( $n_{\text{tot}}=123$ ) and two groups of middle-aged normal-hearing subjects ( $n_{\text{tot}}=62$ ) participated. Pupil dilation was recorded during speech perception in noise and during the text reception threshold (TRT) test. Lower intelligibility and more complex listening conditions consistently evoked larger pupil responses. Processing load was highest for speech masked by an interfering speaker. Furthermore, individual differences in cognitive abilities modulate the relation between speech intelligibility and processing load. When speech perception is very difficult, subjects start to give up trying to perceive the speech, which decreased the amplitude of the pupil response. This inverse-U shaped function of the pupil response across intelligibility levels supports the validity of this cognitive processing load index.

## **Prosody specific distraction during directing of visual spatial attention**

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TV-advertisements present pictures of “best-to-buy-immediately” products with tempting emotional voices. Such hidden emotional manipulation has been evidenced by recent studies indicating that prosodic fear stimuli enhance directing of visual spatial attention when compared to neutral sounds. However, it remains unclear how the effectiveness of spatial cuing depends on the emotional valence (positive/negative) and the context-relation between cue and target (identical versus different emotional meaning). Recording EEG, we used a modified Posner-paradigm, presenting an emotional voice, which induced either an emotion of disgust or deliciousness as spatial cue in equal ratio to the left or right side, followed 1200-1300ms later by two laterally (left/right) presented apple pictures: one with a slug (visual disgust), the other a polished apple (visual delicious). The subjects indicated the side of slug having been presented. Control trials included this detection task without sound stimulation. ERP-results for invalid versus valid differences indicated a posterior negativity at 350-400ms over right parietal sites for disgust, however, a late frontal ERP-negativity at 500-650ms for delicious prosody, thus indicating differential processing due to emotional valence. We conclude that both the prosodic valence and cue/target-context determine the success of directing spatial attention to the expected object.

## Posters





## Hand versus foot: Effector specific compatibility effects in language processing

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Theories of embodied cognition suggest that sensory-motor processes are involved in language comprehension processes. In line with this view Hauk, Johnsrude and Pulvermüller (2004) reported an fMRI-study showing that action verbs referring to actions performed with specific effectors (e.g., *kick vs. grasp*) activate specific brain regions that are also activated when the respective actions are performed. The purpose of our study was to investigate effector-specific compatibility effects in a behavioral paradigm. In addition to action verbs (e.g., *kick, grasp*) we also presented words with a weaker association to hand/foot responses. In particular, we used object nouns referring to objects that are typically manipulated with the hand or the foot (e.g., *cup, stirrup*) and words referring to entities that have a spatial association with up vs. down (e.g., *eagle vs. root*). We indeed found strong compatibility effects. Surprisingly, both noun categories showed stronger effects than the action verbs. Implications of this finding will be discussed.

## Werden phonologische Kongruenzeffekte bei Mehrwortäußerungen durch sprachspezifische Wortstellungsregeln beeinflusst?

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Russische Muttersprachler benannten farbige Darstellungen einfacher Objekte entweder mit vorangestelltem Farbadjektiv (Adjektiv-Nomen, z.B. rote Gabel) oder nachgestelltem Farbadjektiv (Nomen-Adjektiv, z.B. Gabel rote). Beide Wortfolgen sind in russischer Sprache grammatisch korrekt und gebräuchlich. Farbadjektiv und Objektname begannen entweder mit dem gleichen Anlaut (kongruente Bedingung, z.B. grüne Gabel) oder mit unterschiedlichen Anlauten (inkongruente Bedingung, z.B. rote Gabel). In der kongruenten Bedingung fanden sich schnellere Benennungslatenzen, allerdings nur bei der Produktion von Adjektiv-Nomen-Äußerungen und nicht bei der Produktion von Nomen-Adjektiv-Äußerungen. Dieses Datenmuster entspricht dem Ergebnis vergleichbarer Studien in deutscher und englischer Sprache (z.B. Janssen & Caramazza, 2009), in denen jedoch nur Adjektiv-Nomen-Äußerungen korrekt und gebräuchlich sind. Das korrespondierende Ergebnis in russischer Sprache, in der beide Wortreihenfolgen korrekt sind, widerspricht damit der Annahme, dass das Ausbleiben des phonologischen Kongruenzeffektes bei Nomen-Adjektiv-Äußerungen auf spezifische Wortstellungsregeln einer Sprache zurückzuführen ist.

## **Impacts of a sleep-phase alarm clock on EEG alphapower (8-12Hz) and visual sustained attention**

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Alarm-clocks that are triggered by sleep phase proved to have a significant effect on lowering drowsiness. The aim of this study was to evaluate, if an alarm-clock that is triggered by sleep phase has a significant effect on alphapower and visual sustained attention processes and to further evaluate if alpha and attention show any significant correlations. In a single-blind randomised within – subject design 16 people (11 female, 5 male), whose age ranged from 20-28, spend two nights in a sleeping laboratory as one night served as control condition and the other as treatment condition. After arising a visual sustained attention task (psychomotor vigilance task) was carried out while the EEG was recorded.

Concerning alphapower, attention processes and subjective sleepiness the results showed no significant differences between the two conditions. There was, however, a significant influence on alphapower by electrode position, as occipital regions showed the highest power. Alphapower and attention processes did not correlate significantly, but in the treatment condition subjects woke up significantly more often during light sleep phases (N1+N2), than during other sleep phases (REM+N3). This shows that the alarm-clock was working properly.

## **Implicit measurements of Fremdschämen**

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There is a well known phenomenon in spanish speaking countries which has recently found it's way to the consciousness of german speakers: *Fremdschämen*.

On our way to define and develop a model of the process leading to it, we developed and experimented with different behavioural measurements (avoidance behaviour and restlessness), bodily reactions (EDR) and continued our work on self-report measurements.

Contrary to all popular explanation attempts and in accordance with available literature, we don't assume the central role of empathic or vicarious processes and test this hypotheses against an alternative: a (remote) first person experience of embarrassment. Accordingly, we developed video stimuli and manipulations specifically conceived to test this assumption, while minimising the impact of empathic processes.

First results support the Remote Embarrassment Hypothesis and the expected negative relationship between empathy related experiences and Fremdschämen.

## Memory under pressure: Secondary-task effects in contextual cueing of visual search

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Repeated context can expedite visual search – an effect which has been referred to as contextual cueing (Chun & Jiang, 1998). While the reaction time (RT) benefit for repeated over non-repeated displays is typically attributed to some form of (implicit) perceptual memory aiding the deployment of attention (e.g., Johnson, Woodman, Braun, & Luck, 2007 – though the effect might facilitate post-perceptual processes too – see, e.g., Kunar, Flusberg, Horowitz, & Wolfe, 2007), recent investigations asked the opposite question, namely whether contextual cueing is modulated by attention, both in terms of selectivity (e.g., Jiang & Chun, 2001) and limited resources (e.g., Vickery, Sussman, & Jiang, 2010). The current experiments were intended to further investigate the effect of divided attention on contextual cueing. Specifically, we were interested in whether the effects of a secondary spatial working memory (sWM) task on contextual cueing (see, e.g., Manginelli, Langer, & Pollmann, in preparation) are due to an overlap in the neuro-cognitive machinery involved in the sWM and contextual cueing task (*sWM load hypothesis*) or increased demands for executive control processes (observers in the current paradigm were required to schedule two tasks – *Executive load hypothesis*). Results suggest that sWM load, but not executive load, hampers contextual cueing.

## The impact of costs of information on confirmatory information processing

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Confirmatory information processing refers to the phenomenon that after having made a decision, people prefer information supporting rather than conflicting with their decision (selective exposure effect; Frey, 1986). Furthermore, people are biased in evaluation of information by assessing consistent information to be of higher quality (biased assimilation; Lord, Ross & Lepper, 1979). Previous research has identified both factors which strengthen this effect and others mitigating it. Within these moderating effects the factor “money” has been neglected so far. However, we live in a world where acquisition of knowledge and therefore obtaining information mostly entails financial costs. To address this theoretical gap, present research aims at clarifying whether financial costs increase or decrease confirmatory information processing. In a series of studies people could either spend a fictive or a real amount of money on information supporting or conflicting with their decision. Additionally, potential mediators were tested. Results indicate that costs of information strengthen confirmation bias and lead to a better evaluation of standpoint-consistent information. Results and underlying psychological processes are discussed in the framework of accuracy and defense motivation.

## **Influence of age on left-hand grasping in different behavioral contexts**

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Our group recently introduced a paradigm for comparing the execution of grasping movements with the same physical constraints in two different behavioral contexts, once as a typical laboratory task and once as an everyday-like task. We found that movement kinematics differed substantially between contexts, and the differences were reduced by factor analysis to five orthogonal components. The context difference was even larger in elderly participants; here we investigate if this holds even if the left (non-dominant) hand is used for grasping. We found that with the left hand, context-dependence of grasping still existed but was no longer larger in old age. Factor analysis again traced the context-dependence back to multiple orthogonal factors.

We suggest that young subjects possibly improve their left-hand performance in the laboratory context by devoting substantial attention to the task; this strategy is not available in the everyday context, which increases the context dependence of that age group.

## **tDCS and neck vibration: Effects on visuo-spatial neglect in the subacute phase of stroke**

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Neglect is a multifaceted syndrome, commonly following right hemispheric stroke, in which patients fail to detect stimuli located contralesionally. Limiting active participation in rehabilitation, it is associated with poor over-all functional recovery. Contralesional transcranial direct current stimulation (tDCS), supposedly reducing interhemispheric inhibition, as well as neck vibration (NV), supposedly enhancing the ipsilesional neural circuitry, were individually shown to alleviate neglect symptoms. Given their complementary approaches, we aimed to study potential synergistic effects of both stimulation techniques.

So far, 5 subacute stroke patients with neglect, assessed by a detailed neuropsychological test battery, were included. At 4 consecutive days 4 different stimulation conditions were applied in randomized order: anodal, cathodal or sham tDCS to the left posterior parietal cortex (1.5mA, 20min) each in combination with NV of the left posterior neck muscles (20min) or sham tDCS combined with placebo NV of the left hand. Line bisection, star cancellation and cats test before and after each stimulation captured intervention effects. Preliminary data hint at a descriptive amelioration over all dependent variables by real NV (with sham tDCS). However, neither its combination with anodal nor cathodal tDCS showed a similar effect. Preliminary data thus suggest that combining stimulation protocols does not potentiate treatment effects.

## Lack of usability enhances perceived risk in information-based websites

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Does web usability ensure a favorable impression of websites? It clearly plays a crucial role when users estimate possible negative outcomes of online interactions. In transaction-based websites additional features like third party assurance seals help to underline the providers' trustworthiness. Such features are not used in information-based websites as the risk for the user is rather low compared to services like online-banking or e-commerce. Still, reliability of information might be critical depending on the context and the personal importance of the desired information. In an online study (N=63) two information-based websites which were previously checked for different levels of usability were tested. Both websites presented information about services but did not aim at selling goods. They did not use any trust cues provided by third parties. The website with higher usability was rated less risky than the badly usable website. Usability and risk perception correlated significantly for the less usable website ( $r=-.34$ ,  $p=.047$ ) but not for the website with higher usability scores. Usability is no guarantee that the user will rely on information. However, the lack of usability enhances perceived risk even in websites with low general risk.

## Modulation of hippocampus-dependent memory formation by monetary versus social reward

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**Background:** The neurotransmitter dopamine has repeatedly been implicated in reward processing. Activation of dopaminergic midbrain by monetary reward has previously been associated with enhanced hippocampus-dependent memory encoding. However, previous work has employed monetary reward and it is unclear whether social reward can improve memory formation in a similar way.

**Methods:** We investigated reward-related differences in memory processing, using functional magnetic resonance imaging (fMRI) in a cohort of 24 young, healthy subjects (12 females). Two different reward conditions were employed: In the monetary condition the participant could win money, in the social condition a picture of a smiling face was presented upon successful response.

**Results:** We found reward-related neural correlates across different stages of the rewarding process. Pictures that predicted monetary or social reward were associated with stronger activity in the bilateral striatum than neutral stimuli. The analysis of the neural activation during feedback led to an increased activity in left OFC, rACC and right vIPFC in the monetary condition. In the social condition, feedback pictures elicited stronger activity in FFA and amygdala compared to the monetary condition. Currently, we are analyzing the interaction between monetary versus social reward anticipation and hippocampus-dependent memory formation.

## **Competitive interactions of emotional distractor faces and a foreground task at early stages of visual processing**

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To investigate the time course of competitive interactions between different emotional facial expressions as task-irrelevant distractors and a to-be-attended visual foreground task, we conducted a study in which we used fearful, angry, happy and neutral faces superimposed by a 15 Hz flickering display of moving dots that constituted the task and enabled us to record steady-state visual evoked potentials. Subjects attended to the dots and detected short intervals of coherent motion while ignoring the background facial expressions.

SSVEPs were found to be reduced for emotional facial expressions compared to neutral ones. Strikingly, the SSVEP reduction lasted longer for happy facial expressions (from ~110 to ~360 ms) than for fearful (from ~100 to ~270 ms) or angry faces (from ~110 to ~160 ms), which might be interpreted as a natural tendency for positive rather than negative events or stimuli to draw attention among the healthy individuals that constituted our sample. Furthermore, we observed increased N170 amplitudes for fearful compared to neutral and angry faces.

The results of the present study indicate that facial stimuli produce an earlier and rather short-lasting distraction effect at early stages of visual processing than the more complex emotional images used in our previous studies.

## **Neural correlates of behavioural adaptation in active and observational feedback learning**

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Humans can adapt their behaviour by learning from the consequences of their own actions or by observing actions and outcomes in others. In active learning, behavioural adaptation is accompanied by a shift from feedback- to response-based performance monitoring, reflected in complementary learning-related changes of two anterior cingulate cortex (ACC) driven event-related potentials components, the feedback-related negativity (FRN) and the error-related negativity (ERN). While recent research has identified comparable components for the processing of observed behaviour and outcomes (observational (o)ERN and oFRN), it is as yet unknown, whether these components are also modulated by behavioural adaptation. In this study, two groups of subjects learned action-outcome contingencies either actively or by observation. In active learners, FRN amplitude for negative feedback decreased and ERN amplitude for erroneous actions increased with learning, while oERN and oFRN were not modulated by behavioural adaptation. Learning performance was comparable between groups. The results show that the neural mechanisms involved in active and observational feedback learning differ, with the ACC linking action and reward related information in active learning, potentially mediated by dopaminergic inputs.

## **Fear and inhibition of return. Does the target matter?**

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Inhibition of return (IOR) refers to a bias against returning the attention to a previously investigated location. As a foraging facilitator it is thought to be important in visual search since it prevents repeated scanning of locations that have already been sampled. On the other hand, some cognitive theories suggest a hypervigilance towards threatening cues and difficulty for anxious individuals to disengage the attention from threat. Thus, emotionally salient material may disrupt attentional phenomena including the IOR effect. However, few studies have investigated a potential attenuation caused by phobia relevant material, and so far no study incorporated emotionally salient targets. To this end, a sample of 40 students (20 spider fearful and 20 controls) completed a typical inhibition of return task including schematic representations of spiders and butterflies as cues and targets. Reaction times showed that even for spider fearful participants the IOR effect remained stable and did not diminish due to fearful targets. Even though in contrast with other cognitive theories, our study is a strong evidence for the robust nature of the IOR phenomenon, suggesting that neither the cue nor the target valence can influence it.

## **Brain oscillatory signatures of WM and LTM interfacing**

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Working memory (WM) processes involve temporary information storage, mental manipulations and matching of WM content with information stored in long-term memory (LTM). Whereas EEG oscillatory activity is often reported in studies looking at WM, interactions between WM and LTM (especially semantic LTM) and their implementation in the human brain are still unclear.

To investigate WM-LTM interactions and cortical expressions of semantic LTM utilisation we designed a visuospatial and a verbal delayed-match-to-sample task specifically to differentiate between (1) WM maintenance, (2) WM manipulation and (3) WM manipulation with LTM involvement. In the WM maintenance condition participants had to retain information for 2000ms and compare it to a probe for the verbal and visuospatial tasks. In the WM manipulation condition they had to rearrange consonant letter strings backwards and mirror line-drawn animal pictures around a vertical axis, for the two tasks respectively, before comparing their mentally manipulated image to a probe. The WM-LTM manipulation condition required them to rearrange the consonants alphabetically and spatially reorder animals according to their real-life size, respectively.

Changes in amplitude of frontal-midline theta, posterior upper alpha and lower beta and interregional synchronisations/desynchronisations were observed; indicating utilisation of semantic LTM and its interaction with WM.

## How rhythm opens attention

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We combined the attentional blink paradigm and a rhythm task to test whether detection of targets are affected by expectancy. In the attentional blink, we used rapid serial visual presentations (RSVP) of letters. Two targets were presented in each RSVP. The first one (T1) was presented in white, and participants had to identify this target after the RSVP stream. The presence or absence of the second target (T2, an X) had to be detected. Additionally, we presented a uniform rhythm (either with auditory stimuli or visually with a color changing letters) starting before each RSVP stream and ending either at T2, one letter before T2, two letters before T2 or one letter after T2. With colors, T2 detection was unaffected by rhythm. With tones, the results evidenced better T2 detection if the tone was presented at T2 compared to all other positions. However, when the rhythm stopped some time before T2 (or the surrounding positions), there were better T2 detections if the tone would have been at one position before T2. Results were discussed with reference to rhythm research, theories on attentional blink, research on accessory stimuli, and prior entry.

## The role of peripheral and central retinal stimulation in the perception of vection: A combined behavioral and event-related potential study

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Illusory self-motion (known as vection) describes the sensation of ego-motion in the absence of physical movement. Vection typically occurs in stationary observers being exposed to visual information that suggest self-motion (e.g. simulators, virtual reality). In the present study, we tested whether sensory integration of visual information triggers vection: Participants perceived patterns of moving altered black-and-white vertical stripes on a screen that was divided into a central and a surrounding peripheral visual field. In both fields the pattern was either moving or stationary, resulting in four combinations of central and peripheral motions: (1) Central and peripheral stripes moved into the same direction, (2) central and peripheral stripes moved in opposite directions, or either (3) the central or (4) the peripheral stripes were stable while the other stripes were in motion. This stimulation induced vection: Results showed significantly higher vection ratings when the stationary center of the pattern was surrounded by a moving periphery. Event-related potentials mirrored this finding: The occipital N2 was largest with stationary central and moving peripheral stripes. Our results highlight the importance of the retinal periphery in the genesis of vection and suggest that sensory integration of peripheral and central visual information triggers the perception of vection.



## Different neural signatures of compensatory and non-compensatory strategies during memory-based decision making

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The decision-making literature distinguishes between compensatory and non-compensatory strategies. Compensatory strategies trade off between different cues, whereas non-compensatory strategies base a decision exclusively on one cue and do not allow for the trading off between cue values. In a previous study (Khader et al., 2011), we found that for the non-compensatory “take-the-best” (TTB) strategy, the amount of required cue knowledge was mirrored by a parametric activation of cue-specific posterior areas, in which cue knowledge is supposed to be stored. Here, we examined the neural signature of a compensatory strategy (i.e., the weighted-additive strategy; WADD), while everything else remained unchanged from the previous study. To our knowledge, this is the first study that investigates the neural basis of WADD. We hypothesized a more uniform response in the posterior areas compared to TTB, which would support the claim that all cues are activated when a compensatory strategy is used. As expected, we found that the neural responses in posterior and frontal areas were markedly different from those during TTB, i.e., they were more uniform across the cue-specific storage sites and frontal control areas, suggesting that the activation of cue knowledge and the involved retrieval-control processes are specific to the employed strategy.

## Pre-training performance affects configural discrimination learning

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Previous studies suggest that compound stimuli can either be represented elementally or configurally, depending for instance, on the participant’s prior learning experience. In the present study, participants learned configural discriminations (negative patterning) with predictive and non-predictive compounds of auditory cues consisting of sequences of interrupted tones and noises. In a prior learning stage, participants were either trained with a discrimination problem that encourages an elemental solution (A+, AB+, C-, CB-) or one that cannot be learned in a strict elemental way (A-, AB+, C+, CB-). The results show that participants who showed high performance during training were also more likely to learn the negative patterning discrimination problem later on, irrespective of the type of training. Interestingly, participants who were trained with an elemental task showed better performance not only during training but also the later configural discrimination task. These results show that experienced high performance can enhance configural discrimination learning even if the training task did not require configural representations.

## Effects of judgment type on the perceived duration of visual and auditory oddballs

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The duration of rare deviant stimuli (oddballs) presented within a series of homogenous stimuli is commonly overestimated, an effect referred to as *oddball effect* (OE). The OE is usually attributed to perceptual processes. However, the typically employed comparative judgment task might be prone to decision biases and thus, the OE could also reflect a method-based artifact. To test for this possibility, we compared the classical comparative judgment to an equality judgment. In Experiment 1, participants were asked to judge whether the duration of a visual oddball (e.g. blue circle) was shorter/longer (comparative judgment) or equal/unequal (equality judgment) than the duration of the standards (e.g. a stream of red circles). We observed a reliable OE of similar size (~30 ms) in both judgment tasks. In Experiment 2, we employed the same design with auditory stimuli (high and low pitch tones). Again, an OE was observed for the comparative judgment but not for the equality judgment. These results indicate that the OE could be prone to decision biases, at least for auditory stimuli.

## Cross-modal integration in anticipation of table tennis strokes

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Action representations are coded in different sensory modalities. We investigated (A) whether auditory information affects anticipation of ball flight direction and (B) whether sensorimotor areas are susceptible to audiovisual congruency.

A table tennis player who observes his opponent striking uses the moment of the racket-ball contact for evaluation of the stroke. Twenty-six observers were examined with fMRI while they watched strokes, which were presented as point-light displays (PLD) excluding the ball and the racket. Task was to predict the ball flight direction. The racket-ball contact (RBC) was marked by a sound which was either presented shortly after the start of the movement (overt incongruence), or shifted 120 ms prior to the actual RBC (covert incongruence), presented congruently in time to RBC (congruence), or was skipped completely (unimodal visual).

(A) Participants performed best in the congruent condition, overt and covert incongruence showed no behavioral effect. (B) Using a ROI approach, fMRI data showed that multisensory integration areas in the middle temporal gyrus and the intraparietal sulcus were sensitive to congruency. The ventral premotor cortex and the inferior frontal gyrus (BA44) showed higher activation in congruent than in covert incongruent stimulation, suggesting that multisensory action representations are functionally relevant for movement anticipation.

## Higher or lower? Contrasting perception and production of tonal stimuli

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Several psycho-acoustical studies revealed lower same-different discrimination thresholds compared to high-low identification thresholds (Semal & Demany, 2006; Mathias et al., 2006). Furthermore, it could be demonstrated that better discrimination lead to better production performance (e.g. Estis et al., 2011; Loui et al., 2008; Moore et al., 2007). However, due to methodological shortcomings evidence of the results remains inconclusive.

In the present study two tones were presented successively. Participants had to either sing both tones (production task) or to indicate the second tone as higher or lower compared to the first (identification task). In addition we varied the pitch of the first tone and the pitch difference within tone pairs in semi-tones. The quality of the production responses was assessed using three different criteria: (1) correct frequency, (2) correct interval, or (3) correct contour production, followed by signal detection analysis. Identification task responses were also analysed with SDT.

In both tasks results reveal better performance with increasing semi-tone difference. Using the frequency- and interval-criteria, production performance was worse compared to identification performance. However, production performance according to the contour criterion exceeded identification performance. This indicates a dissociation between production and identification and supports recent findings of auditory perception performance.

## Changing the context changes the clocks' accuracy

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The pace of a stop-watch is always the same. Our brain, however, is a dynamical system that changes over time and it is therefore reasonable to assume that our internal biological clock does not work in the same way as a technical clock. To investigate how our internal clock is influenced by changes in the environment we manipulated the context. Participants had to decide if a standard interval (SI) is shorter or longer than a following comparison interval (CI). In every block there were target trials (TT) with a SI of 550 ms. In the "short context" condition the TTs were presented together with 100 ms SIs. In the "long context" conditions TTs were presented with 1000 ms SIs trials. The ratio between the TT and those context trials (CT) was varied from 20 to 80% CTs in five experiments. Results showed that it was easier to detect a temporal difference in the "short context" in comparison to the "long context" conditions. In addition, the effect increased with an increasing number of CTs. These results are in line with the predictions of an adapting pacemaker that changes its frequency dependent on the context.

## **That's "Spanish" to Me! A Comparison of the meaning of Spanish and German probability expressions**

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In a globalized world, differences in culture and language can lead to misunderstandings between people and nations. According to Hofstede (1980, 2001), uncertainty avoidance (UA) is a major dimension on which cultures differ. The study examines whether (1) UA differs between Spanish and Germans – as Hofstede suggests – and (2) if there is an influence of UA on language, especially on the interpretation of verbal probability expressions. Therefore, German (N = 147) and Spanish (N = 21) native speakers evaluated 12 probability expressions (e.g., "possible") using the translation procedure suggested by Bocklich, Bocklich & Krems (2012). Data was modeled using fuzzy membership functions that reflect the meaning of linguistic terms. Main results are: (1) Spanish and Germans do not differ significantly in UA and (2) only for one probability expression there is a considerable difference in the meaning. Implications concerning results and methodology as well as future perspectives are discussed.

## **Does knowledge make us more sensitive to the anchoring effect?**

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Common sense suggests that well informed people are better equipped to judge whether they like something or not. The aim of this study was to examine whether this holds in the context of the anchoring effect. Anchoring effect denotes the assimilation of quantitative judgments towards a previously considered standard. According to the Selective Accessibility Model (Strack & Mussweiler, 1997) it is a product of a biased memory search. Based on this model I suggested a hypothesis contrary to common sense: people should be more sensitive to the effects of anchoring if they are more knowledgeable of the target. This hypothesis was tested on a student sample (N=81), where half of the participants were exposed to a detailed text about a novel electronic device, whereas the other half were informed shortly just about what the device does. After reading the text the participants were exposed to the anchor and then answered about the maximum price they would pay for the device. The expected results were not obtained, but neither did the common sense assumption hold. The plan is to test the hypothesis again in a different design.

## **Involuntary versus voluntary attentional orienting: How we attend in space and time**

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It is well established that predictive spatial cues facilitate the orienting of attention to the cued location. Similarly, recent work has suggested that temporal attentional orienting is analogous to that of spatial attentional orienting and that shifting spatial-temporal attention to a target location in time improves signal detection. However, this work may have been biased towards finding larger spatial cuing effects since the spatial cues used may have triggered an increased spatial representation due to the involuntary nature of the cue, whereas the temporal cues were purely voluntary in nature, thus accounting for this improvement in performance. The present study used cues designed to be purely voluntary. We found that for space or time, voluntary cued stimuli show similar RTs. However, when the participant is required to orient attention to both a point in space and time and when only the voluntary attentional network is engaged, this becomes more complex and the finite capacity of the attentional network is tested. Our results show that the new conditions allows for the investigation and comparison of attention in space and time in a way that is comparable in terms of the type of attentional orienting being engaged.

## **Context specific implicit age stereotypes in different age groups**

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Recent studies provide evidence for the context specificity and complexity of age stereotypes assessed with explicit questionnaire measures (Kornadt & Rothermund, 2011). This raises the question whether implicit age stereotypes might also be domain-specific. Considering the pivotal role of implicit age stereotypes in developmental regulation (Levy & Banaji, 2002), the present study investigated the domain-specific nature of implicit age stereotypes for different age groups. Implicit age stereotypes in the domains family and health were assessed with two newly developed IAT measures in a sample of  $N = 96$  younger, middle-aged and older adults. IAT effects for the health and family domains were uncorrelated, indicating independent and distinct domain-specific implicit age stereotypes. Across participant age groups, stronger IAT effects indicating more negative age stereotypes were found for the health context. This difference in the negativity of age stereotypes between the two domains was most pronounced for the group of middle-aged participants. The results demonstrate that considering the complexity of age stereotypes is relevant on an implicit level, and also highlight the importance of further research investigating the role of implicit stereotypes on behavior regulation over the life span.

## **Does the experience of difficulty influence introspective judgements of reaction times during dual-task paradigms?**

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The ability to introspect accurately about one's own cognitive processes has implications for performance, consciousness and metacognition. In a dual-task situation (PRP paradigm), responses to the second task are usually slower when the two tasks are presented with short compared to long stimulus onset asynchrony (PRP effect). Interestingly, participants appear to be unaware of the PRP effect; a finding that has been attributed to a delay of conscious awareness until the central processing stage of the first task is completed. We have found that participants' judgements of reaction times can be influenced by the level of difficulty of the task; whereas difficulty estimates are less influenced by reaction times (in both extrospective and introspective situations). Of course, in the majority of circumstances, reaction time and difficulty are closely linked; this is not the case in the PRP task. We posit that the two tasks are not experienced as more difficult when they are performed simultaneously compared to when they are performed sequentially, and therefore participants' apparent unawareness of the PRP effect could, at least in part, be caused by reaction time estimates being influenced by experienced difficulty.

## **Does task format matter? Experimental results of a comparison of two versions of sequence planning tasks**

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We compare two versions of task format of a computer-based test of sequence planning: drag & drop and drop-down. Based on theoretical comparisons concerning split-attention, possibilities of errors and monitoring processes we argue that the drop-down format should be more difficult than the drag & drop format. To compare the two formats we conducted an experiment based on a one-factorial between-subjects design with 107 subjects (mean age: 22.93,  $SD = 4.89$ , 54.2 % female). Each participant dealt with 8 tasks, each followed by two 7-point rating scales of task difficulty and mental effort. Results show that there is a multivariate effect concerning the achievement scores. Follow-up ANOVAs show that only two tasks differ between the groups. Students rated the task difficulty in the drop-down format – except for one task – higher than in the drag & drop format, but the differences are not significant. Invested mental effort in the drop-down group is for all tasks higher than in the drag & drop group, but the differences are only significant for two tasks. Overall, the results show that – despite of some effects – concerning our tasks it does not matter which of the both formats is used.

## Good looking man – The influence of the color red

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Pride expressions function to signal potential status to perceivers, while shame expressions signal weakness and regret. Such crucial social information prevail specific motive-relevant incentives that in turn frame different contexts, and hence explain the influence on cognition and perception. As a consequence, contexts are no longer explained by situations, rather are elicited by stimulus-induced motivational tendencies. In addition, color is known to associate different meanings. In the case of red, meaning fluctuates between 'danger' and 'sex'. The present research investigates how the psychological meaning of the color red biases the perceived attractiveness of a potential mating partner (displayed by a proud body posture) and a male with low mating qualities (displayed by an ashamed body posture). In line with evolutionary based assumptions, red increases perceived attractiveness of a proud male, whereas red decreases the perceived attractiveness of an ashamed male. In other words, the color red emphasizes indicators for high or low mating qualities, respectively, and thus, influences perceptions of perceived attractiveness.

## The increasing importance of web-based data collection methods in psychology: Large-scale metadata analysis from online questionnaires in the field

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Online research (i.e., the use of web-based data collection methods) is still growing in the field of Psychology. However, meta-information (i.e., demographical and methodological background information) about online research is scarce. After identifying online portal sites that are widely used by researchers to recruit participants for their online studies, the present study extracted objectively identifiable information from 3036 data entries and 720 links to unique active online questionnaires available on these portal sites. It was found that online research is carried out predominantly in Western industrialized nations (e.g., USA, Central Europe, UK) whereas there is almost no activity in Asia, South America, and Africa. The dominant research areas turned out to be Social Psychology (38%), Clinical and Health Psychology (16%), and Cognitive Psychology (15%). Regarding quality standards recommended in the methodological literature, online questionnaires complied well with the avoidance of disadvantageous features (e.g., using pre-answered item options), but failed to comply with standards pertaining to the implementation of advantageous features (e.g., using progress indicators). Summing up, the present research confirmed that online research is still a growing trend, particularly in Western countries. However, regarding methodological standards, there is still ample room for improvement, especially in the application of advantageous features.

## **When does the individual master the habit, and when the habit the individual? Affect modulates habit-induced blindness**

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A common assumption is that “practice makes perfect”. However, it also is known since long that practice can make us “blind” when more efficient solutions are available. We examined the role of affect in overcoming such blinding effects of habits. As positive affect is known to broaden and negative affect to narrow thought-action repertoires, we speculated that participants experiencing positive affect more likely overcome acquired habits whereas participants experiencing negative affect more likely stick with their habits. Participants practiced problems requiring the repeated application of two rules to reach a solution. Afterwards, happy or sad affect was induced, and participants continued to work on the problems. Critically, there now was an additional simple way to solve the problems. Consistent with our predictions, happy participants were more likely to detect the simple solution than sad participants. These findings reveal that affect modulates how much we are constrained by acquired habits.

## **Numeracy and logical abilities in cognitive heuristics and biases**

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The abstract presents the empirical approach used in order to establish relations between the most well-known heuristics and biases on one hand and numeracy and logical abilities on the other. Heuristics and biases have been tested by using the same classical experiments drawn from the dedicated scientific literature. Starting from several empirical cognitive studies (Bruine de Bruin, Parker, & Fischhoff, 2007; Frederick, 2005; Slugoski, Shields, & Dawson, 1993; West, Toplak, & Stanovich, 2008), and considering the most important heuristics (Tversky & Kahneman, 1974) and several classifications of biases (Arnott, 2002; Baron, 2000; Carter, Kaufmann, & Michel, 2007; Stanovich, Toplak, & West, 2008), 21 heuristics and biases and the connected tasks-experiments used to identify them have been extracted. Numeracy has been tested by using the Berlin Numeracy Test (Cokely, Galesic, Schulz, Ghazal, & Garcia-Retamero, 2012) and the Subjective Numeracy Scale (Fagerlin et al., 2007). As for the logic ability, the Watson-Glaser Critical Thinking Appraisal has been used (Watson & Glaser, 1980). The sample is composed of about 300 participants. An explorative statistical analysis has been applied in order to determine the relations between heuristics and biases and the skills investigated. Some relations between statistical biases and numeracy have been found (Sartori and Ceschi, 2011) Analyses are still in progress, so results are currently provisional.



## Local processing enhancements associated with superior observational drawing are due to enhanced perceptual functioning, not weak central coherence

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Individuals with drawing talent have previously been shown to exhibit enhanced local visual processing ability (Drake et al, 2010; 2011). The aim of the current study was to assess whether local processing biases associated with drawing ability result from a reduced ability to cohere local stimuli into global forms, or an increased ability to disregard global aspects of an image. Local and global visual processing ability was assessed in art students and controls using the Group Embedded Figures Task, Navon shape stimuli, the Block Design Task and the Autism Spectrum Quotient, whilst controlling for non verbal IQ and artistic ability. Local processing biases associated with drawing appear to arise from an enhancement of local processing alongside successful filtering of global information, rather than a reduction in global processing. The relationship between local processing and drawing ability is independent of individual differences in non verbal IQ and artistic ability. These findings have implications for bottom-up and attentional theories of observational drawing, as well as the training of artistic skills in higher education.

## Shifted neuronal balance during stimulus-response integration in schizophrenia – an fMRI study

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Schizophrenia is characterized by psychotic symptoms but also by marked deficits in executive and psychomotor functions. We used a stimulus-response compatibility task to investigate the neuronal correlates of stimulus-response integration in schizophrenics. Eighteen patients and 18 matched controls responded to lateralized stimuli either congruently or incongruently.

Incongruent vs. congruent responses revealed common activation across groups in a parietal-premotor-prefrontal circuitry. For the main-effect across all conditions, patients revealed significantly lower activation of the right DLPFC and increased activation in a left hemispheric network including parietal and premotor areas and the SMA. When testing for condition specific group differences, patients showed significant increased activation in the former reported left hemispheric network during incongruent responding. However, these activations were even more pronounced than those found for condition unspecific effects and accompanied by additional activation in parietal and premotor regions in the right hemisphere. The present study shows that hypoactivity in the right DLPFC in schizophrenic patients is accompanied by hyperactivity in regions associated with task execution. This hyperactivity is present during task execution but is even more pronounced during incongruent responding. Impaired top-down control due to a dysfunctional DLPFC might thus be partly compensated by an up-regulation of task-relevant regions in schizophrenic patients.

## **Opened (not closed): Do adjectival passives activate a contrasting state?**

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This study addresses the processing of adjectival-passives in German, e.g., *Die Tür ist geöffnet* (The door is opened). Linguistic accounts propose that adjectival-passive states are evaluated against a contrasting state (e.g., closed door) – implying an enhanced mental availability of the contrasting state after processing adjectival-passives. The goal of the present study was to test this proposal’s psychological reality. Adjectival-passive sentences were juxtaposed with corresponding sentences with adjectives (Experiment 1; e.g., *Die Tür ist offen*) or with verbal-passives (Experiment 2; e.g. *Die Tür wurde geöffnet*). After reading a sentence, participants were presented with a picture of the contrasting state (e.g., closed door) or factual state (control, e.g., open door). Participants had to press a key immediately upon identifying the depicted object. In both experiments, analyses of the picture-identification latencies – that were assumed to reflect the depicted state’s mental availability – yielded a significant interaction between picture and sentence type. For contrasting-state pictures, picture-identification latencies were significantly shorter after adjectival-passive sentences than after sentences with adjectives or verbal-passives – suggesting that contrasting states were better available with adjectival-passives, consistent with the linguistic account. For factual-state pictures, there was no effect of sentence type – indicating that the effect was specific to the contrasting states.

## **Cross-modality across space: The role of stimulus spatial-location in intermodal-competition**

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Previous studies found that regardless of stimulus-modality, its steady-state response (SSR) amplitude was reduced when a second stimulus was presented in the same modality, as opposed to a different modality where there was no reduction. On the level of early sensory cortices, this argues against an intermodal-competition for processing-resources. However, this lack of competition might be explained by spatial differences in stimulus presentation, due to a perception of stimuli from different sources in space. By utilizing the SSR, we looked into the effect of relative spatial-location on SSR-amplitude in a potential intermodal-competition context. Participants were fixating a central cross and performing a distractor task. Meanwhile, either a visual (15Hz), or an auditory stimulus-stream (40Hz) were presented to elicit an SSR. Visual stimuli appeared on the screen, while auditory stimuli were presented in separate runs: via headphones, or loudspeakers. Competition was investigated by presenting a second visual (24Hz) or auditory stream (35Hz) and comparing SSR-amplitudes between a competition and no-competition time-window. We found an amplitude decrease when the stimuli were in the same modality, no reduction in different modalities, and no effects of spatial-location. Thus, our experiment shows that the lack of intermodal-competition cannot be explained by spatial differences in stimulus-presentation.

## Dynamics of saccadic responses reveal how object substitution masking interferes with reentrant processing

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Object substitution masking (OSM) occurs when a briefly presented target in a search array is surrounded by small dots that onset at the same time as the target but remain visible after the target disappears. It has been suggested that OSM selectively impairs reentrant processing while leaving early feedforward processing intact. This interpretation predicts that fast behavioral responses, if initiated fast enough (i.e. during the early feedforward sweep), should be unaffected by OSM. We combined an OSM paradigm with a saccadic choice task which has been demonstrated to give access to an early phase of visual processing. On each trial, two items in a search array (one target, one lure) were surrounded by four dots. Participants had to make a speeded saccade to the target item. On half of the trials, the four dots remained on the screen after target offset, resulting in OSM. On average, performance was strongly impaired by the mask. However, the accuracy of the fastest saccades was largely unimpaired. By contrast, masking had a strong effect on saccades initiated after approximately 250 ms. This late effect of masking on behavioral responses is consistent with a selective impairment of reentrant processing by OSM.

## Natural scene perception with increasing time-on-task: Sensitivity to fatigue?

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This study assesses the effects of Time-on-Task on rapid natural scene categorization. Human observers can recognize a complex natural scene extremely efficiently at a glance. The astonishing efficiency of natural scene processing might rely on many factors: It requires a minimal capacity of attention and highly efficient attention-memory interactions. We hardly have information, however, about how natural scene processing is sensitive to attentional impairments. Mental fatigue induced by Time-on-Task (ToT) has been found to compromise attention in many aspects. Therefore, ToT can be applied as a potential paradigm to investigate the effects of compromised attention on natural scene perception. In this study, participants (N = 21) performed a Go/NoGo task for 2.5 hours without rest. Stimuli presented were outdoor images from 5 natural scene categories. Performance measures (RT, accuracy), and subjective fatigue were recorded. In addition, to elucidate the effect of personality differences in performance, participants filled a trait impulsivity questionnaire. Accuracy, RT as well as discriminability data ( $d'$ ) showed significant decline with increasing ToT. The factor of trait attentional impulsivity, however, moderated the ToT induced performance decline.

## **Neuronale Aktivierungsmuster bei Symptomprovokation bei Akuter und Posttraumatischer Belastungsstörung**

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Untersuchungen neuronaler Aktivierungsmuster zur PTSD lieferten bislang heterogene Befunde. In dieser Arbeit wird zusätzlich das Aktivierungsmuster auf SP bei ASD untersucht, um eine verbesserte Kenntnis über die Entstehung des Traumagedächtnisses zu erlangen. Hierzu werden 19 akute Traumaopfer unmittelbar nach dem Trauma untersucht und mit 15 PTSD Patienten sowie 19 gesunden-Pbn verglichen. Alle Pbn erhalten standardisierte klinische Interviews und Fragebögen.

Zur SP werden, entsprechend der Intrusionen, traumarelevante und neutrale Bilder zusammengestellt, in Farbgebung, Komplexität und Größe parallelisiert und durch die Pbn hinsichtlich Traumarelevanz und Angsterzeugung bewertet. KG werden die Bilder von Traumaopfern präsentiert.

Anschließend werden 15 traumarelevante sowie 15 neutrale Bilder während der Messung (3-T MRT) in pseudorandomisierten Durchgängen (3-5 sec) präsentiert, gefolgt einer gesrambleten Version (11-13 sec). Die funktionelle Bildgebung erfolgt mit EPI-Sequenzen (TR = 4 sec, 44 Schichten pro Scan, 136 Scans pro Durchgang).

Verglichen mit den KG zeigen ASD-Patienten im Vergleich von Trauma- zu neutralen Bildern einen signifikanten Effekt in folgenden Arealen: Frontalis Agranularis, Precuneus, Frontalis Granularis, Insula, Parastriata, Parahippocampus, Cingularis Posterior Dorsalis, Cingularis Anterior Dorsalis und Angularis.

PTSD-Patienten zeigen signifikante neuronale Effekte im den Arealen: Frontalis Agranularis, Precuneus, Cuneus, Cingularis Anterior Dorsalis und Frontalis Media.

## **The vista paradox and the effect of fixation**

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The term "vista paradox" was first coined by Walker, Ruppich and Powell 1989 for an illusion that occurs by moving toward an object seen through a framing window in the way that the distant object will shrink in apparent size and will appear farther away. The paradox effect is that the distant object appears smaller as its visual angle increases. We investigated the effect in three experiments by varying object size, distance, texture of the frame and the task. In the first experiment we used a comparison task and found a tendency of apparent shrinking of the object. In the second experiment we varied the fixation between frame and object as well as the texture of the object and the frame and found a dominating effect of fixation which overlays the vista effect. Fixating the frame leads to an apparent shrinking of the object whereas fixation on the object does not. Texture of the frame had also influence in apparent shrinking of the object. The third experiment was a virtual replication of experiment 3 and showed similar results: the effect of apparent shrinking was stronger when the object was farther away and big and the frame was textured.

## Step by step: Capturing the initial truth activation during deception

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It is likely that a liar first needs to retrieve the truth in order to give an alternative, deceitful response. From such a reasoning, lying can be seen as a two-step process, in which in a first step the truth is activated in working memory, so that based on this response a lie can be formulated in a second step. To investigate this hypothesis, we tried to capture the covert activation of the truth response in a reaction time-based deception paradigm. We presented either the truth or lie response as a distractor surrounding the questions. We predicted that telling a lie would be easier when the truth response was simultaneously presented compared to when the lie response was presented. A truth distractor would help to activate the truth, thereby facilitating the completion of the first step of the lying process. A lie distractor, on the other hand, would interfere with this first step. The results support our hypothesis: participants made less errors and were faster to lie when the questions were surrounded by the truth response than by the lie response. Theoretical and practical implications are discussed.

## Transient multisensory integration of perceived duration

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Previous studies using discrimination tasks have shown that sounds can dominate the perceived temporal occurrence of visual events when both are asynchronously presented. This phenomenon is well-known as “temporal ventriloquism”. In the present study we investigated whether this effect also plays a role in perceived duration by employing a time reproduction task. In Experiment 1, participants reproduced the duration of empty visual intervals that could be either unimodal or accompanied by irrelevant auditory intervals of longer, shorter, or identical duration. We found an influence of auditory interval duration on reproduced visual duration such that reproduced duration resembled the auditory duration rather than the visual one. In Experiment 2, we investigated whether this multisensory integration effect is also stable over time. To this end, a temporal recalibration task was employed. Participants were exposed to repeated presentations of asynchronous multimodal intervals during an adaptation phase and then perceived visual duration was assessed with unimodal visual intervals. The results showed no effect of multisensory asynchrony adaptation on reproduced visual duration. Taken together, these findings suggest that presenting multimodal incongruent intervals affects perceived duration, but only in an immediate and transient manner.

## **From Destination to Origin – The influence of different learning conditions and landmark positions on finding the return path**

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Finding our way back is an essential ability in everyday life. The current study is the starting point for a more complex project on the return path. Here, we investigate whether it is easier to recall a learned way or the return path (in our virtual environment Squareland) with landmarks on different positions (optimal, suboptimal). Furthermore, two learning conditions were compared: Map and verbal description. The participants ( $N=20$ ) either learned a path via map or through verbal description. Subsequently, the initial path was shown in reverse order. At each intersection decisions about the direction (right, left, straight) had to be made. The position of the landmark led to significant performance (errors) ( $F(1,18)=4.99$ ,  $p=.038$ ) but no decision time differences. Consistent with expectations better decisions were made for optimal landmark positions. The different learning conditions did not lead to significant differences (performance, decision time). We may conclude that the quality of a landmark as a point of reference depends on its position. Moreover, different learning conditions (encoding) for the initial path lead to similar performance. This study is closely linked to a study (Strickrodt et al.; submitted to Teap 2013) where participants learned the path in another way: Visual snapshots of intersections.

## **Recognition meets impulsiveness – It's fast, I'll take it!**

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The recognition heuristic (RH) is a fast and frugal decision strategy for pairwise comparisons. According to the RH people make judgements based on recognition alone and ignore further knowledge. We hypothesized that the RH might be particularly attractive for impulsive individuals (i.e., individuals with a strong tendency towards non-reflective cognition) even in contexts in which the RH is not a valid decision strategy. In line with this idea we predicted an interaction effect of impulsiveness and recognition validity on use of the RH. Specifically, in decision domains characterized by high recognition validity, use of the RH is not expected to vary with impulsiveness. In contrast, in domains with relatively low recognition validity, high impulsive individuals are expected to use the RH more often than low impulsive individuals do. These hypotheses were tested using both established questionnaires and a Delay Discounting Task as measures of impulsiveness. Participants provided paired comparison judgments on both city sizes (high recognition validity) and altitudes of Italian cities (low recognition validity). Results will be discussed in the adaptive decision maker framework (Payne, Bettman, & Johnson, 1993).

## A MATLAB plugin for the analysis of combined EEG and eye-tracking data

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Although natural vision involves frequent eye movements, EEG data is usually recorded during prolonged fixation. An alternative approach to EEG analysis, used in recent studies (for review see Dimigen et al, 2011, JEP:General), is to time-lock the signal to the onsets of saccades or fixations under free viewing conditions (fixation-related potentials). However, combining high-resolution eye tracking with the EEG is also useful for other purposes: controlling fixation, detecting distortions from microsaccades, improving eye artifact correction, measuring saccadic reaction times, simultaneous pupillometry, or gaze-contingent stimulus presentation (Dimigen, Kliegl, & Sommer, 2012, Neuroimage). To facilitate joint analyses of oculomotor and electrophysiological data, we present a plugin to the popular open source MATLAB toolbox EEGLAB, which imports and synchronizes eye tracking data and adds it as extra channels to the EEG. Saccades and fixations can be either detected with an extended version of a velocity-based algorithm (Engbert & Mergenthaler, 2006) or imported from the raw EDF file and are then added as new events to the EEGLAB event structure. Furthermore, ocular ICA components can be objectively rejected based on their covariance with the electrically independent eye track. Eye trackers from SR Research and SMI are currently supported.

## The role of emotions in cognitive biases

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Several studies suggest that, when people making such important life decisions often seek to maximize well-being and positive emotional experiences and minimize enduring disappointment, regret and other negative emotional states (Bentham, 1948; Bernoulli, 1954). Our empirical work attempts to study the relations between cognitive biases and personal traits as measures of emotions. A wealth of research indicates that personality is intricately linked to emotional experience (Hoerger & Quirk, 2010). Indeed some studies have proposed that the five factors of the Big Five test are largely due to biases (Biesanz & West, 2004; Paulhus & John, 1998). The Big Five model of personality has gained extensive support during the past half century and characterizes personality along the dimensions of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (John & Srivastava, 1999). Recent studies of biases and decision making have shown that people often rely upon their anticipated emotional reactions as a guide to choice (Mellers, Schwarz, & Ritov, 1999). The purpose of the present study is to examine the extent to which cognitive biases might be in correlation with emotions, measured by personality traits. Data have been collected from 90 students, analyses are still in progress.

## **Do I trust women with soccer?**

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We investigated the influence of stereotypes on incentivized pairwise choices. Decisions were thereby made between male and female products based on recommendations provided by testers that differed in gender and explicitly stated validity. Study 1 shows that objective validity information is partially overwritten by gender information. The weight given to information from stereotype congruent sources (e.g., recommendation from a female tester for lotions) was increased leading to biased choice (and vice versa for incongruent sources). In Studies 2 and 3 this finding was replicated and it was shown in a between-subjects design that previous stereotype activation even increases this choice bias substantially. Furthermore, participants reported that they were not affected by stereotypes in their decisions even when their responses indicated otherwise. These findings suggest that stereotypes not only influence the perceived validity of information, ultimately influence preferences, but that they do so by affecting cognitive processes on the subconscious level.

## **The “flash-lag effect” occurs in haptic perception but less pronounced than in vision**

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In the visual flash-lag effect, a brief stationary flash is perceived to be spatially aligned with a continuously moving object, when the object lags behind the flash. We found a similar effect in haptic perception. Participants moved one hand regularly back and forth, while the other hand was stationary below the trajectory. At different positions we presented a brief vibration, “the flash”, to the moving finger. Participants judged whether the moving finger was left or right of the stationary finger when the vibration occurred. We determined the point of subjectively equal finger positions using the method of constant stimuli. The fingers were perceived as being aligned, when the moving finger lagged behind the stationary finger. The effect was more pronounced for faster than for slower movements. Further, we directly compared the effect when using haptic, visuo-haptic and visual stimuli. Participants felt their finger movements without and with watching a visual finger representation, or they watched finger representations from previous trials. The flash was haptic or visual. The effect did not depend on the moving stimulus’ modality, but it was larger for the visual than for the haptic flash. We will discuss the theoretical implications of the haptic “flash-lag effect”.



## **A dynamic systems approach to intertemporal choice**

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Previous research on intertemporal choices has revealed human choice behavior that is disadvantageous with regard to normative economical theories. Here, we take a different approach based on dynamic systems theory to shift the focus on the process of decision making. Therefore, we implemented an intertemporal choice task in a computer game in which participants had to decide between two different rewards of varying size and distance by moving an avatar towards the chosen reward. This allowed us to vary sequential and contextual parameters, unnoticeable for the participants. Furthermore, we computed from each participant's data individual models of advantageous decisions to compare advantageous with disadvantageous choices patterns. We explored the decision process on two different time-scales. First on a within trial time-scale, we recorded and analyzed the mouse movement trajectories of choice reactions. Second on a between trial time-scale, we analyzed sequential effects on the final choice. We present data acquired with the proposed approach and discuss future advances of this approach.

## **Implicit memory function in fibromyalgia syndrome**

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The study investigated implicit memory function in fibromyalgia syndrome (FMS) and its association with clinical parameters. Implicit memory refers to the influence of past experience on current behavior without conscious awareness of these experiences. Eighteen FMS patients and 25 healthy individuals accomplished a word stem completion task. As possible factors mediating the expected impairment, pain severity, emotional disorders and medication were taken into account. The patients displayed markedly reduced task performance and higher levels of depression and anxiety. Among the clinical features, pain severity was most closely associated with performance, whereas depression, anxiety and medication showed only a minor impact. The study documented reduced implicit memory function in FMS. In contrast to former findings on impaired performance of FMS patients on classical memory tests, lower implicit memory function cannot be ascribed to motivational deficits. Instead, the aberrances may relate to functional inference between central nervous nociceptive activity and cognitive processing.

## **Verbal and nonverbal intelligence show different patterns of hand movement**

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This study investigates whether verbal intelligence (VIQ) and nonverbal intelligence (PIQ) are related to different patterns of hand movement behaviour. 11 right-handed participants were videotaped in two experimental settings of which one elicited competences corresponding to VIQ (intelligence test) and the other competences corresponding to PIQ (cartoon narration). Two independent raters, blind to the hypothesis of the study, analyzed the participants' hand movements with NEUROGES-ELAN coding system (Lausberg & Sloetjes, 2009). IQ was investigated with WAIS-R. The results revealed different movement patterns for each intelligence type. High VIQ correlated positively with high frequency of right hand movements and high frequencies of both hands acting as a unit or acting on each other. High PIQ was positively associated with a higher frequency of left hand dominance in bimanual movements and a higher frequency of movements in which the hands act apart from each other. These findings are in line with a cortical lateralization for different competences. The left hemisphere, dominant for processing speech, controls the right hand whereas the right hemisphere, which is competent in processing nonverbal aspects, controls the left hand. Further, act apart movements are processed in the right hemisphere, which is dominant in tasks concerning spatial cognition.

## **Dimensional overlap of time and space**

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Recent research has shown that spatial concepts are activated when temporal linguistic information is processed. In these studies processing the temporal content of a word or sentence influenced a subsequent spatial response: subjects responded faster to future (past) related words with the right (left) hand. In order to explain this space-time congruency effect it has been suggested that our mental representations of time and space overlap. However, the extent to which the representations of these two domains overlap has not yet been assessed. We present the results of two experiments that draw on the predictions of the dimensional overlap model (Kornblum, Hasbroucq, & Osman, 1990). According to this model, the size of a congruency effect depends on the overlap of stimulus and response dimensions. The larger this overlap is, the more pronounced is the congruency effect. In our experiments, stimulus and response sets were either related to time or space. The stimulus-response congruency effects obtained for identical stimulus-response sets (time-time or space-space) and different stimulus-response sets (time-space or space-time) were of approximately the same size. Since the overlap is maximal for identical S-R sets, our results support the view that the representations of time and space strongly overlap.

## Dekomposition von Lächeln

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Die Kontraktion des Muskels Zygmatius major wird als nicht diskriminativ für den Unterschied zwischen Duchenne und höflichem Lächeln angesehen, weil diese bei beiden Formen des Lächelns zu beobachten ist (AU12 in emFACS). Allerdings können Krumhuber und Manstead (2012) keinen Effekt in der Detektionsleistung zwischen beiden Formen des Lächelns feststellen, obwohl jeweils der obere oder untere Teil präsentierter Gesichter durch eine schwarze Maske abgedeckt gewesen sind. In der vorliegenden Studie liefern Photos von  $N=9$  Vpn, die sowohl die Directed Facial Action Task (Ekman, 2002) durchlaufen haben, als auch zu einem spontanen Lächeln provoziert worden sind, Material für artifizielle Gesichter. Bei diesen stammen AU6 und AU12 von beiden unterschiedlichem Formen des Lächelns. In einem 2x2 Design werden die Stimuli hinsichtlich der Spontanität eingeschätzt. Ein Haupteffekt für AU12 liegt nicht vor. Es ergibt sich ein paradoxer Haupteffekt für AU6 ( $F(1,6253) = 14.55$ ;  $p < 0.001$ ), demnach die Probanden Augen aus einem höflichen Lächeln eine höhere Spontanität zuschreiben. Darüber hinaus kann eine bedeutende Interaktion festgestellt werden ( $F(1,6253) = 4.10$ ;  $p < 0.05$ ).

Ein vom Eindruck der Augen (AU6) unabhängiger Effekt des Eindrucks durch den Mund (AU12) konnte somit nicht gefunden werden.

## Social categories influence conscious vision: Own-race and own-age biases in face detection

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Social categories such as race and age have a strong impact on how we perceive, remember and interact with other persons. Here we asked whether social categories influence whether another person's face is consciously perceived in the first place. Using continuous flash suppression, we measured the effect of face inversion on access to awareness for faces from different race and age groups. The advantage of upright over inverted faces in gaining access to awareness was approximately twice as large for faces from the participants' own race and age group compared to faces from other race and age groups. These findings demonstrate that perceptual mechanisms involved in simple detection are tuned to upright faces from one's own social categories, thereby equipping in-group faces with a competitive advantage for access to conscious awareness. Our data now show that in-group advantages in face perception are not limited to comparably complex processes involved in face recognition memory or in fine-grained perceptual judgments about properties of visible faces, but extend to the earliest levels of visual processing that govern simple detection.

## **Explicit action coding modulates usage of implicit knowledge**

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It is widely acknowledged that different types of associations (e.g. reaction-reaction (R-R) or reaction-position (R-P) associations) can be acquired to guide behaviour in implicit motor-sequence learning. More recently it has furthermore been stated that the type of learning to occur is influenced by the way properties of a sequence are coded by explicit objectives (Gaschler, Frensch, Cohen, & Wenke, 2012). What is unbeknown is whether explicit framing of already acquired implicit knowledge can influence by which properties a motor sequence is controlled. Current theories on the interaction of conscious and unconscious task processing would predict that explicit task sets can modulate the relevance of contributing knowledge (Dreisbach & Haider, 2009). To investigate this, we trained people with a pure motor sequence in a SRT-task and tested the influence of R-R and R-P associations on performance by measuring RTs for either R-R or R-P deviants. The acquisition phase was followed by an induction task that contained a different motor sequence and either pronounced the importance of R-R or R-P associations. Testing performance on the training-sequence again revealed that RTs for R-R or R-P deviants were modulated by the way the induction pronounced the different properties of the sequence.

## **Musicians process prosody within left hemisphere while nonmusicians do not: A MEG study**

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It is generally assumed, that language prosody is processed within the right hemisphere. Within the right hemisphere the posterior superior temporal gyrus (pSTG) is known to be involved in the spectral analysis of slower changing patterns such as prosodic features, whereas the left pSTG appears to be specialized in the analysis of rapidly changing sounds. It has been reported that with increasing musical expertise, however, the analytic functions of the left hemisphere are recruited for the processing of prosodic features. The present MEG study focuses on the processing differences of language prosody in musicians and nonmusicians. We tested 18 musicians and 18 nonmusicians in a sentence processing paradigm with varying prosodic parameters. We demonstrate, that musicians process prosodic features within the left pSTG, while nonmusicians do not. The high temporal resolution of the applied measures in the millisecond domain, moreover, provide a first insight into when during processing these lateralization differences between musicians and nonmusicians occur.

## **Texture-based attention allocation**

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The distribution of visual selective attention is shaped by the structure of the visual field. For example it has been shown that attention is allocated rather to entire objects than to the spatial location alone. The present study investigated the time course of attention allocation in textures of 10x10 simple oriented line elements. In a variation of the spatial cueing paradigm (Posner, 1980), targets were presented at the same location as the cue (valid trials), at a different location but inside the cued texture (invalid-inside trials) or at a different location outside the cued texture (invalid-outside trials). Results show a general advantage for valid trials throughout all ISIs used. Interestingly, results also show an advantage for invalid-inside trials over invalid-outside trials for short ISIs. This was the case for both endogenous and exogenous cues and for both informative and uninformative cues. This “texture advantage” suggests that attention is distributed texture-wise at short latencies. Control experiments revealed that the texture homogeneity contributes most to the effect, but the texture advantage is a function of both texture border contrast and within-texture homogeneity.

## **Detection of linear ego-acceleration from optic flow**

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Human observers are able to estimate various ego-motion parameters from optic flow, including rotation, translational heading, time-to-collision (TTC), time-to-passage (TTP). The perception of linear ego-acceleration or deceleration, i.e., changes of translational velocity, is less well understood. While time-to-passage experiments indicate that ego-acceleration is neglected, subjects are able to keep their (perceived) speed constant under changing conditions, indicating that some sense of ego-acceleration or velocity change must be present. In this study, we analyze the relation of ego-acceleration estimates and geometrical parameters of the environment using simulated flights through cylindrical and conic (narrowing or widening) corridors. Theoretical analysis shows that a logarithmic ego-acceleration parameter, called the acceleration rate  $\rho$ , can be calculated from retinal acceleration measurements. This parameter is independent of the geometrical layout of the scene; if veridical ego-motion is known at some instant in time, acceleration rate allows updating of ego-motion without further depth-velocity calibration. Results indicate, however, that subjects systematically confuse ego-acceleration with corridor narrowing and ego-deceleration with corridor widening, while veridically judging ego-acceleration in straight corridors. We conclude that judgments of ego-acceleration are based on first-order retinal flow and do not make use of acceleration rate or retinal acceleration.

## **Cognitive architecture and cognitive reserve in elderly**

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Cognitive reserve represents the brain's ability to compensate for age-related cognitive decline as well as to adapt to structural alterations caused by injury or neurodegenerative processes. It may also be understood as practice-dependent plasticity that can be used for successfully selecting and optimizing functions and skills in response to cognitive challenges. The main goal of this study was to investigate the relationship between cognitive status ('cognitive architecture') and successful skill acquisition by systematic practice ('cognitive reserve') in healthy, community-dwelling elders. We assessed 120 subjects (age: 60 – 75 years; gender: 60f) using standardized tests for cognitive architecture (information processing speed/attention, learning and memory, executive functioning), and a testing-the-limits paradigm for measuring cognitive reserve (modified version of the digit symbol substitution test). Age and gender were not related to cognitive reserve. Higher cognitive reserve was significantly correlated with higher performance in verbal learning, verbal long term memory, cognitive flexibility and visual problem solving abilities. Our results suggest that cognitive reserve and cognitive architecture may be associated in a task- or function-specific way. Furthermore, cognitive reserve also exists in older age and thus could represent an important resource available for compensation of cognitive decline even in advanced age.

## **Quick and dirty: Delay and framing influence judgments of truth**

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Recent research has shown that statements are more likely judged true when they are framed negatively rather than positively. So far, findings further indicate that this might be due to differences in processing fluency. To test this notion, we relied on the recent finding that the time-lag between a statement and its numerical solution influences truth ratings (with short intervals yielding higher truth ratings and vice versa). In our experiment, participants rated the truth of statistical statements, which varied in both framing and time-lag (both manipulated within subjects). Results replicated both the framing effect and the time-lag effect. Still more importantly - we found that when comparing negatively framed statements with a long time-lag to positively framed statements with a short time-lag, there was no longer a difference in truth ratings. These findings provide further insight concerning the role of processing fluency in judgments of truth and that it may well account for framing effects in the latter.

## **Effect anticipation and the online control of stimulus-based action – an fMRI study**

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A fundamental prerequisite of goal-oriented behavior is to correctly recognize associations between events, such as for instance, between a certain action in a certain context and a certain subsequent event. Previous behavioral studies have shown that such associations between events can be linked up very fast.

The present study investigated the brain activation dynamics linked to the initial incremental strengthening of associations between stimuli (S), response (R), and effect (E) during an early and short period of learning of novel instructed arbitrary S- R- E-mappings using functional magnetic resonance imaging.

In order to directly compare different types of action control we manipulated the type of association that can be acquired, including the S-R-E association, R-E and S-R associations. The results suggest that picking up a triple S-R-E association specifically enhanced activation related to action control in the SMA. Thereby the present study corroborates and extends previous findings on the involvement of the SMA in the retrieval of learned action-effect associations.

## **I push my seed and I push the life: Gender differences in the implicit association of sex and love after mortality salience**

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Terror management theory posits that relationships serve as buffer against death-anxiety. From an evolutionary perspective, gender differences concerning preference for short-term (sex) and long-term relationships (love) can be expected. Men might prefer sex to pass genes, women love to secure protection of the offspring. Evidence is mixed: Former research found increased interest for sex in men and for love in women as well as no gender differences. No study until now has directly compared both concepts. The current study analyzed gender differences in implicit associations (IAT) of love and sex after mortality salience. Results demonstrated more positive associations of sex among men and more positive associations of love among women. Implications for the preference of short- vs. long-term relationships as anxiety buffers among men and women are discussed.

## **Increased novelty bias under positive affect**

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There is increasing evidence that positive affect enhances cognitive flexibility, while at the same time incurring costs in terms of increased distractibility. Here, we will present data showing that this increased distractibility goes along with a higher susceptibility to novel events. To this end, an experiment with two arousal matched affect groups (positive, neutral), using a Stroop-like word-picture interference task with familiar and new distracters was run. Results show a significant novelty bias in both affect groups with slower RTs in trials with new distractors, which was – as expected – more pronounced under positive affect. The experiment thus provided evidence that positive affect particularly increases distractibility by new distractors as compared to a neutral affect control group. Such an increased novelty bias could explain the increased cognitive flexibility under positive affect repeatedly reported in the literature as the novelty bias turns into a benefit whenever new and unknown information has to be considered.

## **Auf den ersten Blick, wirkt die Brille schick – Der Einfluss des Tragens einer Brille auf die Notenvergabe bei mündlichen Prüfungen**

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In der Praxis ist häufig die Rede davon, dass sich das Tragen einer Brille positiv auf die Notenvergabe bei mündlichen Prüfungen auswirkt.

Die vorliegende Studie geht dieser Theorie nach. Dazu wurde ein Fragebogen, welcher neben der Sehfähigkeit und der erhaltenen Punkteanzahl in der mündlichen Prüfung auch mögliche Störvariablen, wie Geschlecht, Haarfarbe, Lernintensität und Geschlecht des Prüfers erhebt, an AbiturientInnen verteilt.

Unter Anwendung eines Ex-post-facto-Designs wurde die Stichprobe in zwei Gruppen unterteilt, je nachdem ob bei der Prüfung eine Brille getragen wurde oder nicht.

Die Auswertung der Daten erfolgte unter Anwendung von R. Da das deutsche Abitursystem, durch die Vergabe von Punkten, von intervallskalierten Daten ausgeht, wurde zur Überprüfung der Fragestellung ein t-Test für unabhängige Stichproben und zur Untersuchung möglicher weiterer Einflussvariablen die Varianzanalyse durchgeführt.

Die Hypothese, dass das Tragen einer Brille in mündlichen Abiturprüfungen die Note beeinflusst, musste durch die Ergebnisse falsifiziert werden. Dafür zeigt sich, dass die Haarfarbe die Notenvergabe beeinflusst. Brünette SchülerInnen erhalten mehr Punkte als SchülerInnen mit anderen Haarfarben. Außerdem konnte gezeigt werden, dass es bei blonden AbiturientInnen eine Rolle spielt, welches Geschlecht die zu prüfende Person hat. Blonde Prüflinge erhalten von Prüferinnen geringfügig bessere Noten. Bei männlichen Kollegen erhalten blonde Personen dagegen die schlechteren Noten.



## **Financial incentives influence the learning of a visuomotor rotation**

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Recent research shows that learning a new visuomotor transformation can either be implicit (via an internal model) or explicit (via acquired strategic knowledge). The influence of extrinsic motivation on the mastery and learning of a novel visuomotor transformation is still unclear. In the present study two groups of participants learned a 60° visuomotor rotation. Both groups received feedback related to their endpoint-accuracy in terms of a score. While group “financial incentives” received financial incentives rewarding movements with high end-point-accuracy (to increase their extrinsic motivation), the control group only received a fixed monetary reward for participating in the experiment without additional financial incentives for accurate movements. We expected the experimental group to learn the visuomotor rotation better and/or faster than the control group. The results show that indeed participants in group “financial incentives” executed more accurate movements than those in the control group, but at the cost of slower movement times. These results are discussed in the context of the speed-accuracy-tradeoff.

## **Effects of long-term physical activity on interference processing in aging**

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Executive functions like interference processing decline with increasing age. However, there is a large interindividual variability in performance, suggesting factors which may either prevent or accelerate age related impairment.

The present study examines effects of long-term physical activity on performance and event-related potentials in a sample of 21 active and 21 sedentary seniors. Both groups were matched regarding gender, age and educational level.

The participants performed a number of psychometric paper & pencil tests and a computer based version of the Stroop test during which the EEG was recorded.

The results showed consistently higher performance in the physically active participants group in both paper & pencil and computerized version of the Stroop task. These findings were supported by ERP analyses showing a generally faster stimulus evaluation (P2), more efficient response-selection (N2) and an enlarged long lasting negative potential (N450), associated with interference processing. No group differences were found in the preparation interval indexed by the CNV, underlying the specificity of the reported effect for executive functions.

In line with other reports, these findings suggest that enduring physical activity may help to preserve or even improve executive functions in aging.

## **Asymmetrien in der visuellen Suche: Nahe versus ferne Objekte**

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Diese Arbeit untersucht den Einfluss stereoskopischer Tiefe auf die Performance in visuellen Suchaufgaben. Dazu wurde ein Target (Raute) neben Distraktoren (Quadrate) in drei verschiedenen Tiefenebenen zum Betrachter dargestellt. Zur Simulation räumlicher Tiefe wurde die Anaglyphentechnik verwendet. Als wichtigstes Ergebnis kann festgehalten werden, dass Targets, die nah am Betrachter sind, am schnellsten entdeckt werden. Die Reaktionszeiten auf Targets, die in der mittleren oder hinteren Tiefenebene lokalisiert wurden, sind etwa um 100 ms pro Tiefenebene verlängert. Coplanare Targets, also Targets, die auf der Monitorebene dargestellt werden, erreichen in etwa die gleichen Reaktionszeiten wie Targets, die sehr nah zum Betrachter dargestellt werden. Bei Targets, die auf der Monitorebene präsentiert werden, entspricht Akkomodation und Vergenz dem natürlichen Sehen. Die Asymmetrie nahe versus ferne Targets könnte auf einen Effekt des Hintergrund- und Vordergrundes in der visuellen Suche hindeuten.

## **The influence of viewpoint height on the processing of soccer scenes**

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Prior studies suggest that canonical viewpoints exist not only for static objects, but also for the recognition of dynamic scenes (Garsoffky, Schwan & Huff, 2009). Whereas prior work manipulated the horizontal deviation of viewpoints, the Experiment now presented soccer scenes from camera viewpoints that differed in camera height. Further, construal level theory (Trope & Liberman, 2010) suggests that events are processed more concrete if the psychological distance between the observer and an event becomes smaller. The question is, whether a lower camera viewpoint, which involves the viewer more into the scene, influences processing of a complex dynamic event. Participants first saw short film clips of complex soccer scenes from either a higher or a lower camera viewpoint, and afterwards answered, if there was a backward pass or not during the sequence. Results showed that participants answered questions concerning the flow of events in the soccer sequence significantly more correct, when the camera viewpoint was low than when it was high. The results suggest that the height of viewpoint matters during processing, even if the information concerning the flow of events is the same.

## **Emotion-antecedent appraisal: Effects of goal conduciveness and power appraisal in event-related potentials**

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Emotional events are not only evaluated as pleasant or unpleasant, but also whether we can do something to change their outcome. One appraisal model of emotion (Scherer's component process model, CPM) postulates that the evaluation of an emotion-eliciting event is carried out by a fixed sequence of appraisal checks, e.g., novelty, intrinsic pleasantness, task-goal relevance, goal conduciveness, and power. The goal of the present experiment was to test the prediction of the CPM that goal conduciveness appraisal is processed before power appraisal. Using a monetary gambling task the neural mechanisms involved in the evaluation of feedback containing the information of goal conduciveness (gain vs. loss of money vs. break-even) and power (presence vs. absence of option to change outcome) were investigated. In each trial, information about these two appraisal checks was simultaneously manipulated, while EEG was recorded in 24 female participants. The results of the feedback-locked event-related potentials showed, in line with the predictions, that the processing of the goal conduciveness and power appraisal has differential sequential temporal effects. The results suggest supporting evidence for the importance of conceptualizing appraisal as the underlying cognitive mechanism of emotion elicitation and differentiation when the processing of emotion-eliciting events is investigated.

## **No sports? Sports! How physically fit seniors manage auditory distraction**

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Aging usually affects the ability to focus attention on a given task and to ignore distractors. Physical training, however, has been proposed as an effective resource to decrease age-related declines. Here, we asked in what features of processing older sportive humans and non-sportive humans may differ in goal-directed behavior, employing an auditory distraction task, in which listeners discriminated between equiprobable short and long sound stimuli. Involuntary shifts in attention to rare task-irrelevant frequency deviations and subsequent reorientation were studied. We thereto analyzed behavioral data and event-related potential measures (mismatch negativity, frontal P3a and reorienting negativity) in sportive and non-sportive male listeners (N = 34) matched for education and age (mean 72.6 yrs.). Task-irrelevant frequency deviations impaired performance in non-sportive listeners more than in sportive listeners. Moreover, frequency deviations caused a trend of a lower MMN and a stronger P3a in non-sportive than sportive listeners, indicating a faster and stronger shift of attention towards task-irrelevant stimulus features. Thus, it appears that performance differences are due to a higher distractibility of non-sportive listeners relative to their sportive counterparts. The results suggest a positive effect of physical fitness on perceptual-cognitive processing in elderly, and on preservation of cognitive performance in aging.

## **Do calculation shortcuts that are based on the same mathematical principle trigger each other?**

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Children (a) develop shortcut strategies in primary school arithmetic and (b) concept knowledge about mathematical principles. The relationship between the two is a matter of current debate. For the case of commutativity we tested whether different strategies that are based on the same principle trigger each other. One can use commutativity to flexibly shift the order of addends within a task, for instance calculating  $6+4+7$  if  $7+4+6$  is given (in order to profit from the fact that 6 and 4 add up to 10 which makes it easy to finally add 7). One can also use commutativity across tasks. For instance, after calculating  $7+5+8$ , the result can be copied in case  $8+7+5$  is queried next. After direct instruction of one commutativity-based shortcut we observed no transfer to the other shortcut (Exp.1). Spontaneous usage of one shortcut (as indicated by eyemovement patterns) seemed to transfer to the other shortcut (Exp.2). Results tentatively suggest that transfer might be concept specific. We obtained no transfer from a shortcut that is not based on commutativity to one that is (Exp. 3). Taken together the results suggest that strategies related to the same mathematical principle can trigger each other.

## **Within-person variability in facial attractiveness: Effects of presentation order**

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Within-person variability in facial attractiveness can be remarkably high (Jenkins et al., 2011). We studied how the evaluation of attractiveness of a person depends on previously shown images of the same person varying in attractiveness and their presentation order. After six different pictures – increasing or decreasing in attractiveness from image to image – participants rated the attractiveness of the person according to a seventh picture, which was identical in both conditions. Ratings were higher when the sequence started with the most and ended with the least attractive picture. Moreover, in a different study additionally varying the overall level of attractiveness of the first six pictures (high, low) had no influence on the ratings. In order to understand how these effects develop over time, in a third experiment, the attractiveness was not only rated at the end of the sequence, but for every picture. Presenting pictures in descending order of attractiveness resulted in higher ratings on every level of attractiveness. Thus the effect develops over time. It seems that two effects occurred: Attractiveness does not depend solely on the overall attractiveness of previously seen pictures but also on the order of processing. We assume that first impression serves as an anchor value.

## **On the predictive accuracy of immediate and delayed judgments of learning for automatic and controlled memory processes**

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How accurate are individuals in monitoring their own learning and remembering? It is well-established that judgments of learning (JOLs), that is, people's predictions about the likelihood of remembering recently studied information on a later memory test, are moderately accurate. However, it has yet to be systematically studied whether JOLs differ in their predictive accuracy for automatic and controlled memory processes; two types of memory processes that are often differentiated in current memory theories. We used the process-dissociation procedure in combination with a word stem completion task to investigate the predictive accuracy of immediate and delayed JOLs for automatic and controlled memory processes. We found that (1) both immediate and delayed JOLs were predictive of controlled memory processes, (2) only delayed JOLs were predictive of automatic memory processes, and (3) delayed JOLs were more accurate in predicting controlled memory processes than immediate JOLs.

## **Adult age differences in hindsight bias depend on memory instructions**

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Hindsight bias is the tendency to perceive an outcome as more likely in hindsight than in foresight. Prior research demonstrated stronger hindsight bias in older than in younger adults (Bayen et al., 2006; Bernstein et al., 2011). Both studies used a memory task, that is, participants provided original judgments (OJ) to difficult questions and tried to recall these OJs after a retention interval. Hindsight bias occurs, when recalled OJs are closer to the correct judgment (CJ), when it is presented than to when it is not presented. In both studies, older adults did not only show stronger hindsight bias, but also poorer OJ recall than younger adults. Hence, weak OJ memory may make older adults more prone to hindsight bias. We investigated whether age differences in hindsight bias depend on the presence of memory instructions. Forty-five younger and 45 older adults completed both memory and hypothetical hindsight-bias tasks, using difficult assertion-type questions. In the hypothetical task, participants make a judgment "as if they did not know the CJ" (no memory task). Age differences in hindsight bias occurred in the memory condition, but not in the hypothetical condition, pointing to the role of memory instructions for age differences in hindsight bias.

## Analyzing verbal response scales

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In psychological research and diagnostics verbal response scales including linguistic terms (LTs) as verbal anchors are often used to gather participants' answers. To allow for a valid parametric statistical analysis of response data the categories labeled by the LTs should be (1) distinct in meaning and (2) interval-scaled and, therefore, equidistantly distributed. The present study evaluates the response scale of the Trierer Inventory of Chronical Stress (TICS; Schulz, Schlotz & Becker, 2004) which applies a five-point response scale using frequency labels (e.g., *very frequently*). The original TICS scale is compared to an alternative version using different answering labels. In the study 40 students and 25 occupational rehabilitants took part. The scales were tested concerning distinctiveness and equidistance by employing the translation procedure of Bocklisch, Bocklisch & Krems (2012). This procedure allows modeling the meanings of the LTs using fuzzy membership functions (MFs). Further, the TICS response data were analyzed using statistical as well as fuzzy analysis. Results show that the original TICS-scale is not interval-scaled and as a consequence the stress level is overestimated when using inappropriate parametrical statistical analysis. In contrast, the alternative TICS complies with the requirements for a statistical data analysis.

## A few good cues. Predictive accuracy of a big dawes strategy

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Based on cross-validation studies, it has been argued that simple heuristics are more accurate in prediction than more complex probabilistic inference strategies (e.g. Czerlinski, Gigerenzer, & Goldstein, 1999). For cue-based decisions between two options the more frugal Take The Best was more accurate than strategies that weigh and add all available cues. We reran the cross-validation simulation for ten data sets and eight strategies, and included a new type of strategy – Big Dawes – which equally weighs and adds three to five most valid cues. For each data set and strategy, parameters were estimated for a randomly drawn training sample (50 % of data) and the strategy was used to generate predictions for a test sample (50 % of data). The results across 10 000 simulation trials and all data sets show that generalization accuracy was highest for Big Dawes, if computed for decisions that allow unambiguous predictions. If strategy accuracy is adjusted for guessing than Take The Best and a strategy combination performed best. It will be discussed how Big Dawes relates to structurally similar strategies in other decision tasks, such as a constrained 1/N strategy in asset investment decisions and how additive strategies can be plausibly constrained to the most relevant instead of all available cues.

## **How children and adults become familiar with perceptual item features: Development of ERP and behavioral correlates of familiarity and recollection for identical versus perceptually changed pictures**

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According to dual-process models of recognition memory, two primary cognitive processes, familiarity and recognition, are employed in recognition memory tasks. Event-related potentials (ERPs) can be used to differentiate between both processes by comparing the latency and topographic distribution.

We presented pictures to undergraduate students, second-graders and fifth-graders, asking them to perform an incidental shallow encoding task (indoors/outdoors decisions). During the test phase, pictures were repeated either identically or perceptually changed along with new distractors, while participants were asked to classify these items as same, different or new. In a second phase, we asked participants to intentionally encode more items otherwise using the same procedure.

Item memory was age-invariant, but memory for perceptual features increased for young children and adults after intentional encoding. Parietal effects associated with recollection were observed across age groups for changed and identical items. By contrast, earlier frontal effects associated with familiarity were observed for both item types in young adults only, and larger for same items. Across age groups, ERP old/new effects for same relative to different items had an earlier onset. These results suggest that perceptual and conceptual item processing distinctively contribute to memory retrieval across development.

## **Die zwei ‚Kulturen‘ der Psychologie. Zum Fachverständnis und zur Studienzufriedenheit von Psychologiestudierenden**

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Kimble (1984) konnte nachweisen, dass innerhalb der American Psychological Association zwei ‚Kulturen‘, nämlich eine natur- und eine geisteswissenschaftliche, aufeinanderprallen. Um zu überprüfen, inwiefern dieser klassische Gegensatz an deutschsprachigen Universitäten heute noch von Bedeutung ist, wurden im Rahmen einer Onlinebefragung 2000 Psychologiestudierende unterschiedlicher Semester und Universitäten zu ihrem Fachverständnis und ihrer Studienzufriedenheit befragt. Im Zentrum der Untersuchung stand dabei die Frage, inwiefern das Fachverständnis der Studierenden mit dem (wahrgenommenen) Selbstverständnis der akademischen Psychologie übereinstimmt. Anhand eines semantischen Differentials (z.B. nomothetisch-idiographisch) sollten die Studierenden zu diesem Zweck sowohl ihr eigenes als auch das an ihrer Universität vorherrschende Fachverständnis entsprechend einordnen. Während das Selbstverständnis der akademischen Psychologie dabei eindeutig dem naturwissenschaftlichen Pol zugeordnet wurde, verorteten die Studierenden ihr eigenes Fachverständnis überwiegend an der Schnittstelle von Natur- und Geisteswissenschaft. Zwischen dem Fachverständnis der Studierenden und dem (wahrgenommenen) Selbstverständnis der akademischen Psychologie bestand demnach eine Diskrepanz, die der von Kimble gefundenen nicht unähnlich ist. Die unterschiedliche Gewichtung natur- und geisteswissenschaftlicher Ansätze wirkte sich dabei nicht nur negativ auf die inhaltliche Studienzufriedenheit aus, sondern erwies sich als unabhängig von der Studiendauer. Der klassische Gegensatz zwischen einer natur- und einer geisteswissenschaftlichen Psychologie ist vor diesem Hintergrund keineswegs überholt, sondern bedarf sowohl aus fachlichen als auch aus pädagogischen Gründen dringender Diskussion.

## **Effects of symbolic and nonsymbolic approximate arithmetic on commutativity knowledge**

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Children possess mathematical understanding long before entering school. However, there are no overall attempts to tie formal instruction to this existing knowledge. Findings indicate that nonsymbolic material can promote the transfer of existing knowledge to numerical problems (Sherman & Bisanz, 2009). However, there is no consensus concerning the question of how certain dimensions of the induction affect performance. In particular, it is unclear if also approximate *symbolic* arithmetic, which can be carried out in preschool-age, can help children to understand mathematical principles.

Our study aimed to compare four different inductions of the law of commutativity: countable and not countable nonsymbolic material, approximate symbolic problems and direct instruction. We assessed the respective impact on subsequent procedural and conceptual commutativity knowledge in second-graders and found positive effects of countable nonsymbolic and approximate symbolic material comparable to the impact of direct explanation. These effects only applied to strategy-use, while none of the materials enhanced conceptual knowledge. Surprisingly and inconsistent with findings in different mathematical domains (De Bock et al., 2011), not countable nonsymbolic material had no positive effect on either kind of knowledge. The results are discussed in light of the current state of research.

## **"Is this art or is it crap?" – Context-based categorization of ambiguous objects**

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Which components are needed to identify an object as a piece of (modern) art? This question remains controversial in the recently growing field of research on aesthetic appreciation of visual art. Aesthetic judgments are determined by a variety of factors, e.g. stimulus-symmetry, complexity, style (Augustin et al., 2012) and supplementary information like the titles (Leder et al., 2006). It is further assumed that aesthetic judgments depend on context (Leder et al. 2004). We wanted to investigate a) which variables influence evaluations of artistic quality and b) in which way context has an impact on aesthetic appreciation. As stimuli we used objects which could ambiguously termed "works of art". To cover a wide spectrum, 213 images of contemporary art and everyday objects were rated in regard to favor, originality, ambiguity, understanding and artistic character. Variable originality proved to be the best predictor for artistic quality ( $r=0.87$ ,  $p<.001$ ). Subsequently, 16 images with medium aesthetic character scores were selected and evaluated by 40 participants in terms of several aesthetically relevant variables primed by two different contexts: Half of them did a virtual tour through a museum, the others through a virtual street-setting. The results could not confirm the idea of context-dependent aesthetic appreciation.



## Eye movement statistics to uncover processes underlying prospective memory

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Prospective memory (PM) research usually is based on measuring memory performance. In the present study, we additionally analysed eye movement data as a more direct and continuous indicator of underlying processes. By using different eye movement statistics, we found the skewness of Voronoi cell sizes (see Over, Hooge & Erkelens, 2006) to be of particular importance. This measure indicates the distribution of fixations on a given stimulus, what allows comparing gaze behaviour between different tasks. Participants performed a free viewing, a PM, and a visual search task, respectively. During the latter task fixations were distributed rather evenly across the images, resulting in low skewness values. In the free viewing task, participants closely inspected details while ignoring other regions, thus resulting in high skewness. Interestingly, participants showed a similar skewness in Voronoi cell sizes in free viewing task and while failing in the PM task. Average skewness values while successfully solving the PM task, however, were in-between free viewing and visual search. This indicates either within or between subject variation of strategy use or both. Indeed when comparing high and low performer groups, we found participants differing in approaches to the PM task that explain these idiosyncratic aspects of our data.

## Model selection of multinomial processing tree models – A Monte Carlo simulation

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Multinomial processing tree (MPT) models are a family of stochastic models that can be used to explain categorical data by a sequence of latent processes. In experimental psychology, it is often desired to compare different MPT models in their ability to account for the data. For this purpose, information criteria that balance the fit of a model against its complexity are routinely applied. Recently, Wu, Myung, and Batchelder (2010) employed the principle of minimum description length to provide a new means of model selection, the Fisher information approximation (FIA). Unlike AIC and BIC, FIA has the theoretical advantage that it takes the functional form of the models into account, rather than measuring model complexity by the number of free parameters. The purpose of the present study was to compare the performance of AIC, BIC, and FIA in identifying the data generating model by means of a Monte Carlo simulation. Results indicate only minor differences among the criteria. Although FIA performed slightly better than AIC and BIC, the estimation of the complexity term used in FIA was found to be unstable, in turn questioning its use with small samples.

## The influence of visual short-term memory content on object correspondence

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It has been shown that features play an important role for how newly sampled information is related to existing object representations, i.e., object correspondence is solved. To investigate if the visual working memory can influence this feature effect we used the Ternus display, in which a set of three adjacent discs were presented in alternation with the same set of discs shifted horizontally by one position. The discs could be perceived as moving all together (*group motion*) or one jumping across the others (*element motion*). We used different isoluminant colors for the elements to bias the percept towards group and element motion and asked observers to do a color-matching task that required them to hold a color in memory (presented in the beginning of the trial) while looking at the Ternus display. This memory color could either match the color of the Ternus elements that indicated the element bias, the color that indicated the group bias or have no match with any of the elements' colors. Observers perceived more element motion when the memory color matched the element bias compared to the group bias match, suggesting that feature-based object correspondence is mediated by the content of the visual working memory.

## On possibly separate mechanisms of direct and indirect control of visual fixation duration

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The visual distractor effect refers to a prolongation of fixation duration by any distracting stimulus. Recent research in free viewing revealed that this effect is modulated by the current state of attention (Pannasch & Velichkovsky, 2009, Pannasch, Schulz, & Velichkovsky, 2011). Regarding the ongoing debate on the control of fixation durations, these findings provide evidence for the direct control hypothesis. In the present study, we investigated influences of two contrasting instructions (attention to layout of scene vs. attention to objects) on the distractor effect. Additionally, the position of fixations (on background vs. object) was included as a post-hoc factor. For theoretical reasons, instruction could be attributed to the indirect and fixation positions to the direct control of fixation duration. Visual distractors appeared every eighth fixation with a latency and length of 100 ms. Our results showed that 1) baseline fixation durations were longer under the identity instruction, 2) this observation was remarkably stronger for distracted fixations, and 3) fixation duration differences were additively increased for fixations on objects. The results demonstrate direct as well as indirect control of fixation duration. In particular, the additivity of these influences suggests different stages of processing within single visual fixations.

## EEG theta and alpha activity in Qigong: Same effects of mental practice and physical training?

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In recent years, there has been significant uptake of meditation and related relaxation techniques, as a means of alleviating stress and fostering an attentive mind. Several electroencephalogram (EEG) studies have reported changes in spectral band frequencies during Qigong meditation indicating a relaxed state. Much less is reported about effects on brain activation patterns induced by Qigong techniques involving bodily movement. In this study we tested whether (1) physical Qigong training alters EEG theta and alpha activation, and (2) mental practice causes the same effect as a physical Qigong training. Subjects were asked to perform the Qigong technique *Wu Qin Xi* physically and by mental practice. Eyes-open and eyes-closed resting EEG was recorded before and immediately after each 15-minute exercise. Increased alpha power was found in posterior regions in mental practice and physical training for eyes-open and eyes-closed conditions. When averaged across all brain regions, theta power was increased after mental practice and physical training in eyes-open conditions, decreased after mental practice in eyes-closed conditions. Results suggest that mental, as well as physical Qigong training, increases alpha activity and therefore induces a relaxed state of mind. Effects of different patterns in theta activation will be discussed.

## Replicating rivals? Interdependency modulates the emergence of distractor-response episodes through observation

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Irrelevant distractors and simultaneously executed responses can become integrated into a memory episode; hence, repeating the distractor triggers retrieval of the response. In this study, we investigated the emergence of distractor-response episodes when responses are observed, but not executed by oneself, and examined the moderating role of social relationship in integrating a co-actor's response. We used a prime-probe design that was shared between two co-actors and orthogonally manipulated repetition vs. change of distractors and responses from prime to probe: While one participant observed the co-actor's reactions together with a distractor in the prime, he had to execute either the same (compatible) or different (incompatible) response himself in the probe. We additionally varied interdependency (cooperation vs. competition vs. no interdependency) between participants. Given a positive interdependency (cooperation), participants showed facilitated compatible reactions and delayed incompatible reactions after repetition of the distractor in the probe, indicating that participants associated the prime distractor with the observed response. In contrast, no effect of distractor-response binding and retrieval was obtained in the competitive or independent condition. These results suggest that even observed responses of others become integrated into distractor-response episodes, especially if a positive relationship prevails between two co-actors.

## **Should (s)he be handsome or rich? Sex differences in mate preferences change as a result of the experimental control of social desirability bias**

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Consistent with an evolutionary approach to explaining mate preferences in long-term relationships, it has been argued that there is a male preference for beauty, and a female preference for resources (Buss & Schmitt, 1993). The competing sociocultural approach considers mate preferences to be the product of social conditions (Eagly, Wood & Diekmann, 2000), and therefore predicts an assimilation of male and female mate preferences as a result of the convergence of gender roles in modern societies. In a large-scale assessment of 1613 participants, direct questioning resulted in prevalence estimates that were consistent with the evolutionary approach: Male participants indicated less interest in a potential relationship with a physically unattractive female, whereas female participants indicated less interest in a potential relationship with a male lacking financial resources. These sex differences in preference for beauty versus resources disappeared, however, when an indirect questioning technique based on the Crosswise-Model (Yu, Tian & Tang, 2008) was employed. This surprising finding suggests that direct responses regarding mate preferences may be systematically distorted by social desirability bias, and that true preferences may be less asymmetrical than predicted by evolutionary theory.

## **Influence of schizotypal traits on source memory and meta cognition. An objective approach**

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Schizotypal personality is a risk factor for schizophrenia and has been shown to involve memory impairment (Moritz and Woodward, 2002). Of particular interest to the present study are deficits found in the ability to discriminate between external stimuli and internal thoughts and the tendency to maintain false beliefs about the own cognitive performance (Peters et al., 2007). Undergraduate participants first completed the short form of the Wisconsin Schizotypy scale and scales from other metacognitive questionnaires. Afterwards a list of words were learned one at a time, with half printed on a screen and simultaneously heard over headphones whereas the other half were printed on the screen and participants were asked to imagine what the word would sound like. Following each word, participants indicated their confidence for remembering the word in the upcoming memory task as well as the mode of presentation (heard or imagined). After they completed source and item recognition tests, participants completed a survey regarding their experience. We expect an overall decreased performance for the schizophrenic risk population in item recognition and source discrimination. Additionally, we expect those high to schizotypy to show a higher confidence relative to their poorer performance than the control group.

## Intuitive decisional processes in visual and semantic coherence judgements: An MEG study

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Everyday life decisions are usually made immediately without consciously thinking through all possible alternatives and steps of reasoning. Such kinds of decisions are considered as intuitive. Taking a look at different attempts to define intuitional mechanisms three common definition criteria can be worked out (Glöcker & Wittemann, 2009): (1) Intuitional mechanisms are not necessarily conscious, (2) they are strong enough to cause quick behavioral outcomes and (3) they depend on prior experience in the sense of not consciously retrieved memory contents that lead to a decision or solution. Taking those definition criteria into account Bowers, Regehr, Balthazard & Parker (1990) define intuition as the “preliminary perception of coherence”. Studies (e.g. Volz & Von Cramon, 2006) have revealed the orbitofrontal cortex (OFC) as the crucial brain structure for such perceptions of coherence. To further investigate neuronal mechanisms of intuitive coherence judgements the present study uses MEG to record the brain activity of healthy volunteers while they were conducting a coherence judgement task in the visual and in the semantic domain. Results shed light on the temporal dynamics of OFC involvement in intuitive coherence judgements and give insights to what extent the current model is generalisable over different domains.

## Making sense of subsequent action: Neural signatures of spontaneous interpretation

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When we observe sequences of actions, we spontaneously expect them to be unified by an overarching goal. This tendency has been observed even when actions are in fact unrelated. When it is difficult to find an overarching goal, e.g. when actions are performed in an unusual context, activation in left inferior frontal gyrus (IFG) is increased. This could reflect the search for potential goals that reconcile the observed inconsistency plausibly. To test this, we manipulated transition probabilities (TP) in everyday action sequences. A low TP should make it difficult to find a higher goal that connects two acts, being reflected in increased IFG activation.

Participants watched movies of single acts. To assess the TP between two consecutively presented actions, participants rated in a post-fMRI session how often these actions are performed one after another in everyday life. The individual rating data was used as parameter in the fMRI-analysis. The analysis yielded activity in bilateral IFG for low, precuneus and right superior frontal sulcus for high TP.

Findings indicated IFG to reflect the search for an overarching goal in action sequences. Activation in precuneus might reflect a facilitation to retrieve internally generated episodic memories that fit to the obviously associated actions.

## **Disjunction of ambiguous probabilities in economic decisions**

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Experimental studies show that in economic decisions ambiguous information about sink costs, future investments or predicted success are discounted. Two online - experiments investigate whether the degree of ambiguity play a role in the disjunction. Experiment 1 with 700 university student participants online varied two independent variables: type of scenario (business vs. recreational hedonic situation), and degree of predicted success probability ambiguity (no vs. low vs. high). Ambiguity was operationalized as information originating from two different sources. It was predicted that increasing ambiguity should decrease the willingness to invest in a project gradually, i.e. that ambiguity is a quantitative and not a qualitative (ambiguous vs. unambiguous) factor. The decisions confirmed the main hypothesis; also, in post-experimental justifications ambiguity was mentioned more with higher differences in presented probabilities. Experiment 2 with 600 university student participants additionally varied the mean of the two presented probabilities (70%, 50%, 30%). The decisions revealed that both the mean probability as well as the grade of ambiguity impacted decisions, confirming experiment 1. However, as predicted, in both experiments probability ambiguity influenced decisions only in the economic scenarios, while in the hedonic scenarios no effect was observed.

## **Mind wandering in visual search**

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Experiments on visual attention, usually, assume that the focus of attention is either at the location where one's gaze is directed to (overt attention) or at a different location in the visual field (covert attention) (Posner, 1980). However, on the basis of mind-wandering and task-unrelated thoughts (e.g. Smallwood & Schooler, 2006), it seems reasonable to assume that attention is not always directed to the visual field. Here, we investigated the influence of mind-wandering on response time (RT) and error rate (ER) during visual feature versus conjunction search. Immediately after each 4 to 6 trials, participants reported their state of attention on a 9-point Likert scale, from "I was focused on the task" to "I thought about something else". Although participants had this secondary task of reporting their attentive state, we were able to reproduce the well-known effects of task [ $F(1, 21) = 56.525, p < .001$ ] and set size [ $F(1, 21) = 18.449, p < .001$ ] on RT, as well as a significant Task x Set Size interaction [ $F(1, 21) = 43.609, p < .001$ ]. In addition, our data show only a main effect of the self-reported attentional state [on-task vs. off-task;  $F(1, 16) = 10.537, p < .05$ ] on ER without any interactions. These results indicate a strong link between mind-wandering and performance errors in visual search.

## Wahrnehmung sozial bedrohlicher Reize nach experimentell induziertem sozialen Ausschluss

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Die Induktion sozialen Ausschlusses führt zu affektiven, peripherphysiologischen sowie neuronalen Reaktionen. Inwiefern Ausschlusserfahrungen auch Veränderungen der Wahrnehmung sozial bedrohlicher Reize bedingen, ist bislang nicht bekannt. Bisherige Studien konnten zeigen, dass die Verarbeitung sowohl bedrohlicher als auch sozial bedrohlicher Wörter mehr Aufmerksamkeitsressourcen bindet als die Verarbeitung neutraler Wörter. In der vorliegenden Studie wurde angenommen, dass Personen, die sozial ausgeschlossen werden, im Vergleich zu Personen, die eingeschlossen werden, vermehrte Aufmerksamkeitsverzerrungen bei sozial bedrohlichen Reizen aufweisen.

Es wurde eine studentische Stichprobe erhoben ( $N = 50$ ). Zur Induktion sozialen Ausschlusses wurde das von Williams (Williams, Cheung & Choi, 2000; *J Pers Soc Psychol*, 79, 748-762) entwickelte Cyberball-Paradigma verwendet. Aufmerksamkeitsverzerrungen wurden anhand einer Dot-Probe-Aufgabe erfasst. Als Stimuli wurden sozial bedrohliche, bedrohliche und neutrale Wörter verwendet. Die Versuchsteilnehmer bearbeiteten zwei Varianten der Dot-Probe-Aufgabe, bei der die Stimuli entweder 180ms oder 500ms präsentiert wurden.

Es zeigten sich Unterschiede in den Reaktionszeiten zwischen den beiden Versuchsgruppen. In Abhängigkeit von der Präsentationsdauer konnten Unterschiede in der Verarbeitung sozial bedrohlicher im Vergleich zu bedrohlichen und neutralen Reizen gefunden werden. Die Ergebnisse des Experiments sollen vorgestellt und mit Hinblick auf die Frage, inwiefern soziale Ausschlusserfahrungen die Wahrnehmung sozial bedrohlicher Reize verzerrten, diskutiert werden.

## Viewing time of shopping cues in pathological buyers

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It is still under debate whether pathological buying should be classified as a behavioral addiction, an impulse control disorder or whether it belongs to the obsessive-compulsive spectrum. This study was conducted to ascertain whether pathological buyers would react to relevant cues with craving responses similar to people suffering from substance-related addictions (such as viewing relevant cues longer). Pathological buyers (16) and controls were matched for gender, age, and education. Participants viewed shopping related pictures and neutral pictures which they then had to rate for emotional valence, arousal and urge to buy. Viewing time of these pictures was used as an implicit measure of craving reactions. Preliminary results show that pathological buyers tended to view distal shopping pictures (depicting common shopping scenes such as paying or carrying shopping bags) longer, though comparison failed to reach significance (buyers:  $M=5038\text{ms}$ ,  $SD=1637\text{ms}$ ; controls  $M=4042$ ,  $SD=1040$ ;  $t=-1.59$ ,  $p=.14$ ). These results seem to point to a craving reaction from pathological buyers when presented with relevant cues. Results are discussed with respect to mechanisms contributing to development and maintenance of pathological buying in comparison to individuals suffering from substance addiction.

## Gender differences in chronometric mental rotations tests with embodied stimuli

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This study investigated the possible existence of gender differences in chronometric mental rotation tests with embodied stimuli. Adult males and females (60 each) solved a chronometric mental rotation task with cube figures (CF) and embodied stimuli (cube figures with a head (CFH) and bodies formed as cube figures (BCF), Amorim, Isableu, & Jarraya, 2006). Error rates, reaction times and rotation speed were analyzed as dependent variables. The factor "gender" served as between subject factor. The factors "angular disparity" (0°, 30°, 60°, 90°, 120°, 150°, 180°) and "stimulus type" (CF, CFH, BCF) were the within subject factors. The most interesting results were the results concerning the factor "gender" showing a significant influence but only on error rate,  $F(1,118)=4.56$ ;  $p<.05$ ,  $\eta^2 = .104$  and a significant interaction between stimuli and gender for rotation speed,  $F(2,224)=4.81$ ;  $p<.05$ ,  $\eta^2 = .04$ . Females made more errors than males, and they showed a slower rotation speed but only for the most embodied stimuli, the BCFs. The gender differences found in chronometric mental rotation test for error rate and for highly embodied stimuli in rotation speed for males has to be investigated further by varying the kind of design (within/between subject design) and the kind of mental rotation (egocentric vs. allocentric).

## Can inbreeding explain the motivation to explore?

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What is the function of explorative behavior: Specifically, is inbreeding avoidance responsible for the evolution of the motivation underlying exploration? With an agent-based simulation of bisexually reproducing agents we demonstrated that the selective pressure resulting from a pedigree-based estimation of fitness loss from inbreeding can be compensated with the development of a motivational structure associated with exploration. Conceptually, we framed exploration within the motivational systems of the Zurich Model of Social Motivation (Bischof, 1993). Explorative behavior therefore is a result of the interplay of three motivational systems – the security, autonomy, and arousal system. Specifically we investigated: Which temporal development of motivation over the life-span is adaptive for solving the inbreeding problem? Do the three different motivational systems co-evolve? How does social structure interact with the solution to the inbreeding problem? Thus our model distinguishes between the structures of the social environment (conjugal vs. non-conjugal) and the temporal developments of exploration over the life-span (low or high, vs. rising vs. falling). Our simulation demonstrated that the motivational systems should co-evolve to solve the inbreeding problem; further, that change (falling independence, rising arousal) in the motivational structure is functional, and third that their joint development is contingent upon the social structure.



## Decreased attention in task switching: The influence of task frequency and modality compatibility

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Prolonged car driving can lead to fatigue and vigilance decrements, so that responding to infrequent events is potentially impaired. We examined this hypothesis using a task-switching procedure. Previous studies found higher switch costs when switching between two modality-incompatible tasks (auditory-manual, visual-vocal) relative to compatible tasks (auditory-vocal, visual-manual). In an initial experiment, we manipulated both task frequency and modality compatibility. Infrequent tasks were generally performed more slowly, but this effect was increased specifically in modality-incompatible tasks. We also replicated increased switch costs with incompatible tasks, but only for frequent tasks. In the second experiment, the sensitivity of this task-switching procedure to effects of prolonged driving was investigated in a pre-post design in an applied setting (car driving at night). We found that the after-effect of driving affected performance specifically in modality-incompatible tasks, revealing increased performance costs only in infrequent incompatible task conditions. However, no general influence of prolonged driving on switch costs could be found, suggesting a quite specific influence on performance. We suggest that prolonged driving decreases vigilance, which hampers performance primarily in rare and unexpected situations that are prone to crosstalk, whereas performance in expected situations without modality-specific between-task crosstalk is not sensitive to vigilance decrements.

## A laboratory investigation of anxious cognition: How subliminal cues alter perceptual sensitivity to threat

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Emotional stimuli represent a category of signals that are relevant for survival. This relevance is reflected in the prioritization of threatening over neutral information, which has been demonstrated for inherently threatening stimuli and stimuli with acquired affective significance. The present study aimed to investigate whether threatening cues presented without conscious awareness have an impact on perceptual judgements. For this purpose, neutral or angry facial expressions associated with prior congruent (Experiment 1), incongruent (Experiment 3) or no aversive learning (Experiment 2) were presented subliminally in a perceptual decision task. During the task, subjects rated mask faces that varied in emotion intensity ranging from neutral to angry. Subjects tended to make more “angry” responses only when the subliminal stimulus was angry and had been previously paired with an aversive experience. These findings may have direct clinical relevance because similar mechanisms could account for cognitive biases in anxiety disorders.

## Environmental requirements in motor imagery among older adults

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In the last decades, several studies evaluated the age related deterioration of motor imagery (MI). It has been shown for walking tasks that older adults had difficulties to simulate the motor action accurately, more so with increasing task requirements like track length and path width. The aim of the present study is to clarify the role of complex environmental requirements in MI of walking among older adults. In 20 older ( $70.75 \pm 3.68$  years) and 22 younger ( $24.31 \pm 1.25$  years) adults, MI was estimated using the mental chronometry paradigm. We conducted four walking tasks of equal length and width, but of different complexity: walking A) straight; B) with changes of direction; C) on uneven ground; D) while additionally flipping switches. Durations of imagined walking condition were measured first, and those of actual walking condition afterwards. MI was also measured by using the Controllability of Motor Imagery test. Results revealed a significant interaction of condition x task x age ( $F(3, 120) = 2.76$ ;  $p < .05$ ;  $\eta^2 = .65$ ), suggesting that task complexity seems to play an important role for MI performance especially in older adults. Understanding age related difficulties of MI is of particular interest for the development of an effective mental training for elderly.

## Phonetic parameterization of sexual orientation and gender in German

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In sociophonetic research on the acoustic correlates of sex and sexual orientation, psychological variables have largely been ignored (e.g. Waksler, 2001; Munson, 2007). This seems inappropriate for a number of reasons (see Kachel, 2012): (1) Are speech differences between gay and straight people actually due to sexual orientation or are they mediated through gender-role self-attribution and psychosocial solidarity regarding the in-group? (2) Are there correlations of acoustic parameters and sexual self-identification within the gay and straight groups? (3) What are the acoustic correlates of gender in contrast to sex? This present study addresses these questions. Voice pitch and vowel space dimensions were analysed in recordings of 19 lesbian and 20 straight women. Additionally, sexual orientation, gender-role self-attribution and group affiliation were measured. No significant differences were found when only comparing lesbian and straight women. However, correlations between sexual self-identification and voice pitch were found for the lesbian, but not for the straight group. Furthermore, there is strong evidence for correlations between gender-role self-attribution and averaged values of the first and second formant frequencies. These findings strongly suggest the contribution of a fine-grained analysis of a range of psychological variables in understanding how sex and sexual orientation are transported through speech.

## **“Mindlessly polite” in search of the mechanism explaining the emotional seesaw phenomenon**

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The Emotional Seesaw Phenomenon (ESP) is a situation, in which a person experiences a certain emotion, but where the external stimulus that evoked and upheld the emotion suddenly disappears. Research done so far indicates increased compliance of subjects when addressed with various requests. The current experiment extends previous findings on the impact of the ESP on human behavior. In present study a fast change of emotions was the effect of an outcome-related expectancy violation. Participants performed a common knowledge multiple choice task in which the difficulty of the questions (easy vs. difficult) allowed to control for the emotional valence. Outcome related expectancies were fostered by immediate feedback after each response. A payout matrix after the task was used to support expectations (incentive for correct answers) or to provoke an emotional seesaw (incentive for incorrect answers). Results support earlier findings showing that subjects display an impaired message processing, which results in higher compliance to sign even a nonsense petition. Additionally this experiment revealed a deteriorating impact of the ESP on information recall. It seems that the ESP makes the organism both-, selective with regard to information input and inhibited with regard to processing it.

## **The level of visual processing defines the size of location negative priming**

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The selection of a visual target at a previous distractor location leads to a conflict. This location negative priming (NP) is suggested to vary in size depending on the target distractor similarity (Houghton et al., 1996). In four experiments (N = 24, respectively) we show that the degree of NP critically depends on the level of processing of the visual task. NP decreased with increasing target distractor similarity in simple form discrimination tasks. Opposing results were obtained for discrimination tasks based on conjunction or letter stimuli where NP increased with increasing target distractor similarity. The results indicate that location NP occurs at different stages along the visual-perceptual processing hierarchy. We suggest that the size of this conflict can be differentially modulated due to varying feed-forward and recurrent projections depending on stimulus or task type: While simple form discrimination in lower, highly specialized visual areas leads to reduced location NP possibly via a simple top-down-controlled backward sweep, stimuli that involve multiple higher order areas lead to enhanced NP as a consequence of more complex recurrent processes.

## **Information flow predicts perception**

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Recent studies have shown the importance of activity prior to stimulus presentation for unisensory as well as multisensory perception. Moreover, the role of oscillatory synchronization in large scale cortical networks for multisensory perception has recently been demonstrated. However, studies exploring the flow of information are needed to evaluate the direction of influence between unisensory, multisensory and higher-order cortical areas. We addressed this using the well established sound induced flash illusion (SIFI), in which invariant audiovisual stimuli can elicit varying perception. We applied the phase-slope-index (PSI), a novel measure of information flux in complex physical systems to data recorded with electroencephalography (EEG). Comparing activity from trials in which subjects perceived an illusion with trials without illusion, thereby keeping stimulation fixed, we show that information flow in the alpha band (8-12 Hz) between unisensory and multisensory as well as information flow in the gamma band (80-100 Hz) between unisensory, multisensory and higher-order frontal and parietal cortical areas predicts upcoming perception.

## **Modulations of effective connectivity between brain regions in response to emotional communication channels**

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Dyadic interactions are based at least on three communication channels: facial expressions, prosody and speech content. In a previous functional magnetic resonance imaging (fMRI) study we reported channel-specific emotional contributions in modality-specific areas (Regenbogen et al. 2012). These were elicited by dynamic video clips presenting actors who told short stories, which expressed emotions on different communication channels. Emotionality via facial expressions, prosody, and content were associated with activations in fusiform gyrus (FFG), auditory cortex (AC), and angular gyrus (AG), respectively. Moreover, emotionality expressed via two of three channels yielded activation in dorsomedial prefrontal cortex (dmPFC). Here we pursue a possible description of the network dynamics between these modality-specific areas with the dmPFC during processing of the emotional videos in the same data-set. Dynamic causal modelling and subsequent post-hoc Bayesian model selection pointed to both enhancement and suppression of specific connectivities when stimuli were lacking emotionality in one channel. Notably, neutral facial expressions lead to a suppression of the connectivities from AG and AC to the face-specific FFG while enhancing the projection from AC to AG. Neutral content facilitated the influence of the dmPFC on AG. In conclusion, the modality-specific areas and dmPFC dynamically changed their interconnectivities depending on multimodal emotionality.

## **Are low-spatial frequencies sufficient for unaware (masked) priming of face-sex discrimination?**

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We tested whether the magno-cellular projection is sufficient to support awareness-independent face processing. On the basis of the magno-cellular projection's exclusive sensitivity for LSF bands, we expected that masked HSF primes would not be processed, but that masked unfiltered primes, masked LSF primes, and unmasked HSF primes would lead to a congruence effect. In three experiments, all of these predictions were confirmed. We found that masked unfiltered primes led to a congruence effect and that masked HSF primes did not (Experiment 1). We showed that masked unfiltered primes and masked LSF primes both led to significant congruence effects of about similar size (Experiment 2). We demonstrated that unmasked HSF primes created a congruence effect, while masked HSF primes failed to create a congruence effect (Experiment 3). Our findings are in agreement with an origin of unaware vision in processing along the magno-cellular pathway.

## **Impact of planned movement direction on judgments of visual locations**

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We examined how changes in intended movement direction affect the visual perception. Participants were asked to prepare hand movements that varied in relative angular deviation from a target (Exp. 1 and 2) or in movement extent (Exp. 3). Before movement execution the spatial position of a visually presented target had to be estimated. The results revealed a significant effect of planned movement direction on position judgments and thus, indicate that the perception of visual location may vary as a function of parameters specified during motor planning.

## **Phonological advance planning in sentence production under verbal or spatial load**

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A number of studies have shown phonological activation beyond the first element (e.g., Jescheniak et al., 2003; Oppermann et al., 2010). However, it is not clear if the size of this scope depends on concurrent cognitive load imposed on the speaker. In the present study, we tested (a) whether the phonological planning scope is modulated by cognitive load and (b) whether this modulation depends on load modality, as was reported for grammatical planning (Wagner, 2011; Slevc, 2011). In a picture-word interference task, participants were asked to produce SVO sentences (e.g., “*der Mönch las das Buch*” [the monk read the book]). Auditorily presented distractors phonologically related or unrelated to the subject or object were used to determine which elements were phonologically activated before articulation (Experiment 1). To assess the influence of cognitive load, participants performed a concurrent spatial (Experiment 2) or verbal working memory task (Experiment 3). With no or spatial load, phonological activation was found for both primed elements. By contrast, verbal load restricted the phonological activation to the subject. These results suggest that cognitive load modulates phonological advance planning during sentence production differentially: While nonverbal load does not alter the planning scope, concurrently maintaining verbal material considerably reduces it.

## **Street art and modern art in matching and non-matching contexts**

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Can you put modern art on the street and people will still look at and appreciate it? Will street art gather more attention in a museum? According to a model by Leder et al. (2004) context is an important factor for the pre-classification of an object as an artwork. To find out how the context influences perception and evaluation of art we created stimuli containing “modern art” (which is usually found at a museum/gallery) or “street art” and embedded them in one of two contexts: a museum or a street setting; stimuli were presented in a between-subjects-design. The study was conducted as an eye-tracking experiment, 64 participants looked at each of 40 (out of 80) stimuli for 8000ms. Additionally they had to rate the stimuli on three dimensions (beauty, interest, emotion) and assess the style of each artwork. Subsequently they filled in questionnaires regarding interest in art and street art. We found that artworks were looked at significantly longer in the museum (6362ms) than on the street (5095ms) and that modern art was rated more beautiful, more interesting and caused more positive emotions in the museum than on the street. There were no effects for street artworks. These findings suggest that the context is particularly important for modern art.

## **When our space becomes my space: How the physical separation of space affects sequential modulations of the social Simon Effect**

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In a social Simon task a primary difficulty for each person is to separate one's own actions from those of the co-acting person. In the present study, we investigated if and how physically separating one's own space from the space of the co-actor alters sequential modulations of the social Simon effect (SSE). Participants performed a social Simon task in two conditions: with and without a transparent curtain between both actors. We used an individual (go/nogo) and standard (two-choice) Simon task as control conditions applying the same curtain manipulation. The presence of the curtain modulated the size of the sequential modulation of the SSE in the social Simon task, but not in the two control conditions. The results are discussed with respect to conflict adaption and feature integration theories.

## **Processing of affective prosody in boys suffering from attention deficit hyperactivity disorder: A near-infrared spectroscopy study**

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The ability to correctly decode the emotional content of spoken language is an important aspect of social cognition. Previous research on attention-deficit/hyperactivity disorder (ADHD) has indicated that patients afflicted with this disorder have problems in identifying a speaker's emotional state from affective prosody. If this impairment concerns all emotions to a similar degree or if specific emotions such as anger are disproportionately more affected than others, is not resolved. Moreover, the neural correlates of affective prosody processing are still insufficiently understood.

A near-infrared spectroscopy (NIRS) study with ten 8- to 12-year-old boys suffering from ADHD and ten healthy controls with comparable age was conducted. All participants were exposed to emotionally intoned, standardized sentences of the categories anger, sadness, happiness, and to affectively neutral sentences. For each category blocks of six sentences were presented, to insure an accurate recognition of the emotional content.

Differences in processing of affective prosody were only seen for anger. Boys suffering from ADHD compared to healthy controls showed higher activation for these cues on right parietal sites. These findings might be interpreted to reflect compensatory activation in anger decoding in patients suffering from ADHD.

## Neurophysiologische Repräsentationen menschlicher Grifftypen

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Die vorliegende Studie untersuchte die neurophysiologischen Korrelate von Griffotypen beim Menschen. Es wurde das Elektroenzephalogramm aufgezeichnet während die Versuchspersonen Bilder verschiedener menschlicher Griffe klassifizieren mussten (Hand vs. Fuß; Fußabbildungen als Füllitems). In einem Primingparadigma wurde die Kongruenz des Griffotyps (Präzisions- vs. Kraftgriff) zwischen Prime und Target manipuliert. Weiterhin wurde die Seitigkeit der Hände zwischen Prime und Target manipuliert, um den Einfluss einer Scheinbewegungswahrnehmung zu untersuchen. Vorläufige Analysen der ereigniskorrelierten Potenziale zeigen einen frühen rechts-posterioren Effekt des Griffotyps (200-350 msek nach Targetpräsentation), aber nur bei verschiedener Seitigkeit der Prime- und Targetbilder, wenn also keine Scheinbewegung wahrgenommen werden konnte. Über dem motorischen Kortex fand sich ein späterer Effekt der Griffkongruenz (rechts stärker links; 400-500 msek), wenn die Wahrnehmung einer Scheinbewegung möglich war (gleiche Seitigkeit von Prime und Target). Auf neurophysiologischer Ebene scheinen Präzisions- und Kraftgriffen distinkte Repräsentationen zu Grunde zu liegen. Der spätere Effekt über dem motorischen Kortex lässt sich als Simulation der Scheinbewegung interpretieren (Neuper & Pfurtscheller, 2006) wobei der frühere Effekt des (aufgabenirrelevanten) Griffotyps nicht mehr auftrat. Die distinkten neurophysiologischen Griffrepräsentationen scheinen im Sinne des Event-Codings (Hommel et al., 2001) funktional interagieren zu können, z.B. bei Bewegungswahrnehmung. Damit könnten die Repräsentationen auch eventbezogen als dynamische Repräsentationen gekennzeichnet werden.

## Effects of GPi stimulation on motor inhibition in Parkinson's disease

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Executive control is a crucial element of flexible behaviour and this sometimes requires inhibition of prepared or ongoing action. The frontal-basal ganglia circuits are considered to mediate such inhibitory control over action. The involvement of the subthalamic nucleus in this inhibitory network has been extensively investigated. The aim of our study was to investigate the contribution of the internal segment of the pallidum (GPi), the final output pathway from the basal ganglia to the cortex, to motor inhibition, by examining the effect of deep brain stimulation (DBS) of the GPi (GPi-DBS) in Parkinson's disease (PD) on performance of the conditional stop signal task. Nine patients with PD performed the task twice with GPi-DBS on or off. The results showed that modulation of GPi activity influences the speed of response initiation, as indicated by significantly faster Go reaction times in the ON ( $M = 543.93$ ,  $SE = 29.51$ ) than OFF ( $M = 618.83$ ,  $SE = 44.77$ ) stimulation condition. Measures of proactive and reactive inhibition and conflict resolution were not significantly altered by GPi stimulation. Our findings have implications for understanding the role of the various basal ganglia nuclei in motor response initiation and inhibition.



## **In a sweet mood? Effects of glucagon-modulated blood glucose levels on mood-induction during fMRI**

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Glucose metabolism provides the central source of energy for the human brain. It has been shown that varying peripheral blood glucose levels might have a strong impact on the intensity of the BOLD-signal on cognition and emotion. Changing blood glucose levels therefore might confound not only the BOLD-signal measured in fMRI, but also more generally interact with cognitive and emotional processing, and thus indirectly influence fMRI results. Here we show in a randomized, placebo controlled, double blind study in 20 female subjects subclinically low levels of glucose contrasted to an euglycaemic control condition do have an impact on the BOLD signal during a mood induction procedure. Elevated brain activation is also correlated with individual glucose levels. A cognitive task prior to mood induction leads to even stronger increases in brain activation, when blood glucose levels are low.

Results demonstrate that low levels of blood glucose lead to immediate compensatory increases in relevant brain activation. This indicates that our brain might compensate low glucose levels by stronger recruitment of brain areas relevant to the task, but this elevated compensatory activation is only associated with maintained performance for a certain time, after which performance drops while brain activation further increases.

## **Early auditory emotion processing is influenced by visual context – An ERP study of face-voice perception**

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Emotion identification is an important aspect of social communication that happens rapidly and across modalities, combining emotional cues such as a speaker's facial and vocal expression. Whereas the investigation of audiovisual integration of emotions has been intensely studied, auditory emotion processing and its susceptibility to influences from the visual modality has not. We aimed to explore the effects of visual context and visual-to-auditory predictions on early auditory emotion processing (N1-P2 complex of the auditory event-related potential). In an auditory condition, subjects listened to a random sequence of angry and neutral interjections and judged the emotionality of these voice stimuli. In an audiovisual condition, utterances were accompanied by either congruent or incongruent face videos of the speaker to alter the predictive strength of the visual stimulus. ERPs were suppressed to angry compared to neutral interjections in the auditory condition (auditory emotion effect). Audiovisual mismatch led to a reduction of the emotion effect indicating that early auditory emotion processing is influenced by visual (predictive) context. Visual information induced visual-to-auditory anticipation effects regardless of audiovisual congruency. We suggest that in emotional face-to-face communication the natural precedence of the facial expression is used to predict the tone of voice to facilitate emotion processing.

## Viewing behavior under natural conditions: The impact of emotions

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Previous research has widely neglected the potential impact of emotions on viewing behavior under natural conditions. The present study provides first data showing that emotions influence the way in which complex visual scenes are scanned.

In two eye-tracking studies participants freely observed target scenes embedded in sequences of images (primes) differing in their valence.

In fact, viewing behavior on targets was influenced by the current emotional context, whereby the intensity of the emotional priming revealed as a moderator. In contrast, viewing behavior on primes was valence-independent when primes of the same valence were presented in a block (Study 1), but negative primes were more actively scanned than positive primes when they were presented individually i.e. unpredictably (Study 2). Moreover, viewing behavior on emotion-laden primes was more active than on neutral targets. Finally, viewing activity was slowed down by the mere presence of emotion-laden primes, but the impact of target type on viewing behavior previously shown was not affected.

We conclude that the emotional context significantly influence the acquisition of visual information under natural conditions.

Kaspar, K., Hloucal, T. M., Kriz, J., Canzler, S., Gameiro, R. R., Krapp, V., & König, P. (submitted). *Emotions' impact on viewing behavior under natural conditions.*

## Electrophysiological and magnetoencephalographic correlates of interval timing

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When participants are asked to reproduce an earlier presented duration, EEG recordings typically show a slow potential developing over central regions of the brain. This contingent negative variation (CNV) has been linked to processes such as anticipation, motor preparation and interval timing (e.g., Elbert et al., 1991, Macar et al., 1999). However, initial studies have indicated that the magnetic counterpart of the CNV is weak (e.g., N'Diaye et al., 2004). To assess the robustness of the CMV, we have conducted a replication study similar to Elbert et al (1991) and Gibbons et al (2004) while co-recording EEG and MEG. Participants reproduced intervals of 2, 3 or 4 seconds. As expected, a CNV develops over the interval in the fronto-central areas, with increased amplitude for the 2 seconds condition compared to the the 3 and 4 seconds conditions. A magnetic field at centro-parietal locations is initiated by the onset of the interval but dissolves after 1 second resembling an orienting wave. This is followed by a sustained magnetic variation resembling the CMV. Both magnetic waves showed an increased amplitude for the 2 second interval. Implications of the EEG/MEG slow changes are discussed in the context of interval timing theories.

## **Distractor processing before and after target detection: Evidence from fixation-related potentials**

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Visual search for a target object in an environment that contains several distractor objects is a task that we humans perform many times every day. Typically, the search stops when we find the target. If the task is to search for two identical targets, however, we have to continue the search after finding the first target and memorize its location. In the reported experiment, participants performed such a multiple-target search while their eye movements and EEG were recorded simultaneously. We used fixation-related potentials (FRPs) to investigate the brain's response in different stages of the search. Having detected the first target influenced subsequent distractor processing. Compared to distractor fixations before the first target fixation, a negative shift in the EEG was observed for three subsequent distractor fixations. This result suggests that detecting a target in multiple-target search modifies the processing of subsequent distractors, either transiently by reflecting temporary working memory processes or permanently by reflecting working memory retention.

## **Task-dependent modulation of the attentional span in reading: An ERP study using attentional probes**

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During reading, as the eyes move across the page, they fixate on single words on the way. Throughout each fixation, visual information is extracted from foveal and parafoveal regions of the visual field. However, to process words lexically attention is required. There is an ongoing debate whether attention in reading is to be understood as a moving spotlight that is allocated sequentially word-by-word to foveal and then to parafoveal words, or whether an attentional span is distributed across several words and dynamically adjusted in width according to cognitive demands. Here, we investigate the modulation of the attentional span through task-demands in 24 participants. In a semantic decision task, participants were required to read either just the central or the central and rightward word of a word triplet while maintaining fixation. To assess the spatiotemporal distribution of attention, task-irrelevant stimuli (attentional probes) flashed up briefly above the foveal or parafoveal words. Eye positions and EEG were recorded simultaneously. Performance was significantly impaired when attending to two words in parallel. Most importantly, early visual ERPs evoked by the probes differed according to task-demands. Implications for the attentional span in reading with regard to sequential and parallel models of attention allocation are discussed.

## **An EEG study on recognition memory: Familiarity is based on gamma-band oscillations; recollection is linked to the theta-band**

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According to the dual process account of recognition memory the retrieval of information from memory is based on two distinct processes: *familiarity* (the subjective feeling that an item has been experienced before) and *recollection* (the vivid, episodic remembrance of prior events). Neuroscientific research indicates that familiarity is based on cortical oscillations in the gamma-band (~25–100Hz) while recollection is mirrored by theta-band oscillations (~4–6Hz). To support this assumption a recognition memory design was conducted. Participants were asked to respond “know” for familiar and “remember” for recollected items, while the electroencephalogram (EEG) was recorded. Results confirmed our hypothesis: During retrieval, familiar and recollected stimuli triggered higher evoked gamma-band responses over left posterior regions (20–38Hz, 80–150ms) than misses. In contrast, recollected items elicited higher induced theta-band oscillations (200–600ms) over the left temporal lobe (as opposed to familiar stimuli and misses). Furthermore, gamma-band activity revealed an inverse effect over right posterior electrodes, which might be linked to implicit contributions to recognition memory. Our results provide electrophysiological evidence for the validity of the dual process account of recognition memory. The analysis of oscillatory brain activity provides a useful tool to examine the sub-processes contributing to successful retrieval of information from memory.

## **Gaining the upper hand: Keyboard position over alphabetical position as dominant spatial feature of letters**

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S-R compatibility effects occur when (a) physical stimulus locations map onto spatial response codes or when (b) there is spatial overlap between the mental representation of stimuli and response alternatives. In the domain of letter processing it has been argued that during stimulus identification at least two spatial features were processed simultaneously leading to an *alphabet-keyboard compatibility effect* (Kozlik et al., 2013). Here we explored which stimulus feature—alphabetical or keyboard position—primarily characterizes spatial coding of letters. The results indicated that although both features were processed and translated into a spatial code, the task-relevance determined which attribute of letters was effective in yielding a S-R compatibility effect. When subjects responded to one of these two stimulus features, a response side effect occurred for the task-relevant feature. However, when responding to an unrelated non-spatial stimulus feature, only keyboard position produced a response side effect. The latter implies that keyboard position seems to be the dominant feature that influences response selection, whereas the spatial code representing alphabetical position seems to decay if it is not actively maintained.

## Decision-making under time pressure: The impact of time pressure on stress perception when applying the decision rule “Take the best”

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Time pressure has become omnipresent in modern working life. Although it is important to know how chronic time pressure affects employees' decisions and experiences of stress and workload there is only little research that combines research approaches about the impact of time pressure on subjective stress, workload and quality of decision-making. Based on the data of 49 persons, who attended to computer supported decision tasks, it was examined to what extent differences in ongoing stress perception and workload between time pressure and discretionary time can be found. Also, stress levels and stress monitoring with its effects on information search and decision-making were surveyed after every task. Results indicate that (1) time pressure leads to higher stress and workload levels, (2) that the effects are particularly high for physical sensation and behavior, (3) that difficult decision tasks enhance perception of stress and workload while (4) decision performance decreases. Though people under time pressure decide faster, these decisions, however, are mostly defective. Moreover, the variation of stress perception shows a strong discrepancy between time pressure and the control condition for editing the difficult tasks whereas mean stress scores, although higher pronounced for time pressure lie very close for the easy tasks.

## ICA based coupling of EEG and fMRI in an oddball paradigm

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Simultaneous EEG/fMRI allows the acquisition of functional data sets containing information about the temporal dynamics of neural processes and spatial information about anatomical regions activated by a task. Trial-by-trial coupling of both modalities attempts to directly link their signals by uncovering brain areas whose BOLD activity correlates to EEG amplitudes. In this study, we used this technique to identify brain regions specifically related to the trial-to-trial variability of the P3b elicited by a visual oddball paradigm. We used an approach based on Independent Component Analysis to extract single-trial amplitudes from the EEG data. Independent Components (ICs) were inspected semi-automatically and for each subject the IC best resembling the P3b was used to determine the single-trial amplitudes for the respective subject. The amplitudes were then submitted to the GLM to predict the hemodynamic response. This EEG-informed fMRI analysis revealed small regions in the inferior temporal gyrus (ITG) and the anterior cingulate cortex (ACC) that contributed to the trial-to-trial variability of the P300 amplitude. These results fit nicely with current theories of the ACC as a system for the allocation of neuronal resources and theories implicating the ITG in the processing of shape and object recognition.

## **Memory processes in repeated visual search with and without eye movements**

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Previously, some authors have shown that participants acquire a memory when they search the same display repeatedly. Other authors have argued that memory does not guide search. We investigated whether differences between covert search (without eye movements) and overt search (with eye movements) can account for these different findings. Participants searched for a target letter in circular displays of 3, 6 or 9 items. In the repeated condition the same display was presented in 90 consecutive searches, while the search display changed in the unrepeated condition after each search. There were two eccentricity conditions: In the covert search condition participants could search the display using peripheral vision. The overt search condition required participants to use eye movements to identify the search items. For both eccentricity conditions search was more efficient in the repeated condition than in the unrepeated condition. Critically, we found that search efficiency increased and the distance between the first fixation and the target decreased over time in overt, but not in covert repeated search. Our results demonstrate that memory guides repeated search if that search requires eye movements. We discuss these results with respect to different resource requirements involved in overt and covert attention.

## **Memory for happy and angry faces: A multinomial processing tree analysis**

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Facial identification is important because it informs us regarding how to react to an approaching person, who might be friend or foe. In social situations, the emotional expressions of faces are important and very salient aspects of nonverbal communication. Previous work has shown that the facial expression (happy or angry) influences the memory of this face in a later recognition test (e.g., D'Argembeau & Van der Linden, 2007). A multinomial processing tree model is presented to disentangle old-new discrimination and source memory for happy and angry facial expressions. In an exposition phase, participants rated the attractiveness (Experiment 1) or intelligence (Experiment 2) of facial photographs with either happy or angry expressions. In a later test phase, previously seen and new faces were judged as old or new. This time all faces showed a neutral expression. If a face was judged as old, participants indicated whether they thought that the person had previously shown a happy or an angry expression. Preliminary results indicate that old-new discrimination but not source memory for faces is affected by whether a face was shown with a happy or an angry expression.

## Does the enactment effect reflect accelerated retrieval speed?

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Enacting action phrases during encoding (Subject-Performed Tasks, SPTs) improve memory accuracy in comparison to only reading actions during encoding (Verbal Tasks, VTs). We studied this so called enactment effect in a multi-trial paradigm (including four study-recall cycles). Recall performance as well as recall speed are dependent variables. Thereby, we analyzed the cumulative recall curves over the retention interval, the learning curves across the four recall sessions and the inter-item recall latencies as a function of encoding (SPTs vs. VTs) and age (40 younger and 40 older adults). Main effects of encoding and age in the first recall cycle emerged early in the cumulative recall curve but no interaction between these two variables over the recall curve were found. The relationship between the asymptotic recall level and the rate of approaching asymptote was the same across groups. These results were interpreted within the item-specific/ item-relational processing account (Burns & Schoff, 1998; Hunt & Einstein, 1981).

## Expanding, contracting, or equal learning schedules? The optimal distribution of learning sessions depends on retention interval

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The distributed practice effect is a successful learning strategy that promotes long-term retention of the to-be-learned material. In essence, it describes the benefits of distributing a fixed amount of study time across multiple learning sessions instead of massing it into a single one. While the optimal distribution of two learning sessions (i.e., initial learning and relearning) has been intensively examined in laboratory and classroom studies, it is still unclear how *three* learning sessions should be optimally distributed across educationally relevant time intervals. Using three learning sessions allows comparing three schedules: expanding (increasing intervals between sessions), contracting (decreasing intervals between sessions), and equal (constant intervals between sessions). In this experiment, we examined whether, in general, a specific learning schedule fares better than the others or whether there is an interaction between optimal learning schedule and retention interval. To explore this issue, we used a paired associate learning paradigm and independently manipulated learning schedule and retention interval in a 3 by 4 experimental design. Our results reveal that the optimal learning schedule is conditional on the length of the retention interval. This finding bears important implications for two theories – ACT-R and the Multiscale Context Model – that are discussed in this context.

## Eye movement parameters as implicit attitude measures

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The Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) is a reaction time procedure to identify implicit attitudes as relative differences in association strength between concepts and attributes. Additional recording of eye movements in this paradigm allows for analyses of underlying processing both in the spatial and temporal domain. Taking it one step further, IAT effects can be obtained by gaze reactions solely (Kusch, Helmert, & Velichkovsky, 2011), i.e. subjects are asked to execute a saccade to a predefined target instead of pressing buttons. The current study investigated whether in such a setup the actual valence of the measured concepts affects spatial or temporal characteristics of saccades. Thus, we directly compared two attitude measuring IATs (healthy food and prejudice), that are assumed to comprise highly valenced concepts, and the neutral Task-Switching-Ability IAT (TSA-IAT; Back, Schmukle, & Egloff, 2005). Additionally, related explicit attitudes and actual food choice behavior were obtained. Analyses of eye movement behavior showed that only the temporal domain, namely saccadic latency, was sensitive to the implicit attitudes. Interestingly, in the case of food choice neither explicit nor implicit attitude measures nor eye movement parameters contributed to the prediction of actual behavior.

## Depth of processing in human place recognition

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Place recognition is a basic element of spatial cognition combining context from other places with sensory cues available at the target place. We use virtual reality psychophysics to disentangle the cues interacting in human place encoding and place recognition. Participants navigate to a previously learned place from various starting positions. The study addresses the question if the usage of landmark objects can be explained by a simple snapshot mechanism (e.g., Gillner, Weiß & Mallot, *Cognition* 2008) or if object-based mechanisms are also involved. In the learning phase the subjects were trained to the crossing point of a plus-shaped board-walk over a pond. In the experimental phase the pond and bridge were covered by ground fog and the participants were required to find the crossing point solely via four distinguishable, outstanding landmark objects. Snapshot theory predicts that recognition points should be displaced towards the approach direction but that on average, recognition should be veridical. Our results demonstrate the predicted displacement in the approach direction. In addition, we found a systematic bias towards the center of gravity of the landmark configuration, which is not predicted by snapshot theory. We conclude that human place recognition does not rely on snapshot matching alone.



## Trajectories to schizophrenia: Delinquent behavior as sign of a later developmental stage

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Even though schizophrenia is associated with a higher risk of violent and criminal behavior, the diagnostic criteria do not include delinquency. Further, specific developmental trajectories for delinquent and non-delinquent behavior have been neglected, especially in female patients. Thus, we compared demographic and clinical variables between 35 female incarcerated and 35 female general patients with schizophrenia. Basic forensic clinical documentation were used to assess differences between the two groups. Clinically, incarcerated patients were more affected than general patients. Specifically, forensic patients were younger at disease onset and more often hospitalized than general patients. They further committed more suicide attempts and had higher alcohol and substance abuse compared to general patients. Demographically, general patients were less often homeless, pursued more often a stable employment and were less often relying on social housing and legal guardianships compared to forensic patients. These results imply that, similar to male patients, female forensic schizophrenia patients are clinically and demographically more severely impaired than female patients with schizophrenia. The results are discussed with regards to adapted intervention programs in forensic and general psychiatric settings, considering the fact that convicted criminal behavior may actually depict the schizophrenia phenotype at a very late time points of its developmental trajectory.

## The stimulus-driven remapping of stimuli onto a single response selectively recruits bilateral inferior frontal junction across modalities

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Acquiring and implementing verbally instructed stimulus-response (S-R) mappings in speeded action have been found to involve the left inferior frontal junction. However, the neural mechanisms that underlie the stimulus-driven but modality-independent implementation and updating of S-R associations have so far remained elusive. To shed light on this issue, we scanned 24 young adults using functional magnetic resonance imaging during a cued simple reaction-time task with auditory, tactile and visual response signals. The cue indicated the modality of the upcoming response signal and was mostly valid, but sometimes uninformative (neutral) or invalid. Across modalities, response speed showed a significant slowing from valid over uninformative to invalid cueing, indicating the typical benefits and costs associated with valid and invalid cues, respectively. Contrasting brain activity associated with invalidly cued versus both validly and uninformatively cued response signals revealed increased activation in bilateral inferior frontal junction and rostrally adjacent inferior frontal gyrus as well as right temporoparietal junction across all three modalities. Conversely, contrasting uninformative with valid cueing did not yield this pattern. These results suggest that the inferior frontal junction, rather than generally establishing any new S-R associations, is selectively involved in the stimulus-driven updating of expected and prepared S-R pairings.

## **Influence of juggling training on mental rotation, motor abilities and working memory processes**

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The aim of the present study was to assess the influence of juggling training on motor abilities, mental rotation and working memory processes in preschool children (mean age  $4.36 \pm .90$ ). 14 children were tested before and after an eight-week time period. Half of the children participated in juggling training whereas the other half received no such training. The two groups were matched according to age and gender ( $F(9,4)=1.156, n.s.$ ).

When analyzing the difference score between pre- and post-test we found an effect for group for the measurement "balance" ( $F(1,12)=8.398, p<.05$ ), "total motor score" ( $F(1,12)=13.067, p<.01$ ), and "digit recall forward" ( $F(1,12)=5.352, p<.05$ ). Children in the EG had better scores than children in the CG (balance: EG( $3.29 \pm 3.6$ ) CG( $-1.43 \pm 2.3$ ); total motor score: EG( $3.43 \pm 2.6$ ) CG( $-.57 \pm 1.4$ ); digit recall forward: EG( $2.14 \pm 2.2$ ) CG( $-.29 \pm 1.7$ )). The picture rotation test showed no significant main effect for group. The results reveal an influence of juggling training on motor performance as well as on digit recall forward already in preschool children. Due to the motor requirements of juggling the improvement in motor abilities is plausible. Additionally it seems that motor training has an influence on the phonological loop and the central executive respectively. This relationship needs to be determined in detail in further studies.

## **Can you read my pokerface? Gender differences concerning emotional expressivity in dentophobia**

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Although dentophobia afflicts both genders, differences between males and females during symptom provocation have been reported concerning specific fear contents and underlying brain activity. To further investigate those gender differences, heart rate and facial electromyographic activity of the *musculus levator labii* were recorded in 36 individuals with dentophobia (18 women, 18 men with comparable disorder severity) and 36 nonphobic controls (18 women, 18 men) while they were confronted with pictures showing dental treatment scenes, generally fear- and disgust-inducing as well as neutral contents. Independent of gender, phobics relative to controls showed heart rate acceleration during confrontation with dental treatment scenes. Male and female phobics did not differ in their verbal report of the emotions they had experienced. However, phobic women showed enhanced facial electromyographic activity reflecting feelings of disgust to dental treatment scenes, while this was not true for phobic men. It might be possible, that male dentophobics inhibit behavioral reactions more successfully when confronted with their fears. The results are also in line with theories of higher emotional expressivity in females relative to males.

## The influence of ambient green on creative performance

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Recent research revealed that viewing green (as compared to other chromatic and achromatic colors) on the cover of a creativity test facilitates creativity performance. The present research sought to investigate an important applied question: Does viewing ambient green (relative to red) on the wall of a workspace likewise facilitate creativity performance? A methodological sound, fully powered experiment revealed no influence of green on creativity performance. Although care must be taken when interpreting a null result, this finding suggests that green must be directly associated with the task at hand in order to influence creativity performance. Future work is needed to more clearly delineate the boundary conditions of the green effect (i.e., the “when” question), as well as boundary conditions for other effects emerging in the color psychology literature.

## Experience of agency and sense of responsibility: Do we feel responsible when inflicting pain on another person?

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The sense of agency (SoA) is usually referred to as the experience of controlling one’s own actions, and through them events in the outside world. Notwithstanding an allegedly close relation to feelings of responsibility, so far SoA has mostly been investigated with neutral action effects, such as simple tones. The present study addresses the question of how sense of agency is modulated by emotionally significant action consequences with negative valence. Participants’ actions were randomly followed by one of three different tones that signaled how much pain they supposedly had inflicted on somebody else (the confederate). Sense of agency was measured by intentional binding – the subjective compression of the time interval between one’s own actions and their effects – that has been considered an implicit measure of SoA. Compared to a no-pain condition, we found significantly increased intentional binding in a weak pain condition, and a marginally significant decrease of intentional binding in a strong pain condition. These results suggest that people feel in charge of moderately painful effects of their actions for others, but tend to dissociate themselves from negative effects of increased severity.

## **The role of attention toward the context for the formation of renewal**

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The reoccurrence of extinguished behavior challenges the idea of a permanent elimination of associations built in the past. Renewal is qualified as a recovery of acquisition performance after changing the contextual cues present during extinction. The effect serves as a model for relapse after exposure therapy. In a human predictive learning experiment, we examined the role of attention paid to the context of extinction for the formation of renewal. All participants received a within-subject ABC-renewal procedure. In Phase 1 they were trained with Z+ trials in Context A and in Phase 2 with Z- trials in Context B. In Phase 3, Z was tested for renewal in Context C, where Z was not presented before. In addition, we manipulated the informational value of the contexts during Phase 2: Participants in one group received a discrimination for which contexts were relevant for its solution whereas participants of a second group received a discrimination for which contexts were irrelevant. This manipulation should have led to different strengths of renewal between both groups. Results will be discussed in the attentional approach of renewal.

## **Distracter induced blindness in the attentional blink**

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The effect of a reduced ability to detect a second target (T2) while identifying a first target (T1) is well studied and known as the attentional blink. Another effect leads to impaired detection of a certain target after a cue if distracters that are similar to the target (lures) are presented before the cue. This is referred to as distracter induced blindness. In the present study we combined these paradigms using a RSVP (rapid sequential visual presentation) letter-stream. The first task was to identify the only white letter (T1) within the stream. The second task was to judge whether the letter X (T2) was present after T1. In half of the trials additional Xs were presented as lures before T1. Going along with our hypothesis subjects' performances of T2-detection were significantly reduced by the lures. Lag-1-sparing was also suppressed. Our data show that distracter-induced inhibition takes place in the attentional blink and is able to increase its effect. Additionally the lures have an overall inhibiting effect since there is no lag-1-sparing even in trials where no lures were presented.

## **Attractiveness, beauty, prettiness and sexual attraction as different facets of facial attractiveness**

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Studies on facial attractiveness frequently do not clearly distinguish between the variables attractiveness, beauty, prettiness, and sexual attraction. Notoriously revealed high correlations support the tendency to mix up these variables. To investigate their specific relationship, we presented photos of 160 male and female faces, respectively, in two different modes: In the blockwise condition, the whole set of faces was presented within four separate blocks (one block per variable) in randomized order. In the sequential condition, each face was presented and rated for all four variables one after another before the next stimulus was displayed. Results indeed revealed a high consistency of the variables but we also found an effect of presentation mode with the sequential condition leading to significantly higher correlations. Obviously, participants tend to proceed more economically by reducing cognitive effort when the situation — like, in this case, the sequential condition — allows it. Moreover, results show that prettiness is a good predictor for beauty whereas attractiveness is mainly predicted by sexual attraction when stimuli are presented blockwise. The present study asks for careful and accurate usage and for clearer definitions of the variables attractiveness, beauty, prettiness, and sexual attraction in research dealing with phenomena of attractiveness and associated constructs.

## **Effects of marked routes for navigation in you-are-here maps**

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A You-are-here map (YAHM) is a popular way to guide visitors through a designated area. With that information a visitor can find his/ her way to the desired goal. In the near future, these kinds of maps could be replaced by interactive information-terminals which marks the shortest way from the current location to the destination. In our study, we investigated if a marked route is advantageous. It might also be possible that having to figure out his/ her own way provides the visitor with a better understanding of the complete floor plan, which might facilitate the way finding process. To answer this question, we conducted a study in a virtual environment to see how fast and correct a person finds his/ her way through an unknown building. For half of the participants an optimal route was marked in the YAHM shown before and for half of them, only the starting and ending position was marked. Additionally, the time the subjects were allowed to see the YAHM was varied. Subjects were faster and made fewer mistakes when the route was not marked, whereas the viewing time of the YAHM depended on the complexity of the floor plan.

## **Measuring the development of mental rotation in children with the rotated Colour Cube Test (RCCT)**

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Different to the cube aggregates in the Mental Rotation Test (Vandenberg & Kuse, 1978), we designed a test for children using only one single cube in a Rotated Colour Cube Task (RCCT). The test involved the identification of a test cube, located amongst systematically varied amounts of differently or similarly coloured or rotated distractors, that matched a target cube on top of the page. One hundred 7- 8- and 9-year-old children (51 male, 49 female) were tested with the RCCT and the Raven (RCPM) for reliability. We controlled for socio-economic background (SES) by ascertaining whether parents were able to pay for school meals. The RCCT was increasingly correlated with the RCPM, age 7  $r = .52$ , age 8  $r = .60$  and age 9  $r = .72$ . The Raven was more difficult for the younger children, but this difference significantly diminished with age. Rotated cube identification was affected by individual differences. A split sample analysis by SES revealed no gender differences in children from low SES, but in the high SES sample, boys scored higher than girls, and best in comparison to all other children. Hence, young boys' spatial ability profited significantly from socioeconomic resources in the family.

## **Short-term cardiac and meridian-specific activation patterns in mental and physical stress**

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Evidence is shown that exhausting mental and physical tasks affect statistical properties of heart rate fluctuations. In the current study, we tested short-term psychophysiological effects of mentally and physically demanding tasks comparing standard electrocardiographic parameters and heart rate variability with measures that rely on analysis of corona discharge at meridian endpoint zones according to traditional Chinese medicine. Subjects performed short-term demanding physical (treadmill running, weight training) and mental (d2-test) tasks within one experimental session and repeated the procedure the following day. Electrocardiographic and gas discharge visualization data were recorded before and immediately after each experimental condition. Gas discharge visualization parameters show high reliability (between  $r = .85$  and  $r = .88$ ) and concurrent/divergent validity (between  $r = .75$  and  $r = -.55$ ). Results show different patterns of activation after acute mental and physical stress induction in meridian endpoint zones related to the cardiovascular system. Methodological implications and recommendations for application will be discussed.

## **Enactment superiority effects: Interaction between memory testing method and item type**

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It is a well-established finding within verbal memory research that encoding a list of action phrases (comprising a verb and an object e.g., "open the box") in order to reproduce them later will yield superior remembering if the item is performed in mime (subject-performed task, SPT) in contrast to encode it by reading (verbal task, VT). This is the SPT- or enactment superiority effect. In order to understand the mechanisms underlying the SPT-effect, potential sources of variability of this effect are of interest. The studies to be reported (total sum of participants  $n = 120$ ) focused on memory testing method (recognition vs. free recall), design (between vs. within) and item type (object of action: artefact vs. a part of one's own body) as instances of such sources of potential SPT-effect variability. Results are beside the SPT-effect a main effect of item, no interaction between SPT-effect and item type, but interaction of the latter with testing method. Design seems to be of marginal influence. Results are discussed within various approaches to explain the SPT-effect with regard to mechanisms underlying recognition and free recall, e.g. cue generation and differential cue availability.

## **A new German picture database: Naming and recognition latencies for a set of 520 pictures**

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We present the results of a German norming study for a homogeneous set of 520 line drawings of simple objects which can be used in a variety of psycholinguistic and memory tasks. Naming latencies and name agreement scores were obtained in a free naming task and object recognition latencies in a name-picture verification task. In addition, rating scores for image agreement, familiarity, subjective age-of-acquisition and visual complexity were collected. The contributions of these variables and other relevant lexical factors (e.g. word frequency and length) to recognition and naming latencies are presented. Our results are contrasted to the results of comparable norming studies in other languages.

## **Is a bird in the hand always worth two in the future? Within-subject comparison of real and hypothetical rewards in intertemporal decision-making tasks**

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People generally prefer an immediate reward to a delayed reward of the same amount. Such preferences can be understood in terms of temporal discounting. Most discounting experiments measure delayed reward value by having participants make a series of choices between an immediately available reward and a delayed reward, while either delay of the larger reward or magnitude of the smaller reward is adjusted. The choices are frequently hypothetical. Use of hypothetical rewards in most delay discounting experiments calls into question the validity of the results. Real rewards, which are of true interest, may produce results different from those of hypothetical rewards. The present experiment used a within-subject design to measure delay discounting of real and hypothetical rewards. In addition to comparing delay discounting of real and hypothetical rewards, the present experiment employed a range of real reward magnitudes that exceeded those used in previous delay discounting experiments, permitting a systematic test of a well-established finding. Results suggest that real rewards are discounted to a greater extent than hypothetical rewards.

## **Task set switching performance and its relation to implicit sequence learning**

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Switching is one of the central executive functions (Miyake et al., 2000). Within a task set switching task an attentional process must suppress the most active task set and select another one instead. In the present study we related performance in four set-switching tasks (Roger & Monsell, 1995; Oberauer et al., 2003) to an incidentally probabilistic sequence learning task. Two second-order condition sequences were intermixed based on different probabilities. Results can show that there are specific relations between RT differences of the two sequences and RT switching costs. Theoretical implications of the findings are discussed.



## **Semantic interference from distractor pictures in single picture naming: Evidence for competitive lexical selection**

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Picture naming studies have demonstrated context effects from distractor pictures which are phonological related to a to-be-named target picture. However, corresponding semantic context effects could not be demonstrated so far. This situation is puzzling, as – on all theoretical accounts of lexical retrieval in speech production – semantic processing is viewed as a prerequisite of phonological processing. We demonstrated that such semantic context effects become visible, if sufficient attention is allocated to the distractor pictures. We combined simple picture naming with a spatial cueing paradigm. Naming responses were fastest, when the cue was valid (when it shifted attention to the target picture) and slowest, when it was invalid (when it shifted attention to the distractor picture). Importantly, in the case of an invalid cue, semantic-categorically related distractor pictures interfered with the naming response, when compared to unrelated distractor pictures. In a control experiment with phonologically related versus unrelated pictures phonological facilitation was found, ruling out that the cueing procedure might have been responsible for the polarity of the semantic effect. The semantic interference effect is easily interpreted in models conceiving lexical retrieval as a competitive, but difficult to reconcile with the response exclusion hypothesis proposed as an alternative.

## **Increased EEG beta activity in attentional tasks under dynamic postural control**

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Ongoing research demonstrates a close connection between the cognitive and postural control system. In the current study, we tested whether manipulation of postural control affordances has an effect on activation of attentional processes. Subjects performed short-term attentional and vigilance tasks under two different sitting conditions (static, dynamic). EEG was recorded continuously before, during, and immediately after each experimental block. Behavioral data show improved attentional performance in the dynamic postural control condition: lower error ratios in short-term attentional and shorter RTs in vigilance tasks are observed. EEG-data show increased beta-2 activation in frontocentral regions during sustained attentional tasks in the dynamic postural control condition. Results indicate positive effects of dynamic postural control on attentional performance. Theoretical frameworks and recommendations for application of environments that stimulate the postural control system, and therefore lead to enhanced cognitive performance, will be discussed.

## **Reflexive and volitional orienting to gaze: Is the whole more than the sum of its parts?**

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Recent examinations indicated that predictive arrows elicit an effect which exceeds the sum of reflexive and volitional orienting. Recent evidence also showed that arrows and gaze are processed in the same neural network. Thus, one would expect that predictive gaze also elicits a super-additive effect. We presented eyes which either gazed at the prospective target direction (valid trials) or at the opposite direction (invalid trials). In one condition, gaze direction was non-predictive of the target location - assessing reflexive shifts of attention. In another condition, gaze direction was predictive - assessing the supposedly super-additive combination of reflexive and volitional orienting. We compared the findings to conditions, in which the defining features of the eyes were removed and only the pupils (now perceived as mere dots) remained. The non-predictive dots served as baseline, the predictive dot condition measured volitional orienting. We estimated the magnitude of the effects in two ways: (i) RTs for invalid minus valid trials and (ii) RTs for the baseline condition minus valid trials of the respective conditions. Surprisingly, the findings provide little evidence for super-additivity of reflexive and volitional orienting for gaze direction. This result indicates differences of attentional orienting in response to eyes versus arrows.

## **Subjective arousal ratings in the IAPS are biased by picture valence**

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Researchers using IAPS pictures in order to examine physiological and behavioral effects of emotional valence recognize the importance to control for picture arousal based on normative ratings. However, data from our lab suggests that normative ratings may not adequately reflect the actual picture arousal level. Despite being arousal-matched, unpleasant pictures induced more physiological arousal than pleasant pictures. Therefore, we examined whether subjective arousal ratings in single-item procedures are biased by picture valence. Participants passively viewed pictures while we measured SCR, HR and pupil dilation as physiological indicators of arousal. In another block, participants rated these pictures for valence and arousal. Based on these individual ratings we presented then pairs of pictures that were arousal-matched but differed in valence. Participants had to decide which of them felt more arousing. In line with the physiological data collected during the passive viewing block, participants showed a strong decision bias for the unpleasant pictures. These findings suggest that in single item procedures participants underestimate the arousal of unpleasant compared to pleasant pictures. Matching IAPS pictures for arousal on the basis of subjective ratings, therefore, might result in a selection in which unpleasant stimuli are actually more physiologically and subjectively arousing compared to pleasant stimuli.

## **Social vibrations! Rhythms as the base for the Social Simon Effect**

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Dolk et al. (in press) claim that a “social” co-actor is not necessary to elicit the Social Simon Effect (SSE), but any object which attracts attention. They were able to induce a SSE with a Japanese waving cat, a clock, and a metronome. However, these objects have in common that they produced a rhythmic movement, a rhythmic sound or both rhythmic patterns. As has been shown before, regular rhythms influence temporal perception (Vroomen & de Gelder, 2004) as well as movements (Repp & Penel, 2004). Therefore, we tested whether the SSE was caused by the rhythm or by the mere presence of an attention attracting object ( $N = 120$ ). For this we used a box, which was able to produce both rhythmic as well as arrhythmic sounds and visual stimuli. We analyzed rhythmic and arrhythmic conditions as well as a control condition in which the box remained turned off. Furthermore, we also tested the effect of a Japanese waving cat to replicate the findings of Dolk et al. (in press). We found a SSE in every condition where a rhythmic stimulus was present which included the Japanese waving cat. Yet, without rhythmic stimuli, no SSE was observed.

## **On the retest-reliability of the recognition heuristic**

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According to the recognition heuristic (RH), when faced with a recognized object and an unrecognized one, people decide based on recognition alone. Previous research has shown that use of the RH differs significantly between individuals. To investigate whether these differences are due to variation in personality traits, stability in use of the RH has to be demonstrated. In a series of three experiments, we assessed stability of RH use across two tasks 1) within one session, 2) in two sessions using the same stimulus material, and 3) in two sessions using different stimulus materials. In the first experiment, participants worked on the city-size-judgment task separated by a one-minute break. In the second experiment, participants completed the city-size-judgment task twice, but this time with a delay of either one day or one week. The results of both experiments support stability in use of the RH. Finally, as a more crucial test, we replicated the second experiment using different cities in the two sessions.

## Acute stress and advice taking

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The present experiment sought to examine the effect of acute stress on advice taking. When facing important economic decisions, people often consult others for their opinion. Previous research shows that advice taking helps us to make more accurate judgments. However, we tend to place too much weight on our own initial judgments and underutilize advice. Forty-eight participants were randomly assigned to either the Trier Social Stress Test (TSST) or a placebo version of the TSST. As a biomarker of stress, salivary cortisol was assessed. In order to measure advice taking, we employed the judge-advisor-system (JAS). In the JAS, one person (the judge) is tasked with making an initial judgment. The judge then receives advice in the form of the judgment another person made. Finally, the judge makes a second, possibly revised, judgment. The JAS allows determining how strongly the advice was heeded by measuring how much the judge adjusted the final estimate towards the advice. Our results show that acute stress significantly reduced advice taking. Moreover, the stress-induced increase in cortisol was negatively correlated with advice taking. To the best of our knowledge, this is the first experimental study investigating the effect of acute stress on advice taking.

## Peculiarities of students' subjective perception of the phenomena of elite

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The research aim of the study was to investigate the peculiarities of students' subjective perception of the phenomena of elite. The actuality of the research was caused by the fact that the elite being the top of the society could embody personal, professional and social success, the culmination of person's achievements. Positive perception of the elite could signify the high level of personal motivation to be a successful person and could indicate the development of healthy society.

The methods being used were the method of qualitative research – focus-group discussion and content –analyses as the method to study the results of the focus-group. The usage of focus-group method was conditioned by its effectiveness in receiving deep data about person's way of thinking, motivation, individual perception of social and psychological facts.

The results of the study indicate students' positive attitude to the elite. The elite were associated by the students with the richness, privileges, high status and high intellectual development. The idea of being the elite in the future excites positive emotions and associates with successfulness, freedom and popularity. The students participated in the research expressed desire to be the part of the elite group.

## Ist Facebook wie ein (guter) Freund?

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Facebook, das größte soziale Netzwerk der Welt, erleichtert die Pflege von privaten Kontakten. Dadurch wird auch der Zugriff auf das individuelle Sozialkapital verbessert. Ziel des vorliegenden Experiments war die Überprüfung der Hypothese, dass die Nutzung von Facebook die subjektiv wahrgenommene Verfügbarkeit von Sozialkapital gegenüber einer Kontrollgruppe im gleichen Maße wie die Aktivierung des Konzeptes Freundschaft erhöht. Im Rahmen eines Experiments wurden die Versuchspersonen ( $N=130$ ) zufällig auf eine von drei Gruppen verteilt. In jeder Gruppe mussten sich die Versuchsteilnehmer 10 Minuten mit einer Aufgabe auseinandersetzen. Personen in der Facebook-Gruppe ( $n=44$ ) besuchten ihre eigene Facebook-Seite, Personen in der Freundschaftsgruppe ( $n=40$ ) reflektierten schriftlich die Bedeutung von Freundschaft und Personen in der Kontrollgruppe ( $n=46$ ) mussten mittels Internetrecherche vorgegebene Fragen zu einer Stadt beantworten. Sowohl die explizite Aktivierung des Konzeptes Freundschaft ( $t=2.64$ ,  $df=84$ ,  $p=.010$ ,  $d=0.57$ ) als auch die bloße Nutzung von Facebook ( $t=3.13$ ,  $df=88$ ,  $p=.002$ ,  $d=0.66$ ) führte zu einer höheren Angabe von Sozialkapital. Wohingegen der Unterschied zwischen der Facebook-Gruppe und der Freundschaftsgruppe weder signifikant noch relevant war ( $t=0.53$ ,  $df=82$ ,  $p=.600$ ,  $d=0.12$ ,  $CI_{95\%}$  [-0.31, 0.54]). Daraus folgt, dass in Bezug auf das subjektiv angenommene Sozialkapital die bloße Nutzung von Facebook ebenso förderlich ist wie die Reflexion von Freundschaft.

## Response-effect compatibility with self-generated and partner-produced effects

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When actions lead to compatible effects, response latencies decrease, suggesting that acting is guided by an anticipation of its effects (Kunde, 2001). This is usually studied with people working in isolation, but many of our actions affect other people who then respond in certain ways. If these responses can also serve as predictable (although indirect) action effects, the compatibility of another person's response might facilitate our own action planning. On the other hand, the lack of a direct causal link and the fact that effect integration critically depends on contiguity and contingency might prevent such influences. In the present study, subjects responded to the color of stimuli, with each of four responses being followed by a unique visual effect. This effect was spatially compatible or incompatible and either followed the response automatically or was produced by a mouse movement of a second person. Reactions were faster for compatible effects, regardless of who was producing them. The size of this compatibility effect in the social condition did not correlate with the latency or temporal variability of the partner's responses to the subject's actions. Thus, when a person's actions trigger predictable responses from a partner, their anticipation can facilitate feature-overlapping actions.

## Modulation of affective face processing deficits in schizophrenia by congruent emotional sounds

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Schizophrenia is a psychiatric disorder resulting in prominent impairments in social functioning. Thus, clinical research has focused on underlying deficits of emotion processing and their linkage to specific symptoms and neurobiological dysfunctions. Although there is substantial research investigating impairments in unimodal affect recognition, studies in schizophrenia exploring crossmodal emotion processing are rare. Therefore, event related potentials were measured in 15 patients with schizophrenia and 15 healthy controls while rating the expression of happy, fearful and neutral faces and concurrently being distracted by emotional or neutral sounds. Compared to controls patients with schizophrenia revealed significantly decreased P1 and elevated P2 amplitudes in response to all faces, independent of emotion or concurrent sound. Analysing these effects with regard to audiovisual (in)congruence revealed that, P1 amplitudes in patients were only reduced in response to emotionally incongruent stimulus pairs, whereas similar amplitudes between groups could be observed for congruent conditions. Correlation analyses revealed a significant negative correlation between general symptom severity (BPRS-V4) and P1 amplitudes in response to congruent audiovisual stimulus pairs. These results indicate that early visual processing deficits in schizophrenia are apparent during emotion processing but, depending on symptom severity, these deficits can be restored by presenting concurrent emotionally congruent sounds.

## Attentive tracking of emotional faces

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Visual stimuli signaling danger and emotional significance capture attention. However, as only static visual search tasks have been used in previous research, it remains to be shown whether a threat advantage is observed in dynamic attention as well. We examined whether emotional significance affects attentive tracking, employing photographs of facial stimuli expressing anger or neutrality. If a threat advantage is also present in dynamic attention, attentive tracking should be facilitated when threatening faces are targets, and impaired when threatening faces are distractors. Participants initially searched for target among distractor faces (*threatening among neutral faces*, *neutral among threatening*, or visually marked *neutral among neutral faces*) in static displays. Subsequent to visual search, the faces started moving and participants tracked the target faces over time and movement (*multiple object tracking*). To control for possible effects of salient low-level visual features, the visibility of the facial expressions during movement was varied in three conditions (*overt*, *covert*, and *flashing*). For both visual search and multiple object tracking, performance was enhanced for threatening compared to neutral targets. The threat advantage in tracking did not depend on feature visibility. Our results indicate that affective processing influences dynamic attention – possibly contributing to adaptive functioning.

## **Object properties influence spatial belief revision**

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Beliefs frequently undergo revisions, especially when new pieces of information are true but inconsistent with current beliefs. Our research is concerned with the revision of spatial beliefs, for instance beliefs about arrangements of objects in space. In previous studies, we showed that spatial belief revision is a process during which mental models are varied such that the variation accounts for inconsistencies that occur between current beliefs and new inconsistent facts. Furthermore, we showed that reasoners preferably perform model variations that are guided by spatial information conveyed by the new fact. With the present study we investigated whether physical properties such as the size and mobility of objects affect the mental process of model variation. Participants mentally revised beliefs about the arrangement of objects which could be envisaged as large or small (Experiment 1) or easy or hard to move (Experiment 2). The results show that (1) small objects are more often relocated than larger objects and (2) easy-to-move objects are more often relocated than objects which are hard to move. The findings are in line with the idea of grounded cognition.

## **Searching for forests or trees: Attention and memory resolution in hierarchical objects**

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Objects can be represented at multiple hierarchical levels, but typically, more global object levels receive precedence over more local levels. Here, we explored the resolution of attention and memory across global and local object levels using a modified visual search task with Navon letters as targets and non-targets (see Deco & Heinke, 2007, Perception). Our results show that search for targets defined at the global level was more efficient than search for local-level targets. Moreover, this global precedence effect on attention was transferred to memory, as an analysis of cross-trial contingencies revealed priming to occur only for global targets but not for local targets. Subsequent experiments manipulated the prevalence of global and local targets. When local targets were presented more frequently than global targets (i.e. local targets on 75% of all trials), global precedence was overall reduced and priming occurred at both object levels. In addition, when systematically changing the prevalence of global and local targets throughout the experiment, attention showed a dynamic hierarchical adjustment according to target prevalence, but memory remained static. In sum, our findings demonstrate that the resolution of attention and memory both reflect hierarchical object structure, but both processes show different underlying dynamics of object-level adjustment.

## **Religious salience and selective exposure: Thinking of god influences confirmatory information processing**

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When individuals make decisions, they tend to prefer standpoint-consistent information to standpoint-inconsistent information in information evaluation and search. This phenomenon called confirmatory information processing is known to negatively affect the quality of decision outcomes. In the present research, we investigated the impact of religious salience on confirmatory information processing. Recent research indicates that religious salience benefits self-regulation. Furthermore it has been shown that individuals with depleted self-regulation resources are likely to seek confirmatory information. Therefore we hypothesized that religious priming has a debiasing effect on information search and evaluation. To test this hypothesis we conducted two experiments with political and economic decision making scenarios. Study 1 showed that individuals supraliminally primed with religious concepts exhibited a weaker tendency for standpoint-consistent information than individuals primed with a neutral concept. In Study 2, we replicated this effect and clarified the underlying psychological process.

## **Math is for boys: Are implicit math-language gender stereotypes predictive for teachers' school career recommendations?**

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Girls tend to have more negative math related attitudes, self-concepts and anxieties than boys. Previous work has shown that teachers are one important factor influencing students' math attitudes since teachers' gender stereotypes impact their attitudes and expectations towards boys and girls which in turn affects the students. However, it is far from clear how teachers' stereotypes influence students' attitudes and achievement. The present study scrutinizes whether teachers' gender stereotypes are predictive for recommending different school types (language vs. math-science oriented schools) for girls and boys. Teachers' recommendations are considered one out of many crucial behaviors that may promote a transfer of gender stereotypes. We investigated how implicit math-language gender stereotypes (measured with the Sorting Paired Features Task by Bar-Anan, Nosek & Vianello, 2009) relate to teachers' behavior. Student teachers were presented with descriptions of fourth grade students' school achievement in math and German who were randomly assigned with either a male or female name. They are then asked to recommend a language or math-science oriented school for the student. We hypothesize that having a higher level of implicit stereotypes leads participants to rather recommend a math-science oriented school for boys than for girls. First results will be presented and discussed.



## **Exploring affective human-robot interaction with movie scenes**

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The socio-emotional interaction with robots might become an important part of our future daily lives. However, on the one hand, it is still far from clear which design criteria robots should meet to be capable of adequately expressing affective states and, on the other hand, if humans are capable of interpreting these affective expressions of robots correctly. Most studies on this topic use highly artificial or restricted settings. Our current experimental study, however, investigates how different types of robots are perceived in authentic and complex affective settings in order to examine the importance of salient robot design aspects with regard to affective human-robot interaction. To ensure authenticity and to fully capture the complexity of human-robot interaction, we used different scenes from robot movies. The scenes showed robots that systematically differed in their anthropomorphic appearance and behavior. Participants rated the robots' appearance and ability to express and convey basic emotions (fear, sadness, anger, happiness, vs. neutral) in affect-provoking situations. Results showed that the selected movie scenes were suitable for the exploration of affective human-robot perception and interaction. Moreover, the influence of participants' trait emotional intelligence will be discussed. Implications for further research as well as for applied issues will be outlined.

## **How cognitive is the Chomsky Hierarchy? Evidence for the acquisition of phrase structure grammars in an artificial language**

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Grammar is a fundamental component of natural language. Considering that children are exposed to noisy and often incomplete speech input it is quite intriguing that they master the acquisition of grammar so easily. In order to study the process of grammar learning in adult participants in the laboratory the artificial grammar learning (AGL) paradigm is typically applied. Using the AGL paradigm, the present experiment investigated two phrase structure grammars, the mirror language and the copy language. According to the Chomsky Hierarchy the copy language (context sensitive) is more complex than the mirror language (context free) (Chomsky, 1957). Participants were exposed to auditory stimulus material in which class categorization and element pairing were made highly salient. Results indicated learning effects for the mirror language as well as for the copy language but no difference in accuracy between the two grammars. Thus, as far as learning processes are concerned, we did not find evidence for a complexity difference between the context free mirror language and the context sensitive copy languages. Further experiments are needed to elucidate the contribution of class categorization and element pairing to the process of grammar learning.

## Different effects of dividing sustained tactile spatial attention between fingers and hands

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Our previous study showed that attending to two hands simultaneously resulted in faster response to targets when two hands received concurrent continuous vibro-tactile stimulations. This result was interpreted as continuous concurrent stimulations greatly increase competition in attention. In this study, we investigated behavioural and neurophysiological responses while concurrent vibro-tactile stimulations were presented to both hands or two fingers on the same hand. Participants were instructed to detect rare target events embedded in the ongoing vibration and respond to either (1) targets presented to one location (left or right hand; index or ring finger); or (2) targets presented to both stimulated locations. We hypothesize participants would take even longer to differentiate targets on a specific location when both stimulated locations are on the same hand as competition increased. The results were contradictory to our hypothesis that reaction time were the same for attending to one or both fingers, while attending to both hands led to faster reaction. We also observed combination responses in steady state somatosensory evoked potentials (SSSEPs), which reflect perceptual binding, only when locations on same hand were stimulated. We concluded that tactile spatial attention between hands is different from that of within one hand.

## Motivation by potential gains and losses affects attentional control processes in the prefrontal cortex

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Motivation can improve attentional control (Hübner et al. 2010) but little is known about the underlying neurocognitive mechanisms. In the present fMRI study, we tested whether different manipulations of motivation lead to overlapping or distinct neural effects in a Flanker task in the prefrontal cortex (PFC).

Healthy subjects (n=121) performed a semantic Flanker task in a mixed blocked and event-related design (Ochsner et al. 2010). Control blocks (no motivational manipulation) alternated with two motivation conditions: Participants could either gain money (potential gain) or avoid losing money (potential loss).

Participants were faster in both, motivated congruent and incongruent trials compared to control trials with the possible gain condition being more effective than the possible loss condition. For incongruent compared to congruent trials, fMRI data revealed increased activity in bilateral dorsolateral and medial PFC. Additionally, potential gains led to transiently increased activity in the right dorsolateral PFC, whereas in the potential loss condition there was a sustained increase in activation in the PFC throughout the block.

These findings show that motivation does improve attentional control and, that potential monetary gains and losses affect performance to a different amount and by different neural mechanisms via the prefrontal cortex.

## Neurostructural correlates of motivational conflict processing in social decision-making

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Conflicts between different motivational tendencies can be assessed in the context of Pavlovian-Instrumental Transfer (PIT) paradigms. A model of how conflicts between instrumental and classically conditioned (CC) cues are resolved is provided by Reinforcement Sensitivity Theory (RST): conflicts are expected to induce a Behavioral Inhibition System (BIS) activation depending on the functional integrity of the anterior cingulate (ACC). Here, we compared 14 controls with 12 participants with juvenile myoclonic epilepsy (JME). The latter were expected to show decreased conflict processing and behavioral inhibition and elevated reward-related activity being associated with measures of structural brain integrity. A cross-modal PIT paradigm, a probabilistic decision-making procedure ("Social Talent Show Task"), was employed. Regional brain volumes were assessed with voxel-based MRT morphometry. During conflict, participants with JME appeared to show greater reward but no reduced BIS sensitivity. Performance differences in conflict trials were associated with white matter volume of the rostral ACC in controls ( $r = .50$ ;  $p < .05$ ) but not in JME ( $r = .07$ ). For conflict processing, medial orbitofrontal cortex volume was associated with lower performance in JME ( $r = -.60$ ;  $p = .01$ ) and controls ( $r = -.22$ ). The results are compatible with the view that the structural integrity of ACC and orbitofrontal regions may predict motivational conflict processing in social decision-making.

## Psychopathic personality traits and emotional processing – evidence for biased early attentional processes

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So far, biased attentional processes have been mainly investigated as correlates of psychiatric symptomatology. Therefore, the aim of the present study was to examine whether attentional biases are also present in normal samples and whether they can be considered as personality traits rather than as clinical symptoms. 121 participants were screened prior to study entry with the Psychopathic Personality Inventory-Revised (PPI-R) to obtain an equal distribution for each quartile of the PPI-R total score. To measure early attentional processes a dot-probe task containing pictures of complex neutral, pleasant and unpleasant social situations was administered. In order to capture orienting and sustained attention, pictures were presented for 100 ms and 500 ms. Indices for attentional biases were calculated based on reaction times. Significant attentional biases were found in participants with low and high scores on psychopathy, but not in the two intermediate groups. Low-scorers showed biases in orienting attentional processes such as directing their attention rather towards neutral scenes than towards positive scenes. Consistent with previous findings high-scorers showed a generally diminished emotional responsiveness in trials capturing processes related to sustained attention.

## **Investigating potential mechanisms of reduced perceived temporal duration in the retinal periphery**

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Kliegl (2012) were able to show that the subjective duration of stimuli decreases with increasing eccentricity from the fixation point. In the present study we wanted to test which process is responsible for the effect. In terms of the ticking rate of a hypothetical inner clock one might assume that the rate slows down when processing eccentric stimuli (Treisman, 1963). In terms of the prior entry account (e.g., Spence & Parise), a certain number of ticks could be missed due to a necessary attentional shift from the fovea to the periphery. To test these explanations against each other we repeated the former experiment using shorter (60ms) and longer (160ms) standard stimuli. According to the first explanation longer stimuli durations should lead to an increase in the eccentricity effect, since more ticks can be accumulated. In contrast, following the second approach we assume a constant effect for both standard conditions, as the missed ticks should be independent of the stimulus duration. The present study revealed an increased eccentricity effect for longer stimuli favoring the first explanation. Of course, it cannot be ruled out that both mechanisms contribute to the effect, but prior entry alone doesn't seem to be a sufficient explanation.

## **When context modulates visual illusions**

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Visual illusions dynamically modulate signal processing within the visual system. For instance, contextual information can induce perceptual differences in otherwise physically identical sized objects. Even highly automated actions as for example in a simple reaction time (SRT) task, can be affected by such illusion effects. Recently, it has been shown that participants respond faster towards perceptually longer as compared to perceptually shorter stimuli. Based on these findings, we employed a variant of the Ponzo illusion in combination with a SRT task to determine the dynamics of this process. This was realized by presenting an interfering stimulus sequence after a target stimulus (red line presented for 40ms, differing in perceived size). The additional stimulus sequence was intended to perturb subsequent processing in the visual system.

The SRT task revealed that participants indeed react faster towards perceptually larger stimuli as long as the distracting sequence follows immediately after stimulus offset. In contrast, the reaction time difference disappeared if the interfering stimuli appeared 80-160ms after the target stimulus onset.

Therefore, the present results suggest that the integration of target stimulus and contextual information is more susceptible to temporally "late" interference which might indicate a role of recurrent processing in the visual processing hierarchy.

## Spectral signatures of auditory “what” and “where” processing in bilateral cochlear implant users

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In normal hearing listeners, speech is processed within an anterior-ventral “what” pathway, mediating stimulus identification, and a postero-dorsal “where” pathway, mediating stimulus localization. In quiet environments, postlingual deafened people with bilateral cochlear implants (CIs) show high speech recognition but localization of speech is poor, especially when discriminating stimuli from one hemifield. It is unknown whether this difficulty relates to the inability to encode the artificial stimuli or to a general degradation in auditory pathways. Here, we examined auditory “what” and “where” processing in CI users and normal hearing adults. We used high-density mapping of event-related potentials and oscillatory responses to localization and recognition of auditory syllables presented to the right hemifield. We found larger N1 amplitudes in CI users in the “where” compared to the “what” task, suggesting enhanced engagement of auditory cortex during speech localization. Moreover, source localization of oscillatory activity revealed stronger beta-band desynchronization after 200 ms in the postero-dorsal pathway for the “where” compared to the “what” task. Highlighting the remarkable plasticity of the auditory system, our study shows that the artificial stimuli provided by CIs are processed in distinct “what” and “where” pathways.

## Do children prefer stories about friendship, winning or being the boss?

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The focus of the study was the motive content of teaching material in pre- and primary school. Specifically we had two research questions: a) What do kindergarten teachers and primary school teachers think what kind of stories children rather like? b) What kind of stories do the children actually like? In experiment 1 stories about a little bear in affiliation, achievement, and power/dominance situations were presented to teachers. The stories were matched in all relevant features like length, valence etc. The teachers had to rate, what kind of story children would prefer. In a second experiment we assessed what kind of stories primary school children actually prefer.

It has been shown that teachers judged the affiliation stories to be most and the achievement stories to be less appealing. The same was shown for the children’s ratings. Children judged the affiliation stories to be most and the achievement stories to be less interesting. In addition power stories were more interesting than achievement stories and more interesting than neutral ones.

## **Low frequency information underlies the angry face bias in highly anxious participants**

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Socially anxious participants have repeatedly been found to exhibit pronounced attentional biases for angry faces. Recently, Langner, Becker, & Rinck (2009) found that highly anxious participants are particularly sensitive to facial information with low spatial frequencies. Like separating sounds in terms of different audio frequencies, pictures can be separated in different spatial frequencies, with high spatial frequencies representing fine details and exact facial contours and low spatial frequencies representing rather rough shapes and shades of the face.

Here, we tested what characteristics of angry faces underlie attentional biases in social anxiety. Using a dot-probe task, we presented frequency-filtered neutral and angry faces as task-irrelevant cue stimuli. As expected, we found stronger cueing effects for angry faces in highly anxious participants than in low anxious ones for low-pass filtered stimuli only, showing that angry face biases may rest on the processing of low spatial frequency information.

## **Semantic intuitions in causal reasoning**

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Currently, in psychology, philosophy, and linguistics at least two important frameworks of causal reasoning compete. Dependency theories, especially causal Bayes nets, focus on causally motivated statistical or counterfactual dependencies between events (causes and effects). One of the main goals of these theories is the explanation of how people estimate and use statistical properties of probabilistic causal systems like causal strength (i.e., causal power: the probability that a cause brings about its effect). In contrast, force dynamic theories model causation as arising (deterministically) from force interactions involving agents trying to change the prior tendencies of patients. The main focus within this framework, so far, were the conditions—in terms of underlying force configurations—for people's usage of different semantic causal concepts in scene descriptions (e.g., CAUSE, PREVENT and ENABLE).

By modeling the interaction between agents and patients as probabilistic forces, we try to bring these two competing frameworks together. Besides presenting modeling issues, we will present two experiments in which we tested, how contingency information interacts with the assumptions about intrinsic tendencies of patients in people's usage of semantic causal concepts (e.g., CAUSE, PREVENT, HELP, ALLOW and ENABLE).

## Visuospatial dominance overrules audiotemporal dominance: Evidence from the multimodal Kappa effect

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When participants judge multimodal audiovisual stimuli, auditory information typically dominates temporal decisions, whereas visual information dominates spatial decisions. However, temporal decisions are not independent of spatial features. For example, in the Kappa effect, the time interval between two stimuli appears longer when they originate from spatially distant sources rather than from the same source. We tested this prediction in a bimodal setting in which temporal information was always congruent across modalities but spatial information was not. Specifically, in a unimodal condition, two auditory stimuli were presented either from the same or different spatial sources, and participants were required to reproduce the temporal interval between them. In two bimodal conditions, visual stimuli were presented synchronously with the auditory ones. In bimodal congruent trials, the spatial origin of visual and auditory stimuli was identical. In bimodal incongruent trials, auditory stimuli always originated from the same spatial source, but visual stimuli came from different sources. A Kappa effect was found in all conditions, but it was especially pronounced in both bimodal conditions. The Kappa effect found in the bimodal incongruent condition suggests that visuospatial information dominated the audiospatial information, and thereby even overruled the typical dominance of the auditory modality for temporal decisions.

## Overt head movements moderate the effect of depressive symptoms on mood regulation

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It is increasingly believed that a dysfunction in the regulation of negative mood states plays a significant role in the onset and maintenance of Major Depressive Disorder. For example, sad mood states last longer in depressed patients and individuals who are vulnerable to depression than in normal controls. Additionally, level of depression has been associated with the intensity of mood regulation deficit. Research on embodiment has pointed out an influence of bodily states on higher cognitive processes. Some of these studies have suggested that facial gestures or body postures may have regulatory effects. The present study aimed to test whether overt head movements may modulate the influence of depressive symptoms on mood regulation. Participants were induced a sad mood and then performed either vertical (i.e., nodding) or lateral (i.e., shaking) head movements while watching a set of positive pictures. Results show that the levels of dysphoria were negatively associated with participants' ability to regulate their mood. More importantly, this association was present in participants who shook their heads, but not in those who nodded. These results suggest that performing positive movements boosts the ability to regulate mood of dysphoric individuals.

## **The case of word length and visual familiarity in the development of reading skill**

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In a cross-sectional study we investigated the development of word and nonword reading skill in typically reading German children of grades 2, 3, and 4, and adults. Target words of varying familiarity and length were embedded into sentences and presented in an eye-tracking paradigm. The intent was to study the development of the length effect as a function of visual familiarity. Results were analysed in terms of both absolute and standardised (z-transformed) gaze durations to control for the generally higher processing times of less experienced readers. The predicted decrease in length effect with increasing reading experience was confirmed for absolute gaze duration, but not for standardised gaze duration. Consistent with predictions and consistent across both measures, length effects were found to continually increase from high-frequency words, low-frequency words, through pseudowords. For both absolute and standardised values, there was a three-way interaction of visual familiarity, length, and group. Specifically, length effects increased with decreasing visual familiarity in all groups but the youngest, in which length effects were more comparable between items of different visual familiarity.

## **Neural mechanisms of selective exposure: An EEG study on the processing of decision-consistent and inconsistent information**

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Decision makers tend to prefer decision-consistent information and/or neglect decision-inconsistent information (selective exposure). In the present EEG study the neural mechanisms of the classic selective exposure effect were examined by investigating oscillatory brain responses to consistent vs. inconsistent information. Twenty participants made an economic decision and subsequently were exposed to 45 consistent and 45 inconsistent images concerning their decision. EEG was recorded from 31 electrodes and differences between oscillatory brain responses towards consistent and inconsistent information were examined. The main result was an increase of induced theta power (5–8 Hz, 0–0.7 s) in the consistent compared to the inconsistent condition at right temporo-parietal electrodes, as well as a corresponding increase of evoked theta power at frontal electrodes. Since theta oscillations are often observed during memory formation, we conclude that decision-consistent information triggers memory formation, whereas decision-inconsistent information seems not to do so. This finding supports the classic motivational perspective of Leon Festinger on the selective exposure effect.



## The locus of the shielding function of task rules

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It has repeatedly been shown that the way a task is represented affects distractibility. Subjects using a two-choice categorization rule are not as easily distracted by irrelevant information as subjects using arbitrary stimulus-response mappings. This has been termed the shielding function of task rules. To date, it is not clear at what point along the processing pathway this shielding function is located. We are currently investigating how thoroughly distracting pictures are processed when subjects categorize superimposed target words. To that end we used perceptual (picture fragment identification) and conceptual (category exemplar generation) tests of implicit memory for distractor stimuli. The shielding function usually prevents interference by distracting pictures. A priming effect would indicate that the pictures are perceptually or semantically processed, suggesting that shielding is located at the stage of response selection. No priming would indicate that shielding already prevents processing of distracting information. We found evidence for perceptual priming. Results on conceptual priming are still mixed, but currently further investigated. So far it seems that the shielding function of task rules affects the response selection stage, and not the processing of distracting information per se.

## Acoustic and brain signatures of individual differences in speech imitation ability in late bilinguals

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We investigated individual differences in speech imitation ability in late bilinguals. Of 138 German-speaking participants, pretested on behavioral measures including “pronunciation ability” (imitating Hindi sentences), extreme high / low ability groups (N=30, age 28yrs) were subjected to fMRI and acoustic experiments. FMRI included ‘read aloud’ sentences in 3 conditions: A German, B English and C German faking an English accent. FMRI: 1.5T scanner, sparse sampling, SPM5, flexible factorial ANOVA, random effects,  $p < 0.05$  cluster level corrected, whole brain. Recorded speech productions were subjected to novel modulation spectrum analysis. Since spectro-temporal modulations represent different articulatory features, 2-D energy distributions of the spectro-temporal modulations are called the “*articulation space*”. Phonetically, we measured vowel length in initial vowels of English words. Results: subjects with low pronunciation skills displayed significantly higher and more widespread activations, especially in condition C. Their activation increases peaked in the left inferior parietal (SMG), postcentral areas. Articulation space positively and production of vowel length negatively correlated with imitation ability (Pearson  $r = 0.7$ ,  $p < 0.001$ , condition C. In each condition (A,B,C) high ability imitators had significantly larger articulation areas as well as shorter vowel durations. Results suggest that skilled accent imitators have a larger articulation space, indicating higher pronunciation skill and articulatory flexibility.

## **The influence of the stereo base on matching task performance in virtual environments**

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Nowadays, there is a wide range of applications in virtual environments. At least for some applications the correct perception of modeled distances and object sizes is crucial. However, egocentric distances, i.e. the subjectively perceived distances of a human observer to objects, are frequently reported to be shorter in virtual than in real environments (see e.g. Waller & Richardson, 2008). One of many possible causes for this underestimation is the use of a standard stereo base instead of a stereo base corresponding to the users' inter-pupillary distance (IPD). Here, we present data collected in a CAVE environment. We manipulated the stereo base in relation to the subjects' IPD and used a matching task to assess subjects' spatial perception. The complexity of the virtual environment directly influenced matching task performance with better performance when a regularly structured ground texture was present. The influence of the manipulation of the stereo base, however, was more subtle. We will discuss the impact of our results on methodical considerations both in basic research and applied scenarios.

## **Eye-hand coordination patterns at different learning stages of a visuo-motor transformation**

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The purpose of our study is to examine adaptive changes of eye-hand coordination patterns during a visuo-motor rotation task. Thirty young, healthy subjects performed a visuo-motor rotation task by making aiming movements to targets on a horizontal plane, while looking at the rotated visual feedback (cursor) of hand movements on a computer monitor. Three different rotation angles (30°, 75° and 150°) were tested (10 subjects each). We recorded both eye and hand movements simultaneously by using an eye-tracker and a digitizer. The results showed that hand movements became faster as the subjects practiced more trials of the visuo-motor rotation. Regarding eye movements, gaze fixation locations were variable across different locations in the early trials, but were stabilized on the target in the late trials. This shift of gaze location occurred in much earlier trials for the 30° condition compared with the 75° and 150° conditions. Thus, different gaze fixation patterns occurred depending on rotation demand and learning stage. These results suggest that the role of gaze behaviors changes from exploring the relationship between the hand and cursor movements in the early learning stage to guiding the hand to target in the late learning stage.

## Positive or negative – a matter of personality? Evaluative conditioning effects are associated with specific personality characteristics

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In humans, classical conditioning correlates with specific personality factors, such as neuroticism and extraversion. Evaluative conditioning, as a special case of classical conditioning, refers to valence changes of initially neutral stimuli through repeated simultaneous presentation with positive or negative stimuli. The aim of the present study was to analyze whether correlations between evaluative conditioning effects and individual personality factors according to the Big Five model exist. Twenty undergraduate students participated. They completed an evaluative conditioning task with pictures of men and of liked/disliked animals. Subsequently, neuroticism, psychoticism, and extraversion were measured by the EPQ-RK (Ruch, 1999); conscientiousness was measured by the NEO-PI (Ostendorf & Angleitner, 2003). Our results indicate that conscientiousness and extraversion were associated with the acquisition of evaluative conditioning effects, while other personality traits were not. This indicates that, similar to classical conditioning, evaluative conditioning is also associated with specific personality traits. In a larger context, this implies that these findings should be taken into consideration when interpreting valence changes in neutral stimuli due to evaluative conditioning.

## Facial mimicry towards robotic and schematic faces

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We live in a social world and the mere perception of another person can have immediate effects on our own behavior. One of these instant reactions is the mimicking of the other's facial expressions (facial mimicry). There is, however, an ongoing debate regarding the nature of facial mimicry and the automaticity of its underlying processes. The current study investigated the allegedly profound nature of facial mimicry by varying the prototypicality of facial stimuli.

Facial muscle reactions (EMG activity over *M. corrugator supercilii* and *M. zygomaticus major*) of 33 participants were measured in response to pictures showing happy and sad human, robotic and schematic faces. Facial EMG revealed significant effects of face type and significant interactions of face type and emotional valence - robotic stimuli leading to overall less corresponding facial mimicry than human or schematic faces, especially regarding *corrugator* responses towards happy faces.

Results provide evidence for a u-shaped influence of prototypicality on facial mimicry and resonate well with other findings suggesting facial mimicry not to be a purely default process. The current findings can further be reconciled with theories regarding the effect of stimulus ambivalence on facial EMG and the neuropsychological "sociality" of the two respective facial muscle sites.

## **Interaction between stimulus intensity and perceptual load in the attentional control of pain**

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In this study we investigated the interaction between a top-down factor (i.e. perceptual load) induced by a visual perceptual load task and a bottom-up factor (i.e. intensity of nociceptive stimuli that implicitly modifies saliency of input).

We used a new experimental paradigm, in which perceptual load was altered while laser heat stimuli of different intensities are processed.

Our results showed a significant interaction between intensity of nociceptive stimuli and perceptual load on both pain ratings and task performance. High perceptual load reduced intensity ratings of high intensity laser stimuli especially. Moreover, under this condition task performance was impaired, regardless of inter-individual differences in motivation and pain catastrophizing.

Thus, we showed that pain ratings can be reduced by increasing the load of attentional resources at the perceptual level of a pain-unrelated task. Nevertheless, the disruptive effect of highly intensive nociceptive stimuli on the performance of the perceptual task was only evident under high load. In sum our results suggest that perceptual load alone is not sufficient enough to completely block the perception of salient nociceptive stimuli and that executive functions are necessary in order to prevent the interfering effect of salient nociceptive stimuli.

## **„Hurtig“ beschleunigt – wenn es semantisch verarbeitet wird**

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Unsere Umwelt beeinflusst unser Verhalten. Wie jedoch müssen Reize verarbeitet werden, damit sie einen Effekt auf unsere Handlungen ausüben können? Wir verfolgten die Fragestellung, ob die Bedeutung von Worten unsere Reaktionsgeschwindigkeit beeinflussen kann. Hierzu führten wir zwei Bahnungsexperimente durch, in welchen wir Adjektive zeitlich vor einem farbigen Rechteck präsentierten. Die Adjektive implizierten entweder eine hohe Geschwindigkeit (z.B. hurtig, schleunigst, flink) oder eine geringe Geschwindigkeit (z.B. träge, schlapp, bummelig). Die Aufgabe der Probanden war eine Wahlreaktion bezüglich der Rechteckfarbe. Im ersten Experiment sollten die Adjektive nicht beachtet werden. Im zweiten Experiment induzierten wir eine aufmerksame semantische Verarbeitung der Adjektive, indem wir Nogo-Durchgänge mit anderen Adjektiven einführten, in denen die Probanden keine nachfolgende Farbdiskrimination ausführen sollten. Es zeigte sich, dass der semantische Gehalt der Adjektive die Reaktionsgeschwindigkeit beeinflusste: Adjektive, mit denen eine hohe Geschwindigkeit verbunden ist, führten zu schnelleren Reaktionen in der Farbdiskrimination als Adjektive, die eine langsame Bedeutung tragen. Dieses Ergebnis spricht dafür, dass die Bedeutung von Worten unser Handeln beeinflussen kann. Da der Handlungseffekt nur im zweiten Experiment auftrat, scheint eine aufmerksame semantische Verarbeitung der Wortbedeutung hierfür notwendig zu sein.

## Visual judgments of object weight depend on the physical state of the observer

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The visual perception of spatial layout depends in part on the physical and goal states unique to the observer. For example, slants are perceived as steeper when observers are exhausted, wearing heavy backpacks, or in poor physical condition, and egocentric distances appear greater when observers wear a heavy backpack or suffer from chronic pain. Objects are also perceived as closer when they are desirable (Bhalla & Proffitt, 1999, *JEP: HPP*, 25(4), 1076-96; Balcetis & Dunning, 2010, *Psychol Sci*, 21(1), 147-52; and others). In the current research, we report that visual judgments of object weight relate to the body weight of observers. Here, participants viewed and provided verbal estimates of the weights of two glass containers filled with 5kg and 10kg of colored marbles. A median split of participants' weight found that the lower half provided higher estimates of container weights compared to the upper half. Thus, the visual perception of certain physical properties of objects also depends on the physical states of the observer.

## Attentional network modulation by means of tDCS

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Attentional deficits are a common, yet elementarily disturbing consequence after stroke, often precluding patients from sufficiently participating in and thus benefiting from rehabilitative treatment. tDCS has been shown to modulate spatial orienting. Based on a hierarchical network model of human attention, including alerting, orienting and executive attention as independent, yet mutually interacting networks (Posner & Fan, 2008), we aim to study options of mutual modulations of those interactions using tDCS in a randomized, double-blinded, within-subjects design study.

Effects of anodal stimulation of the right dorsolateral and ventrolateral prefrontal cortex vs. sham stimulation on alerting, orienting, and executive attention networks are assessed by the computerised attention network test (ANT, Fan et al. 2002) prior to and after tDCS on three different days. Mean reaction times and error rates are analysed in SPSS when the pursued sample size of 22 participants is reached.

Preliminary analyses of the current data set of 14 participants ( $\bar{\mu}$  7,  $\sigma$  7) show stable attention network effects and slight changes of attention performance. The incomplete sample size and blinding precludes a definite statistical analysis at the time of abstract submission. Analysis on the full sample will allow more detailed interpretations of the currently appearing moderate attention changes after prefrontal tDCS.

## **Boundaries of thinking the opposite**

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The theoretical assumption was examined that distrust generally enhances a «thinking the opposite» (Schul, Mayo & Burnstein, 2004). We asked subjects to reject or accept one-word utterances (adjectives) of either trustworthy or untrustworthy faces. Subsequently, subjects had to solve a memory task and decided whether adjectives, appearing in the first task (=old) or their antonyms (=new) were presented. The memory task was done in order to measure the rate of false positives as a further proxy for a «thinking the opposite». Additionally, we used adjectives with neutral as well as positive and negative valence. It was assumed that subjects perceiving an untrustworthy face do not generally think the opposite, but will reject negative utterances less than subjects perceiving a trustworthy face. Furthermore, we expected a lower rate of false positives for initially negative adjectives than for initially positive adjectives underlining the boundaries of thinking the opposite. We could partly corroborate these assumptions and tested in Experiment 2 whether the results are probably due to valence of faces (happy, sad) rather than trustworthiness. Results show that effects can be better explained by valence congruence than by trustworthiness

## **Interaction gestures influence category learning on multi-touch-tables**

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This study investigated the influence of interaction gestures on a multi-touch-table with regard to category learning. Recently, growing evidence has been provided that gestures can affect thinking and learning. The Gestural Conceptual Mapping (GCM) approach argues that congruency between gesture and mental processes enhance learning. The Reality-based interaction (RBI) approach, however, argues that gestures should map with interaction experiences in the real world to promote learning. The present experiment aims to examine these two hypotheses. During a learning phase participants learned to categorize Renaissance and Baroque paintings either by moving them over the display of the multi-touch-table (dragging gesture) or by pressing a marked field on the display representing an art epoch (tapping gesture). In the test phase participants had to categorize paintings into known and novel paintings. Based on the idea of a GCM, the tapping gesture will be more beneficial for learning due its discrete character resembling the binary nature of categorization tasks. Following the RBI approach, the dragging gesture should facilitate learning on multi-touch tables due to its similarity to the real world experience of sorting physical objects into piles. The results support the latter approach and provide evidence that interaction gestures influence category learning on multi-touch-tables.

## **The gender effect in children's mental-rotation performance: Influence of rotational axis and gender-related stimulus attributes**

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Mental-rotation tasks usually produce significant gender effects in favor of male participants. The largest male advantage is reported for the "Mental Rotations Test" (MRT, Vandenberg & Kuse, 1978), which consists of perspective cube-figure drawings. Several features of the MRT probably contribute to the gender effect, e.g. stimulus characteristics and rotational axis (in-depth rotations). Our research examined how these task features influence the gender effect by systematically varying stimulus features and rotational axis. In contrast to the majority of previous experimental research on this topic, which mainly focused on adults and adolescents, the current study investigated the gender effect in elementary-school children. In an experimental design four paper-pencil mental-rotation tasks were administered, consisting either of male-stereotyped objects rotated in the picture plane, or of male-stereotyped objects rotated in depth, of female-stereotyped objects rotated in the picture plane, or of female-stereotyped objects rotated in depth. 72 second- and 72 fourth-graders solved the male and female picture-plane rotations, and 72 second- and 72 fourth-graders solved the male and female in-depth rotations. Task order was counterbalanced in order to control for priming effects of the first task. Results suggest that both rotational axis and gender-related attributes influence the gender effect in children's mental-rotation performance.

## **The influence of social network profiles on the evaluation of job applicants**

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Employers increasingly use social networking web sites to screen job candidates in order to get further personal information. While the validity of this information remains unclear, researchers have shown the influence of Facebook profiles on the evaluation of applicants. In our study (N=90) we manipulated the applicant's qualification (high / low) and the Facebook profile (alcohol and party orientation / professional orientation / no profile). As hypothesized we replicated earlier findings (Bohnert & Ross, 2010), showing that applicants with alcohol-oriented Facebook profiles were considered as less conscientious and less suitable for jobs and therefore were less likely to be interviewed and employed. Additionally, we introduced a new dependent variable by asking the participants to choose questions out of typical job interview questions they would ask the applicant. We measured the number of critical questions chosen. The applicant with an alcohol-oriented Facebook profile would be asked significantly more unfavorable questions.

Currently an additional experiment investigates the differences of an anti- and prosocial oriented Facebook profile (comments showing for example a helpful or unhelpful person) with the same experimental design. To generalize our findings and to test our hypotheses in praxis, we prepared an online experiment actual recruiters will participate in.

## **Binocular disparity signals as a cue to surface gloss**

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Specular (shiny) surfaces appear more realistic if highlights have binocular disparities that are physically correct. But which specific binocular cues does the visual system use to identify specular reflections? We computationally analyzed the disparity fields generated by irregularly shaped matte and specular objects and found several differences: First, specular objects may have non-fusible regions which appear aniseikonic. Second, distributions of vertical disparities and horizontal disparity gradients of specular objects are heavy-tailed and have unusual patterns. To test whether these signals affect perceived glossiness, we employed stimuli whose disparity fields could be varied parametrically (from Lambertian to specular) with a single parameter (vIPD) while keeping monocular cues unchanged. We measured gloss discrimination and found vIPD thresholds, above which human observers perceived stimuli to be as glossy as physically correct mirror stimuli. In our second experiment, we applied masks to the stimuli, to reveal shape regions that contained (i) reliable or (ii) unreliable disparity signals. Masking the unreliable regions of the stimuli had a significant impact on gloss perception – the remaining visible regions of the object no longer appeared mirror-like or glossy. This suggests the brain does not ‘know the physics of specular reflection’ but instead relies on specific binocular cues.

## **When Stroop and task shifting meet the n-back: Behavioral, electrophysiological (EEG) and eyetracking correlates of working memory load in a modified n-back task**

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The n-back task is a widely used paradigm to study working memory (WM) updating. We were interested whether enriching this paradigm with additional load on other executive functions than updating (e.g., inhibition, switching) would alter the typical behavioral, electrophysiological and eyetracking correlates of increased WM load in the n-back task. To investigate the specificity or generality of these correlates of increased load with regard to different executive functions, we combined the n-back task (load levels zero to three) with an integrated Stroop task (inhibition) and a switching task. As expected, increasing load in the n-back task resulted behaviorally in increasing response times and decreasing accuracies, electrophysiologically in an increasing event-related theta band synchronization and alpha band desynchronization as well as in a decreasing P300 amplitude and in an increasing pupillary diameter. However, the load manipulation for other executive functions than updating led to less unequivocal results. Whereas an additional switching load led to an increase of the same load measures as the n-back (but only for the lower n-levels), additional inhibition load showed no significant impact on these load related measures. Possible explanations for these findings and optimizations of the paradigm used will be discussed.



## Effects of bimodal adaptation on voice gender perception

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Repeated exposure to male voices biases the perception of subsequent androgynous voices towards female and vice-versa. This contrastive voice gender aftereffect (VGAE) was attributed to high-level perceptual adaptation. However, it is unclear whether the VGAE is purely acoustically-based or driven by the perception of adaptors as male or female. Here we combined videos of articulating male and female face adaptors (F♂ and F♀) with either gender-congruent voices (V♂ and V♀), or perceptually androgynous voices (V?) as determined individually. Voice gender classification was perfect for gender-congruent adaptors (F♂V♂ and F♀V♀), but was biased towards female for androgynous voices when paired with male faces (F♂V?), indicating a simultaneous contrast effect. Bimodal adaptation to gender-congruent adaptors caused a VGAE in subsequent test voices. Crucially, voice-ambiguous adaptors (F♂V? and F♀V?) – rather than eliciting contrastive aftereffects in reference to face gender – elicited a VGAE according to the biased perception of these voices in bimodal adaptors. This is reminiscent of linguistic aftereffects for place of articulation (Bertelson et al., 2003). As the VGAE was elicited by physically androgynous voices when perceived as more female, it appears to result from *perceptual* rather than low-level acoustic voice representations.

## Improvement of health related behaviour in cardiac rehabilitation: The influence of goal setting – first results of the CARO-PRE study

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A major goal in cardiac rehabilitation is the initiation and maintenance of a health-oriented lifestyle (Bjarnason-Wehrens et al., 2007).

This requires active involvement of patients, since behavioural change is the key factor to reduce cardiovascular risks (Rauch et al., 2007). A well established method is goal setting between patient and doctor, where both reach a written agreement regarding the behavioural goals as well as the cardiac risk parameters (Blitzer et al., 2009).

The main purpose of this study was to evaluate the effects of goal setting in a randomised controlled study.

1390 patients took part, 687 (61,6% male) were in the control group (CG), whereas 703 (61,3% male) patients were in the intervention group (IG). We examined 2 measurement points (baseline (t1) and 6 months (t2) after rehabilitation. Based on different assessments of nutrition and physical activity, a health index was determined.

The comparison of t1->t2 showed a significant main effect ( $p < .001$ ) for both groups as well as a significant interaction of health-index and study group ( $p = .031$ ). While both groups could improve their health related behaviour, this effect was significantly stronger for the IG.

## Memory retrieval: Opponent dynamics after short and long retention intervals

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Whereas research from the past decades has shown that retrieval of a specific memory typically impairs retrieval of other memories, very recently evidence arose that prior selective retrieval can also be beneficial for the retrieval of other memories. Such beneficial effects have been reported when access to the original study context was impaired by a forget cue or by a change in subjects' mental context (Bäuml & Samenieh, 2012). Here we investigated whether beneficial effects of selective memory retrieval do also arise after longer retention intervals, when daily life changes the context of subjects more "naturally". Subjects studied a list of target and nontarget items and were tested on the list items after a short (4 min) or a long (2 days) retention interval. All subjects recalled the targets first or after prior recall of the nontarget items. Consistent with the literature, prior recall of the nontargets impaired recall of the target items in the short-delay condition. In contrast, in the long-delay condition, prior nontarget recall improved recall of the target items. The results suggest opponent dynamics of memory retrieval after short and long retention intervals.

## Cross-road and longitudinal traffic accidents: Do they differ in accident causation?

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This study presents accident research as it is routinely done within the Audi Accident Research Unit (AARU). AARU is an interdisciplinary research team, consisting of physicians, psychologists (Regensburg University Medical Centre) and engineers (Audi, Ingolstadt). The main strength of this working group is its beneficial and fruitful interdependence through which subjective data from accident participants (collected by standardized interviews) are objectified by findings from the technical accident reconstruction and vice versa. Through this in-depth analysis, it is possible to get objectified accident causation codes based on the 5-step method. With this study we give an overview over the accident causation distribution across all accidents analysed by the AARU ( $N \geq 500$ ). Moreover, we asked the question if there is an differentiated accident causation distribution per accident type? In more detail, we asked, if crossroad accidents have another causation distribution than longitudinal traffic accidents? On this, our data reveal that more than 90% of all traffic accident causes are due to human error. Most of these errors are due to information perception faults followed by information processing faults. Furthermore, cross road accidents, indeed reveal another causation pattern than longitudinal traffic accidents. These are essential findings directing the technical enhancements of driver assistant systems.

## Existential crisis of determiners: When the birdhouse cannot be found or when a birdhouse appears more than once

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In the sentence “While Simon is painting *the* birdhouse, he makes a plan” the definite determiner presupposes the background information that a birdhouse exists (*existence presupposition*). With a word by word self-paced-reading paradigm we investigated what happens when the context clearly states that no birdhouse is given (“Simon does not possess a birdhouse, ...”) compared to a situation in which a birdhouse exists (“Simon possesses a birdhouse, ...”). Furthermore we replaced the definite determiner in the test sentence with the indefinite determiner (“While Simon is building *a* birdhouse, he makes a plan.”). The second mention of “*a* birdhouse” violated the novelty assumption triggered by the indefinite determiner. Reading times mirrored violation detection earlier for the definite determiner than for the indefinite determiner. Moreover, reading time differences persisted until the end of the sentence for the definite determiner while they rapidly vanished for the indefinite determiner. The different pattern of results obtained for the two determiners support linguistic theories which assume that there are substantial differences between the definite and indefinite determiner.

## Attentional capture by positive and negative singleton distractors in the additional singleton paradigm

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It is a well-known finding that salient distractors automatically attract the visual attention in an additional singleton paradigm (Theeuwes, 1991). Furthermore, it has been shown that evaluatively connoted distractors have a larger distracting influence than neutral ones.

In the present study, different colors were connoted with positive, negative or neutral valences by gain or loss associations in a game context, while the success of this manipulation was tested in an affective priming task in the end of the experiment. These evaluatively connoted colors were used as singleton distractors in a variant of the additional singleton paradigm with visual search displays containing one target and five distractors.

We hypothesized more erroneous and slower target responses in trials with positive or negative singleton distractors as compared to trials with neutral or no singleton distractors. Furthermore, we expected similar effects in the N2pc component of the event-related potential, a correlate of attentional allocation processes.

We found the highest mean error rate in trials with evaluatively connoted singleton distractors, which significantly differed from the mean error rate in trials with neutral or no singleton distractors. The same effects in mean response times failed to be significant. Comparable effects in the N2pc component are discussed.

## **Dopaminergic modulation of selective attention**

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Dopaminergic neurons of the midbrain project to the prefrontal cortex, where they modulate cognitive functioning (Henning & Netter, 2005). These neurotransmissions are implicated in the selective processing of visual stimuli (Noudoost & Moore, 2011). We explored a dopaminergic modulation of visual attention in a sample of 150 subjects using a genetic approach. Each subject completed an identity negative priming task, a Stroop task, and a Posner cueing task. While the first two tasks test selective attention, the Posner cueing task taps spatial attention. In addition to these tasks, each subject completed two attention-related questionnaires, namely the Cognitive Failure Test and the self-report ADHS scale. We also tested the individual processing speed and attentional performance with a short pen and paper test, the D2 test. These behavioral data will be related to the dopaminergic genotype of the COMT Val158Met polymorphism, which crucially modulates the concentration of prefrontal dopamine by shaping the catabolic COMT enzyme (Chen et al., 2004). We assume that subjects homozygous for the Met allele are better on tasks of selective attention compared to subjects homozygous for the Val allele while no differential influences on spatial attention are predicted.

## **Facial cues to body weight and height: A cross-ethnic study from Germany and Japan**

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The ability to exploit features of the human face to predict health and fitness can serve as an evolutionary advantage. Facial symmetry, averageness, and skin colour are known to influence health and fitness. Are we able to use variables like weight and height to validly estimate human health and fitness by the mere inspection of the face? Or are weight judgments on the basis of faces biased by culturally shaped body prototypes? We tested to what extent observers are able to judge body weight and height on the basis of same-ethnic and different-ethnic faces. Caucasian and Asian observers saw Caucasian and Asian faces and estimated the person's weight and height – merely on the basis of black-and-white photographs of the face. Observers ignored the changed base-rate for weight of other-ethnic faces in a culture-egocentric fashion. Height estimates showed a significant but less pronounced culture-specific distortion. Taking into account that body estimations were historically limited to one's own ethnicity, such a simple heuristic makes sense, but leads to systematic biases in a globalized world.

## **Factors influencing visual discrimination in complex geometrical configurations**

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Participants discriminated two letters presented on a complex visual background. The background consisted of an outer row (column) of squares in a 5x5 matrix of equally spaced elements in which all other elements were circles (cf. Dodd & Pratt, 2005). Whereas the squares are perceptually grouped as an object according to the principle of similarity grouping of the circles is ambiguous. Several factors influence the speed of discrimination: Reaction times are fastest for equal stimuli, separated by a small horizontal gap, presented within equal elements (i.e. each within a square, or each within a circle), and both presented within a perceptually grouped object. Most interesting, if the letters are presented in circles next to the row (column) of squares, reaction times are consistent with predictions of induced grouping (Vickery, 2008), i.e. those circles are grouped in the same way as the squares. However, this does not hold if the letters are presented in larger distance to the squares.

## **Blinded by rage? An investigation of the hostility bias towards ambiguous facial cues in antisocial violent offenders**

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Aggressive individuals exhibit a strong tendency to attribute hostile intent to the behavior of others, which may lead to provocation and aggravation of socially inappropriate reactions. Limited research has investigated the hostile attributional bias in the perception of facial affect. This study examined the response styles to emotionally ambiguous faces in a population of 35 incarcerated antisocial violent offenders (AVOs) as compared to matched control subjects (CTLs). Results suggest that aggression is associated with a strong preference to interpret ambiguous stimuli containing proportions of an angry expression as hostile, while there was no evidence for a generally biased interpretation of distress cues under conditions of uncertainty. In addition, AVOs felt more confident when making their hostile attributions, whereas CTLs were less certain about their decision. Thus, the tendency to misinterpret nonverbal cues in social interactions may at least partly underlie aggressive-impulsive behavior in susceptible individuals.

## **Mothers' and children's speech complexities in two settings of social interaction**

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We investigated the relationship between mothers' and children's speech complexities and how this relationship is impacted by variations in social interaction settings. Forty five-year-old children and their mothers were observed in two conversational settings: A) looking at a textless picture book and B) playing with Playmobil figures. The conversation between each mother and child was recorded and measures were obtained for MLU (mean length of utterance), use of verbs, use of complex sentences, and use of direct objects by the children and the mothers. Mothers' speech complexity during picture book reading correlated significantly with children's speech complexity during both picture book reading and Playmobil playing. Conversely, there was no significant correlation between mothers' speech complexity during Playmobil playing and children's speech complexity during either picture book reading or Playmobil playing. These results suggest that a mother possibly adapts her speech complexity to match her child's speech complexity when they interact in a more pedagogic-like setting (book reading) compared to a more playful setting (Playmobil playing). Another potential explanation for the result is that a mother's speech complexity during picture book reading (but not during Playmobil playing) influences her child's general productive speech complexity.

## **Methods of experimental introspection in the study of higher cognition**

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In cognitive science the application of introspection in experimental research is justifiably regarded as problematic. However, we argue that introspection should not be dismissed altogether, particularly in the research of tasks affording higher cognitive skills such as understanding and solving complex problems. Starting with the Würzburg school, experimental introspection, irrespective of its controversial methodology, has essentially influenced the development of cognitive psychology. Verbal reports elicited with think-aloud instructions, as a variety of introspection, provide us with reliable and informative data if collected and analysed with care. Yet, many researchers conducting such experiments agree that we may need another approach that yields information beyond that included in think aloud protocols, reconsidering asking subjects to introspect while performing a task. We surveyed studies employing historic and contemporary methods of introspection, and their critiques from the research community. Resulting from that we compiled a catalogue of methodological requirements with which any sound method of introspection has to comply. We present a comparison matrix displaying existing methods and their adherence to the aforementioned requirements. Finally, by exemplarily examining behavioural and introspective studies concerning the role of imagery in problem solving we consider how introspective experimentation can contribute in the investigation of higher cognition.

## Reward processing in medial frontal cortex related to activity in Ncl. Accumbens and thalamus

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Positive and negative feedback elicits a frontomedial negativity/feedback related negativity (FRN) that is usually larger for error than for correct feedback (Miltner et al., 1997). Recent findings indicate that the diminished negativity for correct feedback might be driven by reward positivity, with the basal ganglia as a likely neural generator (Baker et al., 2011, Foti et al., 2011).

We present data from two patients with Obsessive Compulsive Disorder (OCD) and two with Tourette's Disorder (TD) who underwent stereotactic surgery for deep brain stimulation of the ncl. accumbens (OCD) or ventrolateral thalamus (TD), respectively.

After implantation of the electrodes the patients participated in a time estimation task while local field potentials (LFP) and scalp EEG were recorded.

A FRN at electrode Vertex for error feedback could be obtained.

Preceding the FRN, activity in the ncl. accumbens was enhanced for correct feedback.

Thalamic activity was similar, although larger in amplitude with a latency closer to the FRN. Enhanced activity for correct feedback in the ncl. accumbens and ventrolateral thalamus, with latency similar to the FRN, might support the idea of a reward positivity.

## Attention allocation by gazing heads: A lesson on importance of ecological validity

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Gaze cueing refers to attention allocation caused by the viewing direction (left or right) of a presented gazing head. It remains unclear in this paradigm whether attention is just pulled into a certain direction or can also be drawn to single objects by different eye deflections. We disentangled direction and object by presenting four instead of two possible targets, two solid objects (balls) to the left and two to the right of a gazing head. Additionally, we enhanced ecological validity of the experiment by introducing a 3D layout and varying the head's position in depth. The head was placed either behind (gaze refers to single objects), in line (gaze refers to inner objects only, because outer objects were occluded), or in front (gaze refers to no objects) of the queue of balls. In the first condition, we found object-specific gaze cueing for all targets. In the other conditions, object-specific cueing occurred for the outer targets only. Therefore attention is drawn to the first target in the line of sight when there is no proper visual linkage of gaze and objects in 3D space. The results enlighten the importance of testing the gaze cues in strictly controlled but ecologically valid settings.

## **Manual grasping movements with the dominant and non-dominant hand are influenced differently by the behavioural context**

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It has been shown before that human grasping in an everyday-like situation is different than in a laboratory situation. Factor analysis suggests that multiple context-dependent processing stages are involved. We now investigate whether this context-dependence holds for grasping with the left (non-dominant) hand.

24 subjects performed an everyday-like (E), and 24 subjects a typical laboratory grasping task (L). Physical constraints on grasping were identical, only the behavioral context differed. 24 subjects used their dominant, and the other 24 their non-dominant hand. Numerous classical kinematic, force and eye-movement data were collected.

Statistical analyses confirmed that grasping parameters not only of the right but also of the left hand differed between contexts. In fact, context-dependence was even more pronounced: several significant task\*hand interactions emerged since both hands performed comparably in L, but the left hand was more affected than the right one in E.

We interpret this finding as evidence that an inferior control of the left hand can be compensated in L by devoting additional attention to the task, but is unmasked in E where such a compensatory strategy is no longer available in E. In other words, laboratory-based findings underestimate the disadvantage of the left versus right hand in grasping.

## **Familiarity and recollection in the first two fixations of face recognition**

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It is already known that recognition performance for faces rises from the first to the second fixation on a face and that further fixations do not improve recognition performance (see Hsiao & Cottrell, 2007). However, the processes which are responsible for this increase are not yet clear. Schwedes and Wentura (2012) found longer fixation durations for known than for unknown faces for the first fixation (that could be explained by familiarity) and a hint for a recollection based effect in the second fixation. Based on these findings we derived the hypothesis that the improvement from the first to the second fixation in the recognition performance is mainly due to a boost of recollection. To test this, participants familiarize themselves with a set of faces in the learning phase. In the following recognition test, faces were presented one by one in random order for one or two fixations (controlled by an eye-tracking device) followed by a remember/know/guess procedure. The results show better performance when participants were allowed to make two fixations and that this is mainly due to a rise in recollection.



## Multiple emotion concepts of disgust? Differentiating the emotion concepts of grima and asco

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The Spanish term *grima* is sometimes translated into English as having one's teeth set on edge and refers to the aversive reaction typically evoked when hearing a scratch upon a chalkboard or a plate. In order to rule out that *grima* is not just an aversion that is intimately linked to disgust (i.e., *asco*), we tested the assumption that *grima* and *asco* can be differentiated. The aim of the first study was to explore whether *asco* and *grima* vary in the extent to which they have access to basic defensive and arousal systems, and thus are associated with different response profiles. Assessing heart rate (HR) and skin conductance response (SCR) when listening to sounds revealed that both sounds conveying *grima* and *asco* fall into the range of unpleasant stimuli, evoking significant SCR increase and a typical pattern of HR deceleration/acceleration. Results of a second study demonstrated that implementation intentions targeting the down-regulation of *grima* were effective in down-regulating the targeted experience. Importantly, this effect held true for the *grima*-eliciting sounds, but did not affect disgusting sounds, pleasant sounds or other unpleasant sounds. Thus, these two studies strongly suggest that *grima* and *asco* are indeed distinct emotional experiences.

## Humor will melt the ice! – The positive impact of humor on the likability of tough executives

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Highly competent and tough – but disliked. This trade-off seems to be characteristic of people in leadership positions. This may be detrimental because soft skills and the ascription of warmth promote the appreciation by colleagues and employees, which likely benefits the company's success. Is there a way to reconcile competence and likability or do executives have to accept the trade-off between the two? The present study investigated whether prospective executives benefit from displaying humor. In an online-survey ( $N = 302$ ), participants were provided with fictitious job descriptions and a variety of information about a potential applicant. This information was manipulated to emphasize that the candidate was tough vs. tough and communal vs. tough and humorous. The results revealed positive effects of humor over and above communal characteristics on evaluations of likability and supervisor-desirability for highly competent women and men.

## **Knowing when but not knowing where – does temporal preparation specifically reduce distractor interference in visual search?**

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Recent studies suggest that temporal preparation facilitates target discrimination even if the target is presented among distractors and its spatial position varies. We investigated whether this benefit can be attributed to a reduction of distractor interference. Participants searched for a color singleton in a multi-element search display. On some trials, the search display was succeeded by the onset of an additional element (onset capture). We varied the amount of interference arising from the capture by manipulating the spatial distance between singleton and capture (30° and 90°) and the display-to-capture SOA (48, 98, and 198 ms). Temporal preparation was manipulated via constant foreperiods (800 and 2400 ms). We observed faster reaction times after the 800 ms foreperiod, replicating the beneficial effect of temporal preparation. Furthermore, reaction times were longer for the 30° distance and with shorter display-to-capture SOA, reflecting interference from the capture. The interference effect, however, was not modulated by foreperiod length. This finding is at variance with the idea that temporal preparation specifically aids interference reduction. Instead, it indicates that temporal preparation acts in a non-specific manner, facilitating processing of all stimuli in a display.

## **Time headway and comfort in adaptive cruise control**

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With the implementation of time headway dependent adaptive cruise control and the first successful tests of autonomous cars, the psychological aspects of preset time headways in autonomous and semi-autonomous driving are getting in to the focus of traffic psychological research. In addition to legal and security concerns, it is questionable what effects specific time headways at different speeds have on crucial drivers' aspects like comfort, task difficulty and subjective feeling of risk. In this experimental study, the influence of different time headways at different speeds on subjective driving comfort, task difficulty and subjective risk was studied in a driving simulator. The distance between a vehicle equipped with time headway dependent adaptive cruise control to another vehicle driving ahead was varied for three different speeds. The experienced comfort, task difficulty and subjective risk during the adaptive cruise control drive were measured for every situation. Results suggest that the time headway maintained by the adaptive cruise control affects the comfort experience of the driver. Furthermore, comfortable time headways are influenced by the speed of the car. These results will be discussed in terms of their impact on the design of future adaptive cruise control systems as well as on autonomous driving.

## Parallel processing of self-reference and self-relevance during a social cognition task

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*Background:* Self-reference refers to those mental operations that make up judgments about oneself, whereas self-relevance refers to the affirmative attribution of personality traits to the own personality. Previous fMRI studies indicate that self-reference primarily activates default mode network (DMN) structures, particularly mPFC, PCC and TPJ, but little is known about the effects of self-relevance on effective connectivity during self-referential processing so far.

*Methods:* 110 young healthy adults (53 male, 57 female, mean age 24.37) performed a well-established self-referential processing task in which they judged whether personality traits apply to themselves (self-reference), to Angela Merkel (reference to others) or whether words have two syllables (baseline task), allowing to distinguish self-reference and self-relevance by event type and response. Data analysis consisted of SPM-based GLM analyses and dynamic causal modeling (DCM).

*Results and Discussion:* Confirming the neural correlates of self-reference and showing their modulation by self-relevance, we additionally found that self-reference and self-relevance are processed in parallel, modulating two separate paths from Broca's area to rostral ACC and left precuneus as anterior and posterior DMN structures, suggesting that self-reference and self-relevance are non-successive processes of social cognition in terms of their neural processing, although additional processing hypotheses still need to be tested.

## A comparison of expert and empirical option weighting as alternative procedures to improve the reliability and validity of multiple choice tests

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In multiple-choice tests, the number of items in which the correct option was chosen is typically used as the sole basis for the computation of total test scores. We investigated option weighting as an alternative scoring procedure awarding partial credit even for incorrect options. The magnitude of this partial credit may be determined either by expert judgment, or empirically as the point-biserial correlation between each distractor and the total test score. The idea of both approaches is to award examinees choosing an option that is popular among low (high) scorers with a low (high) item score, respectively. Both expert and empirical option weighting aims at punishing the choice of tellingly wrong distractors more strongly than traditional dichotomous scoring, and allows to give partial credit for the choice of distractors that are presumably - by the judgment of experts - or demonstrably chosen by better examinees than other distractors. We found empirical option weighting, but not expert option weighting to significantly improve both, the internal-consistency reliability and the validity of a soccer knowledge test. This finding suggests that rather than asking experts, test-makers should rely on the empirical determination of optimal weights to award partial credit in multiple-choice tests.

## **The dominance and stability of prototype representation during category learning on complex naturalistic stimuli**

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In case of category learning the question is the nature of the general category representation. Our aim was to test the emergence and stability of prototype abstraction, implicit rule application. We used unique exemplars of artificial but still naturalistic creatures in an information-integration task (cf. Ashby et al., 2003).

During a learning phase subjects learned to differentiate between two categories by feedbacks given to their choice. Their knowledge was tested in a similar situation without feedback. Here we presented the prototype which hadn't been seen before. Reaction time and hit were registered. The test phase was repeated a week later with bad exemplars from the earlier learning phase.

Our goal was to test the appearance of rule application in a task where the rule was not defined in advance, yet the diagnostic features were obscured by other nondiagnostic characteristics. Results show that subjects successfully learned to separate the two categories without an explicit knowledge of any rules (cf. Ashby et al., 2007). Prototype abstraction was demonstrated by the hit results, as we found significant differences along the gradual structure of category membership. The results of the repeated test a week later revealed that the rule-based representation remained stable and reliable.

## **Effects of affective state on the capacity and precision of visual working memory**

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Flexible resource theories propose that visual-working memory (VWM) capacity is limited both in the number of items retained and the precision in which these items are stored. Previous research has shown that both positive and negative affect reduce cognitive resources, which in turn reduces VWM capacity. However, as positive affect is known to promote concept-driven processing whereas negative affect is known to promote stimulus-driven processing, we hypothesized that positive versus negative affect may differentially influence VWM precision. After inducing neutral, happy or sad affect, participants performed a visual memory task where they had to report the color of simple geometric objects in a continuous partial-report paradigm. In line with the above hypothesis, the results revealed that both happy and sad participants showed a decrease in VWM capacity, compared to neutral participants. However, despite comparable capacity levels, sad participants showed an enhanced precision in their stored representations, compared to happy participants. These findings indicate that although happiness and sadness similarly decrease the quantity of representations in VWM, they differentially influence the quality of representations in VWM.

## Overlapping mechanisms of movement planning, attention and spatial working memory

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We investigated the relationship of movement planning, attentional resource allocation and spatial working memory (WM) in a dual-task scenario. Participants planned a grasp-to-place movement toward one of two targets, encoded a WM stimulus (4 x 4 symbol matrix), executed the movement during memory retention, and finally reported the symbols. After memory encoding, but before action execution, the planned movement direction was either confirmed (prepared trials) or reversed (re-planned trials) by one of two visual cues. Our results demonstrate that movement planning influenced which part of the centrally presented symbol matrix (left vs. right part) was encoded and recalled. Further, cue position affected memory performance and movement times in both, the prepared and re-planned trials. Presenting the cue congruent to the intended movement direction resulted in better memory performance and faster movement execution as compared to incongruent cues. These results suggest that movement planning drives attentional allocation and affects the transfer of visual input into spatial WM. Moreover, our data suggest that movement re-planning costs can be reduced by positioning action-relevant signals near the initial movement target.

## Experimentally induced color blindness

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By means of an RSVP-experiment the possibility of inducing transient color blindness was investigated in a sample of 16 individuals. The central stimulus sequence featured rapid orientation changes of a white bar. Quick luminance changes of the surrounding screen between two shades of grey constituted the global stream. This grey flickering was interrupted by the colors red and blue. The task was to name the color of the screen at the instant of a central cue (plus sign). Beforehand red and blue backgrounds were distractors. At the time of the cue they were considered targets. Each trial contained either no distractors, six blue distractors or six red distractors. The target was also either a red or blue background. As expected, both congruent (distractor color = target color) and incongruent distractors (distractor color  $\neq$  target color) impaired detection (correct identification of the target) performance. Similarly consistent with the hypotheses, congruent distractors caused a more severe deficit. The demonstrated distractor-induced color blindness may have been caused by the same central inhibitory process believed to be responsible for motion and orientation blindness. If so, our findings extend its scope to another basic feature indicating a general mode of operation.

## **Into sight, into mind: Establishment of distractor-response bindings by observational learning**

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Irrelevant stimuli can become integrated together with simultaneously executed responses into a memory episode (i.e., distractor-response episodes); repeating the distractor triggers retrieval of the associated response. The present study aimed to investigate the emergence of distractor-response episodes when responses are only observed, but not executed by oneself. In a sequential prime-probe-design participants had to observe a videotaped response to a presented distractor stimulus during the prime. In the subsequent probe, participants had to perform a color categorization task by themselves and executed either the previously observed or a different response. Across prime and probe, distractors either repeated or changed; also, to-be-executed probe responses were either compatible or incompatible to the observed prime responses. The results revealed the expected interaction of distractor and response relation: In case of repetition of the distractor in the probe, responses that were compatible to the observed prime response were executed faster, whereas execution of incompatible probe responses was slowed down, compared to distractor change from prime to probe. These findings suggest that distractor-response episodes can be implemented by the mere observation of recent responses as well.

## **Influence of elaboration processes in cognitive remediation with a biotic designed computer based training (CBT) on global working memory (GWM)**

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Former studies have shown a positive effect of a biotic designed CBT on the performance of GWM in students and patients with depression (Christ et al., 2011; Müller et al., 2012). These studies could not ascribe the effectiveness to flow and intrinsic motivation as determinants. The goal of this study was to explore the effectiveness of the CBT and its' relation to elaboration processes caused by the training. For this purpose a sham-training was developed. 22 students were assigned to the conditions CBT, sham-training and waiting control. Performance of GWM (Lern- und Gedächtnistest; Bäuml, 1974) was measured before and after a training period of ten days. The comparison of the differences in pre- and post-test results between the conditions was not significant ( $p = .558$ ,  $\chi^2 = 1.167$ ,  $df = 2$ ). The results indicate that elaboration processes and depth of processing are not the underlying factors of GWM improvement in the CBT. Confounding factors are discussed.

## The matrix of transnationalism: The Romanian migrant entrepreneurship example in Greece

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In the last few decades the concepts of ethnic and transnational entrepreneurship are widely researched among scholars, but in the case of working Romanians living abroad these concepts are still at beginnings. While Romania, a new European country, has been converted from a country without migration into an immigration country, Greece a former emigration country is now faced with the consequences of economic competition and the violence of cultural diversity. In the present study we aimed to investigate through face-to face in-depth interviews a group portrait of first generation Romanian minority entrepreneurs in Athens. Our findings point to a picture where, in our case two forms of entrepreneurship are coexisting: the mass entrepreneurship, as an expression of commercial opportunism sustained by the access to both national consumers, natives Greeks and migrants and the socio-cultural entrepreneurship, where highly skilled individuals fit especially. Certainly, migrants' economic transnationalism should be considered an evolutionary process, as ethno-professionals pass on a higher position on the labour market, which means a better economic orientation, social and institutional resources exploitation of the two states, thus an enrichment and not a handicap.

## Decomposing willpower: Ignoring distraction, resisting temptation and enduring aversiveness

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Willpower is defined as the ability to reach long-term goals despite distractions, temptations or aversive effects. Here we developed a new paradigm testing all three functions in one task: Healthy participants ( $n = 110$ ) were cued on which side of the screen a target letter ('E' or 'F') would be briefly flashed after a variable interval and had to decide on its identity. Within the cue-target interval four kinds of distractors were presented: erotic and neutral distractors contralateral to the target and disgusting and neutral distractors ipsilateral to the target location. An effect of temptation (erotic versus neutral), aversiveness (disgusting versus neutral) and distraction (neutral versus no distractor) was indicated by significantly increased error rates and reaction times. In addition, temptation was associated with higher gaze distance from the target position during the target presentation, whereas aversive distraction was associated with higher gaze distance from the target position during the distractor presentation. Both were associated with larger pupil diameter. Factor analysis revealed that the three contrasts do not load on a single factor, indicating that these three components tap independent aspects of willpower.

## **First results of a new questionnaire to assess internet literacy: Correlations to pathological internet use and risk-taking behavior**

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Internet literacy is attributed to a high preventive potential against dysfunctional behaviors on the Internet (e.g. Internet addiction, Cyberbullying). Our aim was to develop a new questionnaire measuring individuals' Internet literacy on four dimensions: Technical expertise, social interactions on the Internet, observance of privacy and considering emotions of online-peers. We collected data of 113 participants (79f, age: 15-29,  $M=22.30$ ,  $SD=2.73$ ). Additionally to the new Internet literacy questionnaire (INK; German for "Internetnutzungs-kompetenz") all participants had to fill out several standardized questionnaires, e.g. a short version of the Internet-Addiction-Test (Pawlikowski, Alltstätter-Gleich, & Brand, 2012) and a German Version of the Domain-Specific Risk-Taking scale (Johnson, Wilke, & Weber, 2004). Results indicate strong correlations between characteristics of Internet addiction and Internet usage for purposes of social interaction (all  $p<.01$ ) as well as between risk-taking behaviors (e.g. health and ethical risks) and all dimensions of the INK (all  $p<.05$ ). Furthermore, men reported to be more technically competent ( $T=3.98$ ) than women, which reported to rather consider the emotions of their online-peers ( $T=2.85$ , all  $p<.01$ ). To show the influence of Internet literacy on dysfunctional Internet behaviors more clearly, we aim to present data of a larger sample, including a broad distribution across age groups.

## **From origin to destination – A study on structural salience of landmark**

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Even though finding our way back along a previously learned path is an essential ability for everyday navigation, it is an unexplored topic in spatial cognition research. In our study participants ( $N=11$ ) learned a path from origin to destination, visualized by screenshots of intersections with landmarks on different (optimal, suboptimal) positions in our virtual environment Squareland. Subsequently, they had to navigate along the path in the same or the opposite direction (return path). Is it easier to recall a learned path or the corresponding return path? Do previously defined optimal or suboptimal landmark positions help or hinder this recall? The comparison of path direction revealed a significant difference in performance ( $F(1,10)=5.064, p=.048$ ) and decision time ( $F(1,10)=14.585, p=.003$ ) in favor of the forward path. The position of the landmark did not lead to a significant change. We assume that finding the return path requires more cognitive effort, because of mental transformation processes on landmark position and direction of turn. Significant effects of landmark position when finding the return path found by Dienelt et al. (submitted to TeaP 2013) challenge these findings and may be due to methodological variation – the starting point for further investigations concerning experimental implementation of return path research.



## The influence of stimulus contrast on sequential adjustment effects in the Eriksen flanker task

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Sequential adjustment effects, i.e., reduced conflict effects following incompatible compared to compatible trials in conflict tasks, have often been interpreted as reflecting increased cognitive control following conflict. However, this view has been challenged since repetition priming can also account for the effect. Here we present results from two experiments using a version of the Eriksen flanker task, in which the contrast of flanker and target letters has been manipulated independently. In both experiments sequential adjustment effects were only present for response repetitions but not for response alternations. Additionally, sequential adjustment effects for response repetitions were reduced in conditions with mixed flanker-target contrast compared to conditions in which target and flankers were of same contrast when contrast conditions were presented in a blocked design but not when they were presented in a randomized order. These results are not compatible with the control adjustment interpretation. The repetition priming account, on the other hand, is able to explain this data pattern by assuming stronger memory traces in same-contrast conditions due to perceptual grouping.

## „...hat soeben seinen Beziehungsstatus gewechselt“ – Blockierung von Konditionierungseffekten im Kontext der Partnersuche

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Forschung zur Partnersuche hat mittels des Paradigmas der evaluativen Konditionierung (EC) gezeigt, dass sich im Falle positiver Kontextinformation (USs) positive Einstellungen gegenüber gegengeschlechtlichen Personen (CSs) wie erwartet ausbilden, wenn die gezeigten Personen Singles sind, nicht aber wenn es sich um vergebene Personen handelt. Die Inhibition positiver EC-Effekte bei vergebenen CS ist adaptiv, da hierdurch die Etablierung affektiver Bindungen gegenüber nichtverfügbaren Optionen verhindert wird. Die vorliegende Studie untersucht, wie genau dieser selbstregulatorische Mechanismus abläuft. Hypothese 1: Die Bildung einer positiven Einstellung gegenüber Vergebenen wird bereits in der Konditionierungsphase gehemmt. Hypothese 2: Eine positive Einstellung wird auch im Falle vergebener CS gebildet, doch der Zugriff auf die Valenz-Information wird während der Bewertungsphase blockiert. Um die Hypothesen gegeneinander zu testen, haben wir eine Studie durchgeführt, bei der bei der Hälfte der Versuchspersonen alle CSs im Anschluss an die Konditionierungsphase ihren Beziehungsstatus wechselten. In einem anschließenden affektiven Priming zeigten sich bei positiven USs signifikante Verbesserungen der Singles im Vergleich zu Vergebenen (Grundlage ist der Beziehungsstatus während der Konditionierungsphase), unabhängig davon, ob der Beziehungsstatus gewechselt wurde oder nicht. Dies impliziert, dass bei Vergebenen die Bildung positiver Einstellungen bereits in der Konditionierungsphase gehemmt wird.

## **Benefits of naps in recognition memory**

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It has been shown that sleep improves memory performance by supporting memory consolidation, even after short naps during the day. Sleep-specific EEG parameters like spindle activity and slow oscillations are often positively correlated with memory performance. In this experiment we sought to reveal the role of nap sleep for hippocampus-dependent associative memory (AM) and hippocampus-independent item memory (IM) and its reflection in the ERP correlates of recognition memory. Participants learned word-pairs and single words before performing an IM- and AM-test (baseline). Thereafter, half of the participants were allowed to nap (~90 minutes) while the remainder watched DVDs (control group). Finally, both groups performed a second IM- and AM-test for the initially-learned stimuli (post-test). We expected that napping would lead to a higher benefit in the hippocampus-dependent AM-test and this benefit to be reflected in the ERP correlates of recognition memory. For the control group we expected decreased performance in both tests from baseline to post-test. Analyses of EEG and ERP data are ongoing. IM performance nonetheless decreased for both groups, whilst AM performance decreased for the control group but increased from baseline to post-test in the nap group, consistent with predictions concerning the selective impact of napping on hippocampal-dependent recognition.

## **If turning is not enough, brake it! Strategies of collision avoidance in a multi-person scenario**

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In this study, we investigated how the adjustment of movement trajectory and velocity during collision avoidance was influenced by different angles of path-crossing and different walking speeds. Participants were required to walk 12 meters in either their natural, a faster, or a slower speed, while avoiding colliding with another person (the 'Interferer') who would not react. The Interferer was either absent, remained still in the middle of the participant's path, or walked across the participant's path with an angle of 45°, 90°, 135°, or 180°. Trajectories were recorded using an optic tracking system. Results show the following: 1) A common trajectory adjustment measured by maximal lateral deviation (~0.3 m) was observed in all the conditions with an Interferer. However, the start of deviation occurred later in 45°, 90°, and 135°, and also later for slower walking speeds. 2) Regardless of walking speed, adjustment of velocity was observed only in 45° and 90°, with greater braking magnitude (12% of baseline velocity) for 45° than for 90° (9%), around 0.7 m prior to crossing. Overall we demonstrate that, while spatial adjustment of trajectory seems rather invariant across conditions, velocity adjustment during dynamic collision avoidance is applied only when crossing at acute angles.

## **The cognitive mechanisms underlying deception: An ERP study**

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The Differentiation-of-Deception paradigm is unique in that the experimental (lie) and control (truth) condition only differ in the crucial variable: Deception. We extended the paradigm to gain insight in the cognitive mechanisms of deception using event-related components: the Contingent Negative Variation (CNV), the Lateralized Readiness Potential (LRP), the Error-Related Negativity (ERN), and the Error Positivity (Pe). Twenty participants committed a mock crime and gave speeded yes/no responses to crime and control questions using left and right button presses. A question was presented (e.g., Did you steal a...) for 2000 ms, followed by a truth (T) or lie (L) cue. The cue was replaced after 1500 ms by a keyword (e.g., wallet), allowing participants to respond. The CNV was measured during the cue-keyword interval, the LRP during the keyword-response interval, and the ERN and Pe after correct responses. The CNV and the LRP did not differ between both conditions. Surprisingly, results revealed an enlarged ERN after truthful responses compared to lie responses, probably due to an incentive that was given for successful lying. As expected, a larger Pe was found after lie responses compared to truth responses, indicating a conscious conflict between the lie response and the known truth.

## **The allocation of attention during the use of pointing tools**

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Our attention is generally focused on functionally relevant regions of our body and our environment. However, the area surrounding our hands even receives increased attention, if the hands are not relevant for the respective task. When the segmental chain is extended by a tool, the location of the functionally relevant end effector is shifted from the hand to the tip of the tool. Previous studies indicate that during tool use increased attention is found for the area around the hand position as well as for the area surrounding the distal tip of the tool. For pointing tools like the computer mouse, the connection between the hand and the end effector is either only virtual or it cannot be accessed by direct vision like it is the case for minimally-invasive surgical procedures, with the movement of the tip of the tool being represented on a computer screen. Here it was investigated whether the same pattern of increased attention for the area surrounding the hand as well as for the area around the tip of the tool is also found for pointing tools and whether the locus of attention changes in the course of the acquisition of the tool transformation.

## **Long-term recall of rhyming text: Preschoolers are better than adults**

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Most research on the capacity and reliability of children's long-term recall has found protracted development. Here we show that 4,5-year-old children's recall can equal, or indeed exceed, adults'. 13 middle-class families in Budapest participated in the study. Parents read a novel, rhyming verse ("The Radish-nosed King") as their child's bedtime story (followed by a list of random real and nonsense words) for 10 consecutive days. Children's and adults' performance was then measured by asking them to recall the story verbatim using only the original storybook's illustrations as visual cues. This was followed by recall of the word list. Kids' verbatim recall performance significantly exceeded that of their parents (who also knew that they would be tested somehow). Both groups performed equally well on the word lists (allaying concerns about differences in attention or motivation). We view rhythm and rhyme as ('surface') constraints on candidate words during recall (Rubin, 1985), which are beneficial independent of age. We argue that due to children's limited vocabulary, surface constraints are more efficient, paring down possibilities to a smaller set of candidate words. Due to this combinatorial explanation encoding and retrieval for explicit memories in 4-5-year-olds can be just as efficient as in adults or potentially even more so.

## **Motion impairs infant attention to colour change**

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A perceptual illusion called motion silencing has been demonstrated for adult participants by Suchow and Alvarez (2011). Observers fail to actively perceive a change in colour of the stimuli when adding motion to the presented stimuli. In the present study this approach was transferred to 4-month-old infants by means of a forced-choice-preferential-looking study. The infants were shown two stimuli at a time, each consisting of 100 circularly arranged dots of different colours. In one of these rings the coloured dots continuously changed their hue. The rings were presented in both dynamic and static conditions. During the dynamic condition the coloured rings rotated about their centres whilst they remained still in the static condition. As a result the infants preferred the ring undergoing a change of colour in the static condition, whereas their looking behaviour was uniformly distributed over both stimuli in the dynamic condition. Thus it can be deduced that by adding rotary motion to the stimuli a silencing effect is evoked and the change in colour is not perceived by the infants. To test the stimuli that were especially calibrated for this study we conducted a control group of adult participants. The stimuli also produced a robust silencing effect.

## Willing to give but not to forgive: Borderline personality features and cooperative behavior

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Problems in cooperation have been proposed as a crucial component of social dysfunctioning in borderline personality disorder (BPD). However, prior research has not distinguished active from reactive cooperation – two different aspects of cooperative behavior that are associated with distinct basic personality traits (viz. Honesty-Humility and Agreeableness) and that refer to non-exploitation and non-retaliation. We hypothesized that, due to low levels of Agreeableness but normal levels of Honesty-Humility, BPD features are related to impaired reactive cooperation, but unrelated to active cooperation. To test our hypothesis, participants ( $N = 554$ ) played both the allocator in the dictator game and the recipient in one of two variants of the ultimatum game. In line with expectations, high levels of BPD features were accompanied by impaired reactive cooperation in the ultimatum game, partially mediated through low Agreeableness. Active cooperation in the dictator game, however, was not affected by individual levels of BPD features, as was to be expected given prior results on Honesty-Humility. The findings emphasize (a) the vital necessity to distinguish theoretically and empirically between different aspects of cooperation, (b) the role of basic personality traits in personality disorders, and (c) the importance of teaching specific skills for non-retaliation to improve cooperation in BPD.

## How context influences sentence interpretation and assumptions about the world

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The sentence “Tina went ice-skating again yesterday.” presupposes that there was a time before yesterday at which Tina had been ice-skating. If this piece of background information, i.e. presupposition, is not shared knowledge between the discourse participants, the conversation will be disrupted. The common assumption in the literature on presuppositions is that the hearer will challenge the missing presupposition with a statement along the lines of “I had no idea that Tina had been ice-skating before.”, or silently add the missing piece of information to the common ground, i.e. accommodate the presupposition.

In a word by word Self-Paced-Reading task, we investigated the reading times of sentences when the presupposition was given in the context (positive) compared to when it was not (neutral). Additionally, we asked a question which targeted the presupposed information. Reading times show that test sentences in a neutral context evoke longer reading times than sentences in a positive context. The questions concerning the presupposition reveal that subjects did not accommodate the missing information in a neutral context. These results suggest that while context has a direct influence on the interpretation of a sentence with a presupposition, people are not willing to assume something out of the blue.

## **Different attentional allocations affect the localization of moving stimuli**

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While it seems to be well established that attention might be captured by and directed to peripherally presented stimuli, its contribution to the localization of such stimuli remains largely unclear. Recent evidence, however, suggests that attentional processes might play a vital role in the localization performance of static and moving stimuli alike. Specifically, spatial attentional allocation seems to modulate localization performance and has been suggested as an explanation for differential performance effects depending on trial context in the Fröhlich effect, i.e. a drastic reduction in the localization error with decreasing predictability of stimulus onset positions.

The current experiments further examine the effects of different attentional allocations on localizing the onset position of a moving target in a mouse-pointing task under varying degrees of attentional facilitation.

Results are in support of previous findings suggesting that facilitating the spatial allocation of attention to stimulus onset positions (previously: high predictability of stimulus onset) might indeed be detrimental to localization accuracy while distributed or impaired directed attention (previously: low predictability of stimulus onset) seem to have the opposite effect.

## **Sense of agency illusion: How agency judgments are associated with temporal realignment of motor-sensory timing**

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Illusions in the perception of timing between actions and their corresponding sensory effects can be experimentally induced across different sensory modalities. Specifically, after adaptation to a fixed temporal delay between an action and its sensory effect, stimuli delivered earlier than the adapted latency, but still after the action, are perceived to appear prior to the action. This illusion has been interpreted in terms of a motor-sensory recalibration mechanism to determine causality. Moreover, the evidence indicates that voluntary action and the corresponding sense of agency (the experience of causing our own actions and their sensory effects) play a crucial role in temporal order judgments. This is for example reflected in the finding that participants judge sensory effects to occur earlier in time only when they are causally linked to a voluntary action (the intentional binding effect). In the present study we tested how agency judgments are associated with the temporal realignment of motor-sensory timing in the auditory modality. The results reveal illusions in the perception of agency, indicating a strong association between the perception of the temporal order of actions and effects and the experience of agency. These findings provide further evidence that motor intentions structure human time perception.

## **Empirical research of gender peculiarities of manager's professional development**

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The aim of the research was to find out distinctive gender determinants of professional development of mid-level managers of business organizations.

Methods. To diagnose the level of self-actualization in professional development we used L.Gozman Self-actualization test (which is an adaptation of Shostrom Personal Orientation Inventory – POI) and Bem Sex-Role Inventory (BSRI) and interviews.

Main results. Even Gender analysis of sample shows us that only a third of mid-level managers of Ukrainian business organizations is female. In Ukrainian organizations gender stereotypes about woman's professional activity still very popular ("a woman can't manage as well as a man", "it's better to nominate a man on the high posts in organization", "the woman's family and housekeeping duties interfere her in promoting career").

The experimental study allowed to find statistically significant links between the level and some aspects of managers' professional development and their marital status (being a gender-relevant characteristic). In spite of a generally minor influence of gender on managers' self-actualization, it should be noted that depending on their marital status women managers and men managers had different levels of self-actualization: married life had stronger positive effect on men's self-actualization than on women's. More significant gender-relevant differences were shown to be in time competence, behavioral flexibility, self-perception, support and self-respect.

## **A novel tool for the runtime analysis of adaptive decision strategies**

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A current research direction in the psychology of decision making is the adaptation of decision strategies in changing environments (Bröder & Schiffer, 2006). In previous experiments the subjects initially had to learn a certain strategy which would turn ineffective in the second part of the experiment. With this design one can observe how well people adapt to a change in the payoff structure, but this design depends on the subjects picking up the correct strategy in the learning phase of the experiment, which could only be analyzed after the experiment though. I provide a new tool which allows to classify the decision behavior at runtime using a modified version of the Multiple Measure Maximum Likelihood Method (Glöckner, 2009; Jekel, Nicklisch & Glöckner, 2010). This tool uses an R (R Development Core Team, 2008) backend for runtime analysis as well as a visual basic frontend for the actual experiment. The backend may be used independently for other experiments using a similar design. This tool has been used in a previous experiment (Trakowski, 2012) and hence has been proven valuable for research within this paradigm. Therefore the source code has been made available for usage by other researchers.

## **Age effects on neural correlates of performance in a cognitive task-set switching paradigm**

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In the context of demographic changes, the question arises if adaptive performance, for example cognitive switching between different task-sets and underlying neurobiological mechanisms, differs between young and older adults. To answer this question we recruited two groups of older (54 - 64 years, n = 12) and younger (25 - 35 years, n = 12) white collar workers for a rule recognition task-set switching study in a 3T MR-scanner. Even though older adults generally performed worse than younger adults, there were no differences in switch costs. However, the variability of performance and switch costs was higher in older as compared to younger adults. fMRI data revealed that older people, in general, showed a much lower activity over the whole brain when performing the rule recognition task. After the switch to a different task set, older subjects showed higher activity in the anterior cingulate cortex, whereas the younger subjects had stronger activity in the bilateral temporoparietal cortex and in inferior parts of the cerebellum.

Our results indicate that older subjects need more brain resources for cognitive control when switching task-sets to compensate for age-related losses and to achieve similar switching performance as young adults.

## **Nutzungsbarrieren älterer Autofahrer gegenüber Fahrerassistenzsystemen**

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Der Anteil älterer Autofahrer wächst stetig. Bereits im Jahr 2011 war knapp ein Viertel aller Fahrzeughalter in Deutschland über 60 Jahre alt. Vor diesem Hintergrund ergeben sich im Bereich der Straßenverkehrssicherheit neue Herausforderungen für die Zukunft. Im Fokus steht hierbei die Unterstützung älterer Verkehrsteilnehmer durch infrastrukturelle, technologische sowie verhaltensorientierte Maßnahmen zur Sicherung der Mobilität bis ins hohe Lebensalter. Zur technologischen Unterstützung der Autofahrer entwickelt die Automobilindustrie seit Jahren eine Vielzahl von Fahrerassistenzsystemen (FAS), welche das Potential haben, sowohl die Sicherheit als auch den Komfort der Autofahrer zu erhöhen. Gerade ältere Fahrer könnten aufgrund ihrer sensorischen, kognitiven und motorischen Leistungseinschränkungen von den Assistenten profitieren (Cohen 2008), (Schieber 2006). Allerdings fällt ihre Kauf und Nutzungsbereitschaft gegenüber FAS eher gering aus (Wallentowitz 2005).

Um den Fragen nachzugehen, welches Wissen und welche Erfahrung ältere Autofahrer im Umgang mit FAS haben, wie sie diese bewerten und welche Gründe gegen eine Nutzung sprechen, wurde eine Fragebogenstudie mit 400 Autofahrern im Alter zwischen 50 und 80 Jahren durchgeführt. Dabei stellte sich heraus, dass ein Großteil der FAS zwar namentlich bekannt ist, jedoch viele Probanden nicht über deren Funktion und Nutzen informiert sind. Aufgrund der geringen Nutzungserfahrung können viele Autofahrer das Unterstützungspotential nicht abschätzen. Bei der Analyse vorhandener Nutzungshürden zeigen sich rationale, emotionale und funktionale Barrieren.



## **Kritikalitätsbeurteilung von Folgeabständen bei verschiedenen Fahrgeschwindigkeiten – eine Untersuchung im dynamischen Fahrsimulator**

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Bisherige Forschung zeigt einheitlich, dass Fahrer bei Folgefahrten in höheren Geschwindigkeitsbereichen geringere Folgeabstände (Time-Headways, THW) wählen als bei niedrigeren Geschwindigkeiten. Daten hierfür stammen vor allem aus Aufzeichnungen von Realverkehrsdaten (z.B. Brackstone, Waterson & McDonald, 2009). Die vorliegende Studie hatte zum Ziel, die subjektive Beurteilung verschiedener THWs in verschiedenen Geschwindigkeitsbereichen in der Fahrsimulation experimentell zu untersuchen. 10 Probanden durchfuhren dabei in einem dynamischen Fahrsimulator sechs verschiedene Geschwindigkeitsbereiche zwischen 30km/h und 170km/h. Die Aufgabe der Probanden bestand darin, einem vorausfahrenden Fahrzeug mit jeweils drei vorgegebenen THWs zu folgen. Der geforderte Abstand zum Vorderfahrzeug wurde zu jeder Zeit über einen transparenten, farbigen Streifen auf der Fahrbahn angezeigt. Die einzelnen THWs wurden pro Geschwindigkeitsbereich in randomisierter Abfolge durchfahren. Die Probanden bewerteten jeden Abstand anhand einer 11-stufigen Skala hinsichtlich ihrer Kritikalität (Situationsbeurteilungsskala; Neukum et al., 2008). Die Ergebnisse zeigen, dass auch im Simulator ein starker Zusammenhang zwischen Geschwindigkeit und Einschätzung der Kritikalität des Folgeabstands besteht. Vor allem geringe THWs von ca. 0.7s und ca. 1.0s werden bei niedrigen Geschwindigkeiten (30-80 km/h) im Vergleich mit höheren Geschwindigkeiten (110-170km/h) von den Fahrern als deutlich kritischer beurteilt. Dies stützt die bisherigen Befunde, nach denen bei höheren Geschwindigkeiten deutlich geringere Folgeabstände toleriert werden als bei niedrigen Geschwindigkeiten.

## **A comparison of the psychometric properties of multiple choice, inclusion and exclusion testing**

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Multiple Choice (MC) is a probably the most often used testing format for the assessment of knowledge. A dichotomous scoring of responses does not yield much diagnostic information, however, and forces the examinee to guess in cases of partial or uncertain knowledge. Under Inclusion Testing (IT, Dressel & Schmid, 1953), the examinee is asked to mark every option he considers to potentially be correct. This procedure is mathematically equivalent to Elimination Testing (ET, Coombs, 1953), under which examinees are asked to exclude all options he can surely identify as false. None of these procedures asks the examinee to mark the one answer he most likely considers to be correct, however. Hoe et al. (2009) suggested to combine MC and ET by asking examinees to mark their favourite answer, while also excluding all options he considers to be wrong. This procedure may also be combined with Inclusion Testing. We present an empirical comparison of MC and these alternative scoring methods. Our results show the size of the chosen set of potential answers to be larger under elimination testing, in spite of the mathematical equivalence of inclusion and exclusion testing. Reliability and validity did not differ between the various testing methods, however.

## **Things some do in the dark: Subliminal distrust and its effect on information processing in a bright versus a dark environment**

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To analyze a thinking the opposite under distrust, different manipulations for distrust were tested. Subliminal priming of distrust showed effects on implicit and explicit mood and trust measures. After subliminal priming (IV 1: trust/distrust/suspicion/neutral), 200 participants had to perform a lexical decision task, where they had to decide if the target word was an adjective or a noun. Adjective primes were related to the target as antonyms or synonyms as a within-subjects factor (IV 2: antonyms/synonyms). Additionally, we manipulated brightness and darkness of the environment (IV 3: bright/dark) to enforce the relevance of distrust. The response latencies of the different groups (DV) showed that in a bright environment people processed information in general faster under distrust than under trust. The processing of antonyms and synonyms reveals no difference. If the same information is processed in a dark environment, antonyms were then processed faster under distrust and therefore, distrust seems to facilitate a thinking the opposite. Further implications for research about information processing under distrust are discussed.

## **Electrophysiological correlates of social threat processing in social phobia and healthy controls**

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Social anxiety disorder (SAD) has been associated with biased information processing mostly limited to emotional facial expression. To determine abnormal processing of threatening we investigated the electrophysiological correlates of emotional word processing (alpha activity and event related potentials) 20 subjects and 20 subjects with SAD. Subjects had to silently read neutral, positive, physically threatening and socially threatening (insulting) words, while respond to a magenta dot that appeared during stimulus presentation. Additionally an unexpected recall task was included. Social phobics compared to healthy controls showed rapid processing of all words during early stages while at later stages emotion discrimination was displayed by a more pronounced early posterior negativity (EPN) for emotional words compared to neutral words. This attention shift to emotional words in SAD subjects was further enhanced by the finding that alpha activity increased as longer negative words were processed while this effect was absent in healthy subjects. The present findings indicate that SAD is associated with abnormalities in emotional word processing characterized by a very early fast forward mechanism for all incoming stimuli followed by motivated attentional extraction of emotional relevant information. Moreover, regression analyses show that these biases seem to be associated with aversive childhood experiences.

## **The influence of positive and negative valence of events on the intention superiority effect**

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According to the intention superiority effect people remember more future intentions than past events. Moreover, several studies have shown a facilitation of retrieving positive compared to negative past events. The aim of the present study was to investigate whether an intention superiority effect would occur for both positive and negative events. We tested 431 participants. Half of them were asked to write down positive memories of events and intentions and half of them were asked to write down negative memories of events and intentions within a specific time-window. The time-windows were either one day, one week or one year. As expected, people reported more positive than negative events and intentions. However, the results revealed an inverse intention superiority effect, that is, participants reported more events and intentions about the past than about the future. We suggest that the instructed valence (positive or negative) of the *to-be-remembered* events could cause the inversion of the intention superiority effect: It is easier to value past events than future intentions.

## **The efficiency in sensorimotor learning: Spatial realignment vs. modular adaptation**

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The present study reviewed the modular approach in adaptive motor control by taking cognitive efficiency into account. Three experiments were conducted to compare different visuomotor learning mechanisms (modular adaptation, use-dependent learning and spatial realignment) in response to visuomotor rotations. Predictions made based on these mechanisms were compared to the empirical data. In spite of evidential advantages of modular structure, the current work could show a particular case of visuomotor transformation, in which modularity lacks efficiency. Results indicate that the adaptive motor control employed the spatial realignment to accomplish adaptation more efficiently. Furthermore, spatial realignment observed in the present study appeared to affect the entire visuomotor mapping.

## **Moving thoughts: How movement priming influences the solution in problem solving tasks**

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To determine if the effect of movement priming on problem-solving tasks is movement-specific one needs two movement groups to investigate in how participants solve these tasks. Therefore, we used variations of Maier's (1931) two-string problem (study 1) and Luchins's (1942) water-jar problem (study 2) with two possible solutions. We tested 72 participants. In the first study they were primed with arm-swing movements (swing group) and step movements on a chair (step group). In the second study participants sat in front of three jars with glass marbles and had to sort these marbles from the outer jars to the middle one (plus group) or vice versa (minus group). Results showed more swing like solutions in the swing group and more step like solutions in the step group, also more addition solution in the plus group and more subtraction solution in the minus group. This differences were statistical significant. This specificity between movement and problem task allows us in further experiments to investigate how bodily movements influenced the stages of a problem-solving model (e.g. Newell & Simon, 1972).

## **Neural mechanisms for goal-directed actions**

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The goals of an action are critical in action planning (Rosenbaum et al., 1992). We used event related-potentials (ERPs) to advance our understanding of the temporal and neural mechanisms underlying goal-directed actions. In our experiment subjects had to execute a bar transport task. Instructions included specified or free grip postures and specified or free goal-positions of the bar. Either both the grip and the goal-position, only one of them, or none were specified. Preliminary analyses of the ERPs time-locked to grasping the bar show a significant negativity from -900-0 ms at frontal, central, and parietal electrodes between the specified goal-position and free goal-position conditions. No comparable effect was found between the specified grip and free grip conditions. Thus, it appears that the determination of the goal of a movement sequence affects the planning and execution of the action, while this is not true for the determination of the grip. Adjusting to a determined goal-state seems to require planning efforts, which are not require when adjusting to a required initial grip. In accordance with Rosenbaum et al. (1992), our results illustrate the importance of goals for action planning on a neural level.

## Sources of everlasting love – The role of self-compassion and positive illusions

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The present research investigated the effects of self-compassion (self-kindness, common humanity, mindfulness) and positive illusions (unrealistically positive views of the self, one's control, and the future) on relationship satisfaction. We assumed that both concepts would predict happiness and satisfaction in relationships. While positive illusions may lead to viewing everything through rose-colored glasses, the positive relationship between self-compassion and relationship satisfaction should be mediated by mutual empathy of the partners (especially in conflicts). Finally, we predicted that self-compassion should act as a protective factor and predict relationship satisfaction in the long run, whereas positive illusions should only be beneficial for happiness in the first stages of a relationship. Findings from an online survey ( $N = 302$ ) were in line with the prediction that self-compassion and positive illusions predict relationship satisfaction. Perceived mutual empathy in conflicts mediated the self-compassion-contentment link. Findings for the moderation by relationship length were less clear and point to necessities for future research.

## Die Veränderung der Zeitwahrnehmung über die Lebensspanne

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Der Alterseffekt der Zeitwahrnehmung ist ein Phänomen, das viele Menschen ab einem bestimmten Alter kennen (Friedman & Janssen, 2010; Wittmann & Lehnhoff, 2005). Es scheint so, als würde die Zeit zunehmend schneller vergehen, je älter man wird. Dazu gibt es bereits eine Fülle an Erklärungsansätzen und Theorien. Ziel der vorliegenden Untersuchung war es, eine vergleichende Analyse dieser Ansätze im Rahmen einer Internetbefragung durchzuführen. Anhand einer studentischen Stichprobe ( $n = 211$ ) wurden sowohl das Zeitempfinden als auch die in der Forschungsliteratur genannten Einflussfaktoren erfasst. Es wurden dabei nicht nur die Angaben der Probanden zum Befragungszeitpunkt, sondern auch der Verlauf rückblickend über die gesamte Lebensspanne erhoben. Es zeigte sich, dass das subjektive Zeitempfinden deutlich von Faktoren wie dem empfundenen Zeitdruck, dem Wunsch nach einem langsamerem Zeitvergehen und auch der Anzahl von bedeutenden Lebensereignissen in einer Lebensperiode beeinflusst wird. Faktoren wie Routine und Struktur im Alltag scheinen hingegen nur einen geringen Einfluss auf die Zeitwahrnehmung zu haben. Die Ergebnisse werden hinsichtlich einer Einbettung in vorhandene Modelle zur menschlichen Zeitwahrnehmung diskutiert.

## **Time leaps in the filmic presentation of events influence the level of mental construal**

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Activities can be perceived on different levels of abstraction. The present study aims to investigate the question whether filmic means can influence on which level events are being processed.

The study builds on the Event Segmentation Theory (e.g. Zacks, Tversky & Iyer, 2001) and relates to Construal Level Theory (e.g. Trope and Liberman, 2010).

Video clips of 16 everyday activities were filmed and edited in short and long ellipses versions, respectively. These versions differed in the time leaps between the scenes, versions with long ellipses bridged larger time gaps than versions with short ellipses. Each video clip consisted of five scenes, whereby the fourth scene was the target scene and identical in both versions.

After each video clip, participants had to choose between a more concrete versus more abstract description of the activity in the fourth scene.

Results show that participants significantly represent the target scene on a more abstract level when it is embedded in a long ellipses version and on a more concrete level in a short ellipses version.

## **Who has more marbles? Estimation influences looking patterns in primary school mental arithmetics**

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The application of abstract examples in the acquisition and transfer of mathematical concepts has proven to be advantageous (e.g. De Bock et al., 2011). We focused on the principle of commutativity (changing the order of operands does not change the result e.g.  $a + b = b + a$ ) which allows to solve according tasks faster. Our previous studies have found a positive effect of innumerable i.e. abstract examples (marbles) on the subsequent performance in commutative tasks. We wanted to test the basis of this effect and hypothesized that comparing the size of sets of marbles induces looking patterns that can help to trigger flexible application of arithmetic strategies in subsequent addition tasks. Triggering additional saccades might be helpful in searching for shortcut options such as commutativity in subsequent arithmetic problems (spotting that subsequent problems present the same addends in different order). While one group of children started the experiment with an estimation task with spatially distributed patches of marbles, the other group estimated centrally presented patches. We analyzed saccade patterns and calculation performance in simple addition tasks that followed the estimation task. While the groups differed in saccade patterns, both groups benefited from shortcut options based on commutativity.

## **The sound of sentences: A language induced SMARC effect**

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This study investigated whether the association between pitch and horizontal space, with high pitch located to the right and low pitch located to the left, can be evoked by linguistic stimuli. Therefore, instead of auditory sounds, sentences implying either a high or low auditory event were used. Half of the sentences contained the words “high” and “low” (explicit condition), whereas in the other half of the sentences pitch level was only implied (implicit condition). Participants were asked to judge (yes/no) whether the sentences were meaningful by pressing either a left or right response key. Thus, no attention was drawn towards the processing of the implied pitch of the sentences. If linguistic processing indeed evoked a spontaneous horizontal association of pitch, right hand responses would be expected to be faster to sentences implying a high auditory event and conversely, left hand responses would be expected to be faster to sentences implying a low auditory event. The results confirmed an automatic association between pitch and horizontal space. Surprisingly, this association appeared stronger in the absence of the words “high” and “low”. This finding supports theories of grounded cognition, which postulate that language comprehension is accompanied by multimodal simulations of the described events.

## **Temporal buffering and visual capacity: The time course of object formation underlies capacity limits in visual cognition**

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Capacity limits are a hallmark of visual cognition. The upper boundary in our ability to individuate and remember objects is well known, but - despite its central role in visual information processing - not well understood. Here we investigate the role of temporal limits in the perceptual processes of forming ‘object files’. Specifically, we examined the two fundamental mechanisms of object file formation - individuation and identification - by selectively interfering with visual processing using forward and backward masking with variable stimulus onset asynchronies (SOAs). While target detection was almost unaffected by these two types of masking, they showed distinct effects on the two different stages of object formation. Forward ‘integration’ masking selectively impaired object individuation, whereas backward ‘interruption’ masking only affected identification and the consolidation of information into visual working memory. We therefore conclude that the inherent temporal dynamics of visual information processing are an essential component in creating the capacity limits in object individuation and visual working memory.

## **Crowding in a 3 dimensional recognition performance task: Effects of the flanker / target distance to the subject**

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Crowding in the visual field produces that nearby located objects can make each another difficult to recognize. Here, using Landolt rings presented at different depths we investigated the question of how much flankers displayed in different distances to the observer than the target impair this target recognition (opening direction detection) performance and its reaction time, relative to conditions without flankers and flankers presented at the same depth as the target. We asked observers to binocularly fixate on a cross situated at 190cm and then we randomly presented our target alone or flanked at both sides and same distance by identical-sized Landolt rings. The targets were presented at three depth planes (170, 190 and 215cm from the observer). The flankers were displayed either at fixation plane (target in front, leveled or behind them) or at target plane. The dependent variables were the percentage of correct responses and the reaction time. The flanker presence and location effects on recognition performance are discussed.

## **The role of intralist similarity in list length effects in recognition memory**

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The list length effect in recognition memory indicates that memory performance decreases if the length of the study list increases. Though first reported over hundred years ago (Strong, 1912), both the effect itself and possible theoretical explanations are still under debate. Recently, Kinnell and Dennis (2012) found a list length effect for faces and fractals but not for word pairs and photographs as stimuli. According to Kinnell and Dennis, intralist similarity is the crucial factor for finding a list length effect: Whereas faces and fractals are inherently similar to each other, i. e. show a high intralist similarity, word pairs and photographs are more dissimilar. We have tested this explanation more directly by manipulating the intralist similarity within one type of material. More concretely, we have studied the effect of list length for lists of photographs all showing a similar motif compared to lists of photographs showing different motifs. The results are consistent with the 'intralist similarity' hypothesis, i. e. there was a list length effect for lists with similar photographs. However, it is to be discussed if these findings might also be explained by the reduced overall performance in the high similarity condition.



## **The neural signature of intuitive semantic coherence judgments in comparison with implicit memory processing**

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Starting from a conceptual level, definitions of intuition and implicit memory show many similarities. The biggest one might be that for both conceptions a non-conscious process having a positive influence on human behavior is assumed. Thus, an important issue is whether intuitive decision-making is solely a phenomenon of implicit memory processing. This can be tested by comparing the neuronal correlates of intuitive answers and ones that are elicited by implicit memory processing. To that end, an fMRI study is conducted that makes use of a semantic coherence task (Bowers et al., 1990) and an additional priming procedure. Hence, it became possible to compare the same participants on basis of the same stimulus material. In the task used, participants had to judge the semantic coherence of presented word triads and were asked to find a forth word, which might be a common concept of the three. On a neuronal level, activity within the left lateral orbito-frontal cortex was found for intuitive answers, which is in accordance with previous studies. For successfully primed trials the expected activity suppression in the inferior temporal gyrus could be observed. Thus, implicit memory might be characterised by different neuronal mechanisms than intuition in the semantic domain.

## **Spatial context learned but not shown in gaze-contingent limited viewing visual search**

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When surfing the internet, people may need to search for a particular icon on websites, it is easier and faster when this website is frequently viewed than the non-frequent one. This phenomenon is known as contextual cueing, a facilitating effect in visual search induced by incidental context learning. To understand better learning and spatial guidance mechanisms for local repeated context, we conducted two visual search experiments with gaze-contingent limited view, in which, repeated old displays and non-repeated new displays are only visible for gaze-centered area. The results showed no search benefits for repeated display with the smaller viewing window, but classical contextual cueing with the larger viewing window. However, when the whole display was presented in the test phase, both showed typical contextual cueing effects. We conclude that spatial context can be learned with limited local view, however, benefits of this learned spatial context is only available when the whole display are available.

## **Psychometric evaluation of the russian version of the Clinical Outcome in Routine Evaluation – Outcome Measure**

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Clinical Outcome in Routine Evaluation (CORE) is a system of instruments for evaluation of therapy process which was developed in Great Britain. The main idea was to generate a free, “copyleft” instrument to assess the success of the therapy before, during and after the intervention. Clinical Outcome in Routine Evaluation – Outcome Measure (CORE-OM) is a part of this system. It is a self-assessment instrument measuring the patient’s condition among the last week using four different aspects of patient’s life (well-being, functioning, problems and risk). The questionnaire has been translated into many languages (eg. German, Spanish, Italian etc.) and could be used for free.

In the present study the CORE was translated in Russian according to the international standards for translating instruments (e.g. forward-backward translation by native speakers and discussion in focus group). The aim of the present study is to examine the psychometric properties of this newly translated instrument.

To examine the psychometric properties of CORE a sample of  $N = 400$  from clinical and non-clinical population from Moscow got the questionnaire. Re-test-reliability, factorial validity and convergent validity (using Brief-Symptom-Inventory-18, BSI-18) were considered.

The results should be presented at the conference and critically discussed regarding empirical findings of other studies.

## **No anticipation without intention**

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Ideomotor theory of goal-directed behavior states that selecting an action relies on the anticipation of its effects. Supporting this, spatial compatibility between actions and their resulting effects influences response times in simple tasks with unambiguous action-effect mappings. However, in everyday life, one and the same action might lead to quite different consequences depending on the situation. The present study set out to investigate effect anticipation under such circumstances. We used contextualized response-effect mappings which are based on inverted relationships between responses and their effects depending on the (stimulus) situation, thereby excluding context-independent response-effect contingency. We compared a response-effect condition where subjects were instructed to produce a specific effect color with an otherwise identical stimulus-response condition where stimulus-response rules were instructed. In both conditions, the color effects were also contingent upon the responses regarding their spatial location. Importantly, the spatial response-effect compatibility indicative of effect anticipation affected response times only under effect-based but not under rule-based instruction. This indicates that effect anticipation involving context-specific response-effect mappings is not an automatic process but depends on the intention to produce an effect. Interestingly, that intention does not necessarily have to be spatial which extends previous findings on that topic.

# Addendum

## Pupillometrie zur Messung der mentalen Fahrerbeanspruchung

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Bei der Untersuchung des modernen Fahrerarbeitsplatzes ist die Frage, wie stark ein Autofahrer durch Nebentätigkeiten abgelenkt wird, von zentraler Bedeutung. In Probandenstudien ist neben der Analyse des Fahr- und Bedienverhaltens und der Befragung der Probanden, die Auswertung der Blickbewegung eine aufschlussreiche Methode, um diese Frage zu beantworten. Sie stößt jedoch bei neuen Anzeige- und Bedienkonzepten wie Head-Up-Displays oder Sprachbedienung an ihre Grenzen, da bei der Nutzung häufig keine Blickabwendungen notwendig sind obgleich eine erhöhte mentale Beanspruchung vorliegen kann. Eine objektive Messmethode dieser mentalen Beanspruchung ist die Pupillometrie. Sie wertet hochfrequente Pupillenreflexe der Probanden aus. Dieser Versuch wurde in einem statischen Fahrsimulator durchgeführt. Die Probanden fuhren in einem einfachen Autobahnscenario mit möglichst konstanter Geschwindigkeit und mussten dabei verschiedene Nebenaufgaben bearbeiten. Darunter waren sowohl vorwiegend visuell-manuelle Aufgaben (z.B. Daimlers Surrogation Response Task), als auch hauptsächlich kognitive Aufgaben (z.B. der auditive n-Back Task des MIT) sowie Sprachaufgaben. Die Auswertung der erfassten Pupillometrie- und Fahrdaten zeigt einen Anstieg des Pupillometrie-Wertes mit dem, subjektiv ermittelten, steigendem Schwierigkeitsgrad der Nebenaufgabe und korreliert mit den Fahrfehlern. Die Pupillometrie scheint folglich geeignet, die Fahrerablenkung kognitiv beanspruchender Nebenaufgaben objektiv zu messen.

## The role of similarity and ambiguity in face adaptation

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Adaptation-related aftereffects (AEs) show how face perception can be altered by recent perceptual experiences. The role of the adaptor stimulus for face identity AE is not completely understood and was investigated here. Subjects were adapted to faces (S1s) varying systematically on a morphing continuum between pairs of famous identities (identities A and B) or to Fourier phase randomized versions of the faces. Their task was to match the subsequently presented ambiguous faces (S2s; 50/50% identity A/B) to one of the respective original faces. We found that S1s identical with or near to the original identities led to strong contrastive biases of face discrimination. In addition, the closer S1s were to the 50/50% S2 on the morphing continuum, the smaller the magnitude of the aftereffects were. Analysis of the simultaneously recorded ERPs showed S1 specific amplitude modulations of the ERP at around 335 – 385 ms post-stimulus onset for occipito-temporal sites and categorical adaptation effects at 130 ms post-stimulus onset. Our results suggest that face identity AE does not only depend on the physical similarity of adaptor and target stimuli, but it is also determined by the ambiguity of the S1 stimulus. In addition, short-term plasticity of face identity processing, which might work in parallel to object-category processing, seems to be reflected in the first 400 ms of the ERP.

## How social groups are represented in the brain: Clues from neuropsychology

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The most relevant evidence for the organization of the conceptual knowledge in the brain was first provided by the patterns of deficits in brain-damaged individuals affecting one or another semantic category. In particular, patients with various etiologies showed a disproportionate impairment in producing and understanding names of either animate or inanimate entities. These double dissociations between spared and impaired recognition of animate and inanimate entities led to suggest that these categories are discretely represented in the brain. Here we tested 21 patients with different types of primary dementia with three word sorting tasks tapping their conceptual knowledge about animate and inanimate entities and social groups. We found double dissociations between patients in categorizing words belonging to the three categories (animate, inanimate and social). These findings challenge existing theories on the organization of conceptual knowledge by clarifying that knowledge about social groups is distinct from other semantic categories.

## Revised abstract

### Die Macht der Lieblingsmusik: Wie Musik das Zeitempfinden beeinflusst

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Musik ist eines der eindrucksvollsten Medien, um das subjektive Zeitempfinden zu beeinflussen. Menschen setzen es beispielsweise bewusst (oder unbewusst) ein, um Wartezeiten subjektiv zu verkürzen. Im Rahmen von zwei Studien (n = 156) wird untersucht, welche Merkmale von Musik besonders entscheidend sind, um das Zeitempfinden zu verkürzen. Aus prominenten Modellen (Attentional Gate Model von Zakay & Block, 1997; Contextual Change Model von Block, 1989) wurden potentielle Faktoren abgeleitet, die das Zeitempfinden im musikalischen Kontext erklären können. Die Probanden hörten Musikstücke verschiedener Genres, die sich in ihrer Bekanntheit (Studie 1) und in der Beliebtheit (Studie 2) unterschieden, und beurteilten dann die Dauer der Musikstücke und wie schnell die Zeit für sie beim Hören der Musik verging. Der entscheidendste Faktor zur Beeinflussung des Zeitempfindens war, wie stark die Musik gemocht wurde, unabhängig davon, ob die Aufmerksamkeit der Probanden auf das Zeitverhalten gelenkt wurde (prospektive Zeitwahrnehmung) oder nicht (retrospektive Zeitwahrnehmung). Weitere wichtige Musikmerkmale waren, wie aktivierend die Musik erlebt wurde und wie viel Aufmerksamkeit sie auf sich zog. Keinen Einfluss auf das Zeiterleben hatte hingegen die Bekanntheit der Musik sowie wie inhaltsreich die Musik wahrgenommen wurde. Die Ergebnisse werden hinsichtlich einer Einbettung in vorhandene Modelle zur menschlichen Zeitwahrnehmung diskutiert.

# Author Index

## A

Abel, Magdalena, 15, 122  
Acharcki, Manuela, 271  
Ackermann, Kurt A., 15  
Aczál, Balázs, 83  
Adams, Sarah C., 144  
Adolph, Dirk, 183  
Adrian, Mira, 160  
Aggeli, Katerina, 376  
Agthe, Maria, 201  
Ahlberg, Daniela, 321  
Aichert, Désirée, 16  
Akyürek, Elkan, 16  
Albrecht, Thorsten, 17, 222  
Alekseeva, Ekaterina, 321  
Alpers, Georg W., 327  
Al Rasheed, Hashim, 413  
Alt, Philipp, 322  
Altmann, Tobias, 118  
Altmann, Ulrike, 17, 37  
Alvarez Löblich, Paul, 322  
Alves, Hans, 18  
Amirshahi, Seyed A., 221  
Amling, Anja, 154  
Amunts, Katrin, 288  
Am Zehnhoff-Dinnesen, Antoinette, 64  
Anderer, Peter, 110  
Andraszewicz, Sandra, 149  
Andreas, Sylke, 450  
Angerer, Benjamin, 422  
Annac, Efsun, 323  
Ansoerge, Ulrich, 112, 287, 366, 373  
Araujo, Roscoe F., 18  
Armbruster, Diana J., 19  
Arndt, Jana, 19  
Arnold, Nina R., 20  
Asal, Kathrin, 323  
Asbrock, Frank, 75  
Aschersleben, Gisa, 114, 190  
Ashby, Nathaniel J., 20  
Aslan, Alp, 21  
Aso, Toshihiko, 297  
Aßfalg, André, 21, 300  
Athenstaedt, Ursula, 68  
Augst, Susanne, 22

Austin, Gina, 22, 101

## B

Baak, Benjamin, 324, 424  
Baayen, R. Harald, 217  
Babeliowsky, Laura, 391  
Bach, Dominik R., 23  
Bach, Michael, 155  
Backhaus, Nils, 23  
Bago, Bence, 83  
Bakker, Iske, 180  
Balic, Nevresa, 324, 413  
Banissy, Michael J., 241  
Bankes, Florian, 433  
Banse, Rainer, 249  
Bär, Nina, 325  
Baranowski, Andreas M., 24  
Barber, Anjuli, 24  
Bardhan, Neil P., 25  
Barman, Adriana, 228, 325  
Bartel, Gregory, 45  
Bartels, Andreas, 25  
Basten, Ulrike, 19, 26  
Batrancea, Larissa, 151  
Batzner, Eva, 70  
Baumann, Eva, 26  
Baumann, Martin, 66, 86, 110, 141  
Baumgartner, Florian, 27  
Baumgartner, Thomas, 27  
Bäumel, Karl-Heinz T., 15, 21, 64, 122, 147, 209, 418  
Bausenhart, Karin M., 68, 341, 407  
Bayen, Ute J., 20, 123, 357  
Beauducel, André, 167  
Beck, Sigrid, 419, 437  
Becker, Stefanie I., 287  
Beer, Anton L., 28  
Beggiato, Matthias, 28  
Behnel, Marieke, 29  
Bekhtereva, Valeria, 326  
Belke, Eva, 65  
Belke, Marcus, 403  
Bell, Raoul, 29, 123, 231  
Bellaera, Lauren, 295  
Bellebaum, Christian, 326

## Author Index

- Bendixen, Alexandra, 30  
Benedek, Mathias, 68  
Bengler, Klaus, i, 440  
Berdica, Elisa, 327  
Berger, Barbara, 327  
Berger, Franziska, 397  
Bergmann, Johanna, 152  
Bergner, Sabine, 68  
Bermeitinger, Christina, 328  
Bernhardt, Boris, 272  
Bernstein, Daniel M., 21  
Berthold, Kirsten, 76  
Berthold-Losleben, Mark, 377  
Berti, Stefan, 51, 328  
Bertram, Gianna M., 329  
Berude, Carolin, 30  
Betsch, Cornelia, 31, 249  
Betsch, Tilmann, 103, 344  
Bezditko, Alina, 37  
Bhattacharya, Joydeep, 169  
Biele, Guido, 190, 276  
Bilalic, Merim, 31  
Bilewicz, Michał, 106  
Binkowski, Ferdinand, 257  
Bird, Geoffrey, 32  
Birkenbusch, Jana, 329  
Birngruber, Teresa, 330  
Bischoff, Matthias, 330  
Bitter, Thomas, 32  
Bittrich, Katrin, 331  
Blank, Hartmut, 33  
Blank, Helen, 33  
Blankenberger, Sven, 331  
Blaschke, Stefan, 331  
Blautzik, Janusch, 113, 183  
Blechert, Jens, 34, 185, 227, 301  
Blijlevens, Janneke, 34, 217  
Bloechle, Johannes, 146  
Bock, Otmar, 143, 324, 370, 424  
Bocklisch, Franziska, 332, 358, 381  
Bocklisch, Steffen F., 332  
Bodemer, Nicolai, 35  
Boecker, Lea, 35  
Boehm, Udo, 36  
Böhm, Mateja F., 20  
Böhm, Robert, 31, 36  
Bohner, Gerd, 242  
Bohrn, Isabel, 17, 37  
Bokulic, Marko, 332  
Bölte, Jens, 44  
Boltzmann, Melanie, 237  
Bondarevskaya, Irina, 37  
Börner, Annegret, 38  
Bortz, Dominic, 160  
Bosch, Oliver G., 38  
Boshoff, Lieze, 333  
Both, Bernhard, 340  
Bothe, Kathrin, 119  
Boyle, Jason, 208  
Boywitt, Dennis, 39  
Braatz, Janina, 133  
Bradley, Brendan P., 307  
Brand, Matthias, 39, 246, 253, 283, 367, 432  
Brandenburg, Stefan, 40, 162, 238, 292  
Brandt, Martin, 421, 448  
Brandt, Stephan, 203, 371  
Brass, Marcel, 40, 56, 387  
Bratzke, Daniel, 41, 334  
Brauer, Jens, 422  
Braun, Christoph, 365  
Braun, Julia, 221  
Braun, Mario, 41, 227  
Braunstein, Verena, 379  
Bridger, Emma, 434  
Briesemeister, Benny B., 41  
Brinkmann, Hanna, 42  
Britz, Juliane, 42  
Brockhaus, Friederike, 43  
Brodbeck, Felix, 213, 246  
Bröder, Arndt, 43, 75, 134, 173, 269  
Bronk, Maria, 44  
Brown, Gillian, 38  
Bruchhaeuser, Anika, 436  
Bruchmann, Maximilian, 44  
Brück, Christiane, 333  
Bruckner, Rasmus, 72  
Brudermann, Thomas, 45  
Bryce, Donna, 334  
Bucher, Leandra, 45, 280, 399  
Buchheim, Anna, 46, 113, 183  
Buchner, Axel, 29, 123, 179, 231  
Büchner, Vanessa L., 335, 387  
Buchwald, Florian, 334  
Buckert, Magdalena, 47  
Bundesen, Claus, 289  
Burger, Christoph, 335  
Burghardt, Juliane, 47  
Burgván, Annamária, 125  
Burmeister, Hartmut P., 32  
Busch, Niko A., 48, 116, 339  
Büttner, Oliver B., 264

- Butz, Martin V., 115  
 Butz, Sebastian, 445
- C**
- Cada, Julia S., 336  
 Calio, Frank, 48  
 Canic, Emina, 49  
 Carbon, Claus-Christian, 76, 107, 195,  
 360, 389, 420  
 Castela, Marta, 49  
 Cellini, Cristiano, 344  
 Cepeda, Nicholas J., 383  
 Ceschi, Andrea, 50, 336, 343  
 Chamberlain, Rebecca, 337  
 Chaumon, Maximilien, 48, 50  
 Chavanon, Mira-Lynn, 403  
 Chechko, Natalya, 377  
 Chen, Szu-Han, 276  
 Cheng, Xiaoqin, 211  
 Chladek, Anja, 51  
 Christ, Oliver, 430  
 Christmann, Corinna A., 51  
 Cierniak, Gabriele, 416  
 Cierpka, Manfred, 46  
 Cieslik, Edna C., 337  
 Citron, Francesca M., 52  
 Class, Friderike, 80  
 Claus, Berry, 338  
 Colzato, Lorenza, 52, 122, 206  
 Commare, Laura, 42  
 Conci, Markus, 53, 399  
 Conrad, Markus, 125  
 Conti, Antonia, 53  
 Conti, Antonia S., i  
 Coolin, Alisha, 21  
 Corneille, Olivier, 315  
 Covic, Amra, 338  
 Craddock, Matt, 326  
 Cress, Ulrike, 80  
 Crombez, Geert, 435  
 Crouzet, Sébastien M., 339  
 Csatho, Arpad, 339  
 Csisinko, Mathis, 153  
 Cubelli, Roberto, 264  
 Cursiter, Heather, 356  
 Cwik, Jan C., 240, 340  
 Czernochowski, Daniela, 54, 359
- D**
- Dalton, Jeffrey A., 211  
 Danek, Amory H., 54  
 Dassy, Brice, 206  
 Datkiewicz, Sascha, 55  
 Daum, Oliver, 340  
 Davidson, Patrick S., 168  
 Davis, Matt H., 55  
 Deaux, Kay, 88  
 De Baene, Wouter, 56  
 Debey, Evelyne, 341  
 De Bruijn, Ellen, 122  
 Decety, Jean, 188  
 Declerck, Mathieu, 56  
 De Coster, Lize, 40, 387  
 Dehnhard, Ina, 302  
 Dehning, Sandra, 113, 183  
 De Houwer, Jan, 57, 92, 111, 341  
 Deibebe, Anna, 325  
 Deiglmayr, Anne, 208  
 De la Rosa, Maria D., 341  
 De la Vega, Irmgard, 57, 447  
 Del Pin, Simon H., 339  
 Demanet, Jelle, 387  
 De Morree, Helma M., 58  
 Denrell, Jerker, 119  
 Denzler, Joachim, 221  
 Derntl, Birgit, 151, 214, 263  
 Derrfuss, Jan, 71, 90  
 De Ruiter, Jan P., 29, 101, 311  
 Desender, Kobe, 226  
 Deserno, Lorenz, 427  
 Deutsch, Roland, 58, 268  
 Dickert, Stephan, 20, 59, 98, 146, 290  
 Dickson, Joanne, 61  
 Diedenhofen, Birk, 59, 427  
 Diekelmann, Susanne, 60  
 Dienelt, Lena E., 342  
 Dietrich, Anja, 124  
 Dietsch, Sandra, 100  
 Dignath, David, 60, 69  
 Di Lemma, Lisa C., 61  
 Dillmann, Helen M., 342  
 Dimigen, Olaf, 186, 343, 379  
 Dirk, Judith, 251  
 Dittrich, Kerstin, 61, 234  
 Ditye, Thomas, 62  
 Djurica, Djordje, 62  
 Dlugosch, Carsten, i  
 Dobel, Christian, 63, 64  
 Dobler, Ina M., 64  
 Dolk, Thomas, 234, 274  
 Donner, Eckart, 300  
 Dornbusch, Thomas, 65

## Author Index

Dorofeeva, Ksenia, 336, 343  
Dorough, Angela R., 65, 344  
Dotsch, Ron, 210  
Dreisbach, Gesine, 70, 87, 279, 352, 409  
Dreßler, Annika, 66, 187  
Drewing, Knut, 344  
Drewitz, Uwe, 66  
Drouin, Héloïse, 168  
Druey, Michel D., 67  
Dshemuchadse, Maja, 244, 345  
Düclos, Denise, 107  
Dudschig, Carolin, 67, 321, 447  
Dunst, Beate, 68  
Duschek, Stefan, 307, 345  
Dvoretzka, Daniela, 346  
Dyjas, Oliver, 68

## E

Eberhardt, Elisa, 252  
Eberhardt, Katharina, 69, 348  
Ebner, Franz, 156  
Echterhoff, Gerald, 242  
Eckers, Cornelia, 111  
Eder, Andreas, 60, 69  
Eekhoff, Alexander, 363  
Egetemeir, Johanna, 70  
Eggert, Frank, 261  
Ehgartner, Yvonne S., 70  
Ehle, Marcel, 154  
Eichler, Alexandra, 360  
Eickhoff, Simon B., 337, 385, 398  
Eikmeier, Verena, 346  
Eimer, Martin, 9  
Eisenbarth, Hedwig, 70  
Eisenegger, Christoph, 38, 210  
Eisermann, Jens, 347  
Ekman, Matthias, 71  
Elliot, Andrew J., 201, 387  
Elliott, Eeva, 71  
Elmenhorst, Eva-Maria, 202  
Elsner, Birgit, 22, 101  
End, Albert, 347  
Engel, Andreas K., 405  
Eppinger, Ben, 72  
Epstude, Kai, 72  
Erb, Hans-Peter, 81  
Erdfelder, Edgar, 49, 300, 342, 395  
Erdmann, Gisela, 170  
Erev, Ido, 278  
Eriksson, Gabriella, 73, 277  
Eriksson, Lars, 73

Ernst, Benjamin, 73  
Ernstberger, Antonio, 300, 418  
Esser, Sarah, 348  
Estner, Barbara, 74  
Ettinger, Ulrich, 16, 74, 211  
Ettlin, Florence, 75  
Evans, Chris, 450  
Eyssel, Friederike, 75–77, 160

## F

Faerber, Stella J., 76  
Falk, Armin, 116  
Falkenstein, Michael, 353, 355  
Fan, Yan, 155  
Fandakova, Yana, 77  
Fasoli, Fabio, 77  
Felber, Maria, 348  
Feldmann-Wüstefeld, Tobias, 349  
Fenzl, Thomas, 45, 352  
Ferdinand, Nicola K., 251  
Fernandez, Juan P., 181  
Fernández-Dols, José Miguel, 425  
Ferrari, Pier Francesco, 78  
Ferreira, Mário B., 178  
Ferstl, Evelyn C., 78  
Festl, Freya, 349  
Feufel, Markus, 35  
Fiebach, Christian J., 19, 26, 47, 71, 90, 284  
Fiedler, Anja, 255  
Fiedler, Klaus, 79, 159  
Fiedler, Susann, 79, 98  
Field, Matt, 61, 80  
Fink, Gereon R., 215  
Fink, Thomas, 350  
Finkbeiner, Matthew, 373  
Finke, Kathrin, 354  
Fischbacher, Urs, 210  
Fischer, Katharina, 350  
Fischer, Martin H., 266  
Fischer, Nele, 81  
Fischer, Peter, 323, 400  
Fischer, Rico, 99, 241, 298  
Fischer, Ursula, 80  
Fitch, W. Tecumseh, 97, 268  
Fitzner, Inga, 405  
Flaßbeck, Christine, 81  
Fleig, Hanna, 82  
Fleischhut, Nadine, 82  
Fleming, Roland W., 416  
Fliessbach, Klaus, 116



- Florack, Arnd, 51, 94, 146, 264  
 Földes, Tamás A., 83  
 Fölster, Mara, 83, 130  
 Foltynie, Thomas, 376  
 Folyi, Timea, 84  
 Förderer, Sabine, 84  
 Forster, Michael, 85, 195  
 Forstmann, Birte, 36  
 Frensch, Peter A., 356, 360, 394, 446  
 Frey, Renato, 85  
 Frick, Anne, 433  
 Friederici, Angela D., 240, 348  
 Friedrich, Max, 86  
 Frimmel, Steffi, 351  
 Frings, Christian, 86, 178, 189, 200, 278,  
 308, 328, 420  
 Frisch, Johanna, 87  
 Frischlich, Lena, 351  
 Fritz, Julia, 87  
 Fritz-Stratmann, Annemarie, 281  
 Fröber, Kerstin, 352  
 Froehlich, Laura, 88  
 Fu, Xiaolan, 214  
 Fuest, Tanja E., 352  
 Fukuda, Keisuke, 179  
 Fukuyama, Hidenao, 297
- G**
- Gacs, Boroka, 339  
 Gade, Miriam, 88  
 Gadek, Natalia, 403  
 Gagl, Benjamin, 89, 227  
 Gais, Steffen, 89  
 Gaissmaier, Wolfgang, 90, 138  
 Gajda, Kathrin, 353  
 Gajewski, Patrick D., 353, 355  
 Galli, Alessandra, 90  
 Gangl, Katharina, 91, 121  
 Ganzenmüller, Stephanie, 91  
 Garbade, Sven, 354  
 Garsoffky, Bärbel, 354, 446  
 Gartus, Andreas, 92, 374  
 Gaschler, Robert, 306, 356, 360, 402, 431,  
 446  
 Gast, Anne, 92  
 Gazzo Castaneda, Lupita Estefania, 93  
 Gehlert, Tina, 305  
 Geib, Katharina, 104  
 Genç, Erhan, 93, 152  
 Gendolla, Guido, 94  
 Genschow, Oliver, 94  
 Gentsch, Kornelia, 355  
 Georg, Anne, 332  
 Gerdes, Antje, 327  
 Gerdes, Marlis, 95  
 Gerger, Gernot, 95  
 Gerhardt, Holger, 257  
 Gerjets, Peter, 414, 416  
 Germar, Markus, 96  
 Getzmann, Stephan, 355  
 Geukes, Sebastian, 96  
 Geyer, Thomas, 27, 248, 323  
 Giang, Trang, 29  
 Gianotti, Lorena R., 27  
 Gibbert, Michael, 119  
 Gibbons, Henning, 271  
 Giesen, Carina, 97, 363, 430  
 Gigerenzer, Gerd, 82  
 Gilchrist, Iain D., 120  
 Gingras, Bruno, 97, 268  
 Gittler, Georg, 188  
 Gladwin, Thomas E., 310  
 Glasauer, Stefan, 434  
 Glöckner, Andreas, 20, 65, 79, 98, 114,  
 134, 344  
 Glück, Judith, 153  
 Göbel, Silke M., 98  
 Godau, Claudia, 356, 360, 446  
 Godde, Ben, 440  
 Gold, Joshua I., 72  
 Goldberg, Adele E., 52  
 Goldschmidt, Bianca, 199  
 Goller, Juergen, 356  
 Gollwitzer, Mario, 198, 267  
 Gollwitzer, Peter M., 177, 425  
 Gonzalez, Nichel, 277  
 Goschke, Thomas, 244, 298, 345, 431  
 Gottschalk, Caroline, 99  
 Grabenhorst, Fabian, 99  
 Grabner, Roland H., 202, 238  
 Graf, Martina, 315  
 Gramann, Klaus, 100  
 Grande, Marion, 288  
 Grandjean, Didier, 355  
 Grattenthaler, Heidi, 197  
 Graupner, Sven-Thomas, 362  
 Greenlee, Mark W., 28, 292  
 Grice, Martine, 237  
 Griessenberger, Hermann, 110  
 Grippenkoven, Jan, 100  
 Gronewold, Nadine, 357  
 Groos, Carina, 101, 311

## Author Index

- Groppe, Karoline, 22, 101  
Groß, Julia, 357  
Groß, Ramona, 358  
Gross, Theresa, 104  
Grosse Deters, Fenne, 102  
Gruber, Georg, 110  
Gruber, Thomas, 380  
Grudzielski, Anika, 344  
Grundgeiger, Tobias, 102  
Gudrun, Sartory, 340  
Gudziol, Hilmar, 32  
Gula, Bartosz, 358  
Güldenpenning, Iris, 259  
Guleria, Anupam, 129  
Günther, Eva, 103  
Günther, Thomas, 111  
Guntinas-Lichius, Orlando, 32  
Gur, Ruben C., 151, 263  
Gutberlet, Ingmar, 299
- H**  
Haase, Niels, 103, 249  
Habel, Ute, 263, 372, 377  
Haberkamp, Anke, 104  
Hackenberg, Linn, 205  
Hackenfort, Markus, 104  
Haese, André, 54, 359  
Häfner, Michael, 105  
Hagendorf, Herbert, 371  
Hagenmüller, Bettina, 105  
Hagman, William, 290  
Haider, Hilde, 69, 348, 356, 360, 446  
Halfmann, Marc, 384  
Halfter, Sarah, 337  
Haller, Bettina, 229  
Hamann, Karen, 433  
Hamburger, Kai, 342, 432  
Hämmerer, Dorothea, 106  
Han, Shihui, 155  
Handerer, Josua, 359  
Hanich, Julian, 132, 297  
Hansen, Karolina, 106  
Hansen, Sonja M., 360, 446  
Hanslmayr, Simon, 107  
Hariz, Marwan, 376  
Harsányi, Géza, 107  
Härtel, Manuela, 360  
Hartl, Barbara, 192  
Hartmann, Matthias, 108, 210  
Hartner-Tiefenthaler, Martina, 121  
Hartwig, Josephine, 361  
Hasler, Gregor, 218  
Hauser, Tobias U., 108, 238  
Hausmann, Daniel, 109  
Häusser, Jan A., 87, 109  
Hawelka, Stefan, 89, 227, 394  
Hecht, Heiko, 24, 148, 340, 420  
Heck, Daniel W., 361  
Heekeren, Hauke R., 72, 106, 155, 184, 190, 257  
Heesen, Matthias, 86, 110  
Heib, Dominik P., 110  
Heider, Niclas, 111  
Heim, Stefan, 111, 288  
Hein, Elisabeth, 362  
Hein, Laura, 112, 270  
Heise, Nils, 112  
Hekkert, Paul, 34, 217  
Heller, Jürgen, 285  
Hellmann, Jens H., 113, 279  
Helmert, Jens R., 207, 361, 362, 384, 410, 423  
Hennig-Fast, Kristina, 113, 183  
Henning, Anne, 114  
Henninger, Felix, 114, 145  
Hennrichs, Jasmin, 395  
Henz, Diana, 363, 390, 393  
Herbert, Beate M., 115  
Herbort, Maike, 254  
Herbort, Oliver, 115  
Herbst, Sophie K., 116  
Herff, Steffen, 54  
Hermsdörfer, Joachim, 434  
Hernadi, Istvan, 99  
Hernandez-Lallement, Julien, 116  
Herrmann, Johanna, 363  
Hertrampf, Katrin, 26  
Hertrich, Ingo, 419, 437  
Hertwig, Ralph, 85, 216, 258, 276, 316  
Hervás, Gonzalo, 407  
Herzberg, Lena, 117  
Herzog, Stefan M., 117, 216  
Hess, Ursula, 83, 130  
Hesse, Maike D., 324, 413  
Hesslinger, Vera M., 107, 389  
Heuer, Herbert, 353  
Heussen, Yana G., 257  
Hewig, Johannes, 205  
Heyer, Dieter, 23  
Hieb, Victoria, 118  
Hilbig, Benjamin E., 49, 114, 118, 145, 269, 350, 437

Hillebrand, Axel, 187  
 Hillen, Rebekka, 111  
 Hills, Thomas, 119, 191, 316  
 Hjemdahl, Rebecca, 38  
 Hödlmoser, Kerstin, 110, 119, 322  
 Hoffmann, Adrian, 364  
 Hoffmann, Janina A., 120  
 Hoffmann, Sven, 299  
 Höfler, Margit, 120, 382  
 Hofmann, Eva, 91, 121  
 Höger, Rainer, 401, 426  
 Hohensinn, Christine, 121  
 Hohmann, Matthias, 364  
 Hollingworth, Andrew, 362  
 Hollmann, Maurice, 124  
 Holt, Lori L., 223  
 Holterman, Christoph, 122  
 Holtmann, Jana, 254  
 Hommel, Bernhard, 122, 206  
 Hörmann, Hans-Jürgen, 202  
 Horn, Sebastian, 123  
 Horr, Ninja K., 365  
 Horstmann, Annette, 124  
 Horstmann, Gernot, 123, 411  
 Horváth, János, 125  
 Horvath, Lisa K., 124, 184  
 Hrkac, Mari, 365  
 Hsu, Chun-Ting, 125  
 Hu, Xiaochen, 409  
 Huber, Julian, 292  
 Huber, Ludwig, 10, 24  
 Huber, Markus, 434  
 Huber, Odilo W., 366  
 Huber, Oswald, 126  
 Huber, Rafael, 126  
 Huber, Stefan, 80, 127, 146  
 Huber-Huber, Christoph, 173, 366  
 Hübner, Ronald, 176  
 Huckauf, Anke, 127, 148, 389, 404, 448  
 Huestege, Lynn, 128, 216  
 Huetter, Mandy, 128  
 Huettig, Falk, 129, 175, 269  
 Huff, Markus, 129, 174  
 Hughes, Charmayne M., 130, 262, 275  
 Hühnel, Isabell, 83, 130  
 Hulme, Charles, 98  
 Hurlemann, René, 131  
 Hussy, Walter, 281  
 Hüther, Lisa M., 131  
 Hutzler, Florian, 89, 227, 394  
 Hysenbelli, Dorina, 50

**I**

Iffland, Benjamin, 367  
 Imhof, Birgit, 414  
 Ingber, Josefine, 199  
 Irlbacher, Kerstin, 371  
 Ischebeck, Anja, 132, 156, 318, 379

**J**

Jacobs, Arthur M., 11, 17, 37, 41, 71, 125  
 Jacobsen, Thomas, 132, 297, 305  
 Jäger, Gerhard, 401  
 Jahanshahi, Marjan, 376  
 Jahn, Georg, 133, 221, 253, 398  
 Jakesch, Martina, 133  
 Jäncke, Lutz, 108, 238  
 Janczyk, Markus, 134  
 Janke, Wilhelm, 170  
 Janouch, Julia, 367  
 Jansen, Anita, 307  
 Jansen, Petra, 220, 368, 386, 415  
 Janzen, Gabriele, 180  
 Jarecki, Jana B., 368  
 Javadi, Amir H., 116  
 Jaworska, Manana, 106  
 Jekel, Marc, 20, 134  
 Jenkins, Rob, 356  
 Jenny, Mirjam A., 135  
 Jentzsch, Ines, 433  
 Jescheniak, Jörg D., 321, 374, 391, 393  
 Jin, Yu, 203  
 Johansson, Roger, 135  
 Jorschick, Annett B., 101, 311  
 Jost, Kerstin, 136, 262  
 Josten, Johanna, 369  
 Jovanovic, Bianca, 136  
 Jucks, Regina, 280  
 Juli, Marie, 396  
 Jung, Katharina, 307  
 Junge, Martin, 137, 224  
 Junghöfer, Markus, 63  
 Jusyte, Aiste, 369, 421

**K**

Kachel, Sven, 370  
 Kächele, Horst, 46  
 Kaczmarek, Magdalena, 371  
 Kaernbach, Christian, 137–139  
 Kalicinski, Michael, 143, 370  
 Kallenberg, Ulrike, 363  
 Kamleitner, Bernadette, 276  
 Kämmer, Juliane E., 138

## Author Index

- Kapler, Irina V., 383  
Karaś, Agnieszka, 139  
Karch, Susanne, 139  
Karges, Wolfam, 377  
Kaspar, Kai, 140, 378  
Kathmann, Norbert, 371, 431  
Katsikopoulos, Konstantinos V., 181, 236  
Kattner, Florian, 140, 329  
Kaufmann, Hannes, 153  
Kaufmann, Jürgen M., 141, 258, 317  
Kaul, Robert, 141  
Kaup, Barbara, 321, 401, 414, 447  
Kavšek, Michael, 142, 436  
Kazazi, Juela, 293  
Keckeis, Katinka, 214  
Kehrer, Stefanie, 371  
Keich, Alexandra, 86  
Keil, Andreas, 425  
Keil, Julian, 372  
Keitel, Christian, 338  
Kellen, David, 49, 142, 207  
Keller, Ingo, 303  
Kellermann, Tanja S., 337, 398  
Kellermann, Thilo, 372  
Kelsch, Johann, 86  
Kempe, Matthias, 143, 370  
Keppel, Marie-Theres, 318  
Kerkhoff, Georg, 303, 354  
Kerschbaum, Hubert, 301  
Keshavarz, Behrang, 328  
Kessler, Henrik, 46  
Ketzer, Almut, 143  
Keuper, Kati, 63  
Khader, Patrick H., 144, 329  
Khalid, Shah, 373  
Khera, Gunjan, 163  
Khorramdel, Lale, 257  
Kiefer, Markus, 144, 283  
Kiesel, Andrea, 60, 145, 226  
Kieslich, Pascal J., 114, 145  
Kiessig, Yvonne, 381  
Kirchler, Erich, 91, 121, 151, 192  
Kirsch, Wladimir, 373  
Kirschbaum, Clemens, 241  
Kiss, Miklós, 300, 418  
Klackl, Johannes, 227  
Klatte, Maria, 219  
Klauer, Karl C., 142, 234, 266, 277  
Klaus, Jana, 374  
Kleber, Janet, 51, 59, 146  
Klein, Christoph, 58  
Klein, Elise, 146  
Klein, Marieke, 228  
Kleinsorge, Thomas, 22  
Klemer, Nicolas, 374  
Klempova, Bibiana, 147, 375  
Kliegel, Matthias, 252, 361  
Kliegl, Katrin M., 148, 404  
Kliegl, Oliver, 147  
Kliegl, Reinhold, 203  
Klimesch, Wolfgang, 110, 119  
Klinkenberg, Isabelle, 63  
Klößner-Nowotny, Felicitas, 148  
Klostermann, Lars, 149  
Klucharev, Vasily, 126, 149  
Klusacek, Claudia, 351  
Knake, Susanne, 403  
Knauff, Markus, 45, 93, 399  
Knoch, Daria, 27, 210  
Knopf, Monika, 383  
Knudsen, Birgit, 114  
Knuppertz, Helge, 240, 340  
Knust, Mareike, 275  
Kobusch, Pia-Renée, 242  
Koch, Alex, 150  
Koch, Anne, 150  
Koch, Iring, 88, 128, 165, 215, 256, 274, 369  
Koch, Stefan P., 371  
Köchel, Angelika, 375  
Koelewijn, Thomas, 317  
Koelsch, Stefan, 257  
Koepsel, Anne, 127, 448  
Koester, Dirk, 376, 429, 444  
Koganemaru, Satoko, 297  
Kogler, Christoph, 151  
Kogler, Lydia, 151  
Kohl, Sina M., 376  
Kohler, Axel, 93, 152  
Kohn, Nils, 377  
Kokinous, Jenny, 377  
Kollei, Tanja, 152  
Koller, Ingrid, 70, 153  
Koller, Michael, 26  
Komes, Jessica, 153  
Könen, Tanja, 251  
König, Peter, 140, 378  
Kononowicz, Tadeusz W., 289, 378  
Koranyi, Nicolas, 154, 433  
Kordts-Freudinger, Robert, 268  
Koreimann, Sabrina, 154  
Korn, Christoph W., 155

- Korn, Lars, 31  
 Kornadt, Anna, 333  
 Körner, Christof, 120, 132, 379, 382  
 Kornmeier, Jürgen, 155  
 Kornrumpf, Benthe, 379  
 Koschutnig, Karl, 156  
 Köster, Moritz, 380  
 Kotz, Sonja A., 326, 377  
 Kovacs, Carrie, 156  
 Kovács, Gyula, i, 299  
 Kozlik, Julia, 380  
 Kraft, Antje, 371  
 Krajbich, Ian M., 157  
 Krajewski, Jarek, 55, 157  
 Kral, Andrej, 405  
 Kramer, Sophia, 317  
 Krampe, Ralf, 158  
 Kranz, Julia, 414  
 Krause, Kristina, 381  
 Kray, Jutta, 251  
 Krebber, Martin, 381  
 Krefeld, Antonia, 158  
 Krems, Josef F., 28, 221, 253, 325, 332, 358, 381  
 Kreplin, Ute, 159  
 Kriebler, Magdalena, 382  
 Krieglmeyer, Regina, 268  
 Kröger, Bernd, 111  
 Kronbichler, Martin, 227  
 Kroneisen, Meike, 29, 382  
 Krug, Kristine, 96  
 Krüger, Daniel, 17  
 Krüger, Tobias, 159  
 Krummenacher, Joseph, 231  
 Kryspin-Exner, Ilse, 263, 403  
 Kubik, Veit, 383  
 Kubinger, Klaus D., 160  
 Kübler, Andrea, 185  
 Kuchenbrandt, Dieta, 160  
 Kudielka, Brigitte M., 47  
 Kugler, Katharina, 213, 246  
 Kuhbandner, Christof, 161, 336, 398, 428  
 Kühberger, Anton, 245  
 Kuhlmann, Beatrice G., 161, 236, 364  
 Kühn, Anne B., 365  
 Kuhn, Jens, 376  
 Kühn, Simone, 239  
 Kühnast, Milena, 297  
 Kühnel, Anja, 162  
 Kühnhausen, Jan, 251  
 Kujala, Teija, 308  
 Kumar, Uttam, 129  
 Kumari, Veena, 211  
 Kumpf, Daniela, 386  
 Kunde, Wilfried, 22, 60, 145, 215, 226, 255, 313, 373  
 Küpper-Tetzel, Carolina E., 383  
 Kürbitz, Martina, 162  
 Kusch, Kerstin, 384  
 Kuss, Katarina, 116
- L**  
 Lachmann, Bernd, 176  
 Lachmann, Thomas, 51, 74, 163, 219, 247, 284  
 Lachnit, Harald, 388  
 Lamm, Claus, 173, 214, 219, 229, 263, 282, 403  
 Lancier, Stephan, 384  
 Landau, Andreas, 311  
 Landerl, Karin, 408  
 Landgraf, Steffen, 70, 385, 411  
 Lange, Kathrin, 163  
 Lange, Sebastian, 167  
 Lange-Küttner, Christiane, 164, 390  
 Langner, Oliver, 164, 406  
 Langner, Robert, 385  
 Laubrock, Jochen, 270  
 Lauckner, Mathis, 165  
 Laufenberg, Tom, 157  
 Lausberg, Hedda, 346  
 Lawo, Vera, 165  
 Leder, Helmut, 42, 85, 92, 95, 133, 175, 195, 304, 356, 374  
 Lee, Borah, 65  
 Lefevre, Carmen E., 212  
 Lehmann, Jennifer, 368, 386  
 Lehtonen, Minna H., 44  
 Leonard, Ania M., 211  
 Leonhardt, Anja, 251  
 Leow, Yan Ling, 211  
 Lerche, Veronika, 166, 296  
 Leroy, Caroline, 426  
 Lervåg, Arne O., 98  
 Leske, Kathrin, 261  
 Lethaus, Firas, 66, 166  
 Leue, Anja, 167  
 Leutgeb, Verena, 386  
 Leutner, Detlev, 334  
 Li, Shu-Chen, 72, 106  
 Libeau, Catherine, 228  
 Lichtenfeld, Stephanie, 161, 387

## Author Index

- Liepelt, Roman, 147, 167, 274, 375  
Likowski, Katja, 35  
Limbrecht, Kerstin, 148  
Limousin, Patricia, 376  
Lin, Hsuan-Yu, 168  
Lindemann, Oliver, 266  
Lindenberger, Ulman, 77, 106  
Lindner, Isabel, 168, 242  
Lindsen, Job, 169  
Liu, Yingyi, 169  
Lobinger, Babett H., 370  
Löffler, Anne, 387  
Lohmann, Johannes, 170  
Lonigan, Chris, 220  
Löwenbrück, Fabian, 170  
Lübke, Katrin T., 171  
Lubrich, Oliver, 37  
Lucke, Sara, 388  
Ludwig, Simon, 388  
Ludwig, Vera, 402, 431  
Luedtke, Ramona A., 389  
Lukács, Bence, 83  
Lukas, Sarah, 389  
Luna-Rodriguez, Aquiles, 305  
Lütke, Nikolay, 390
- M**
- Maag, Christian, 281  
Maass, Anne, 184  
Macho, Siegfried, 171, 194  
Macht, Sebastian, 390  
Machunsky, Maya, 172  
Mack, Wolfgang, 391  
Mädebach, Andreas, 321, 374, 391, 393  
Maess, Burkhard, 348  
Mahr, Angela, 172  
Maienborn, Claudia, 346  
Maier, Markus A., 335, 387  
Maier, Martin E., 273  
Majdandžić, Jasminka, 173  
Malejka, Simone, 173  
Malek, Stephanie F., 174  
Malesza, Marta, 392  
Mallot, Hanspeter A., 349, 384  
Mamassian, Pascal, 206  
Mandel, Nathalie, 129, 174  
Manginelli, Angela A., 27, 323  
Mani, Nivedita, 175  
Mann, Anne, 146  
Männel, Claudia, 240  
Manzey, Dietrich, 224  
Marcora, Samuele M., 58  
Marin, Manuela M., 97, 175  
Markett, Sebastian, 176  
Markowska, Monika, 164  
Martens, Ulla, 176, 442  
Martin, Larissa, 445  
Martini, Markus, 392  
Martiny, Sarah E., 88, 177  
Martiny-Huenger, Torsten, 177  
Mast, Frank, 178  
Mast, Fred W., 108, 218  
Mata, André, 178  
Mata, Rui, 85, 295  
Mattler, Uwe, 17, 222  
Matuschek, Jonas, 273  
Matushanskaya, Asya, 393  
Maus, Johanna, 393  
May, Laura, 395  
Mayer, Jutta, 179  
Mayer, Michael, 220  
Mayr, Susanne, 179  
Mayrhauser, Lisa, 394  
Mayrhofer, Ralf, 406  
Mazzurega, Mara, 180  
McQueen, James M., 180, 217  
Mecklinger, Axel, 245, 434  
Meder, Björn, 181, 199  
Mega, Laura F., 181  
Mehling, Michael, 153  
Mehta, Mitul A., 211  
Meier, Beat, 182, 443  
Meier, Julia, 383  
Meijer, Ewout, 435  
Meindl, Thomas, 183, 307  
Meinecke, Cristina, 95  
Meinhardt-Injac, Bozana, 182  
Meiser, Thorsten, 82, 236  
Meißner, Dominik, 113, 183  
Meister, Lukas, 183  
Meitz, Tino, 174  
Meixner, Johannes M., 394  
Melcher, David, 447  
Memmert, Daniel, 143  
Menninghaus, Winfried, 37, 132, 297  
Mérillat, Susan, 108  
Merkel, Elisa, 184  
Merz, Simon T., 395  
Meshi, Dar, 184  
Messner, Claude, 185  
Metz, Barbara, 311  
Metzler, Hannah, 263

Meule, Adrian, 185  
 Meyberg, Susann, 186  
 Meyer, Jobst, 420  
 Michael, Lars, 186, 388, 429  
 Michalczyk, Franziska, 187  
 Michalke, Meik, 187  
 Michalkiewicz, Martha, 395  
 Michalska, Kalina J., 188  
 Michel, Anne, 417  
 Milatz, Anne, 188  
 Mima, Tatsuya, 297  
 Mishra, Ramesh, 129  
 Mittelstädt, Anna, 76  
 Mittelstädt, Victor, 389  
 Mitterer, Holger, 189, 217, 223  
 Moeckel, Tina, 119  
 Moeller, Birte, 86, 189  
 Mogg, Karin, 307  
 Mohr, Peter N., 190, 257  
 Mojzisch, Andreas, 87, 96, 109, 396  
 Mok, Sog Yee, 88  
 Moll, Ricarda, 432  
 Möller, Corina, 190  
 Möller, Hans-Jürgen, 113, 183  
 Möller, Korbinian, 80, 127, 146, 408  
 Monaghan, Padraic, 269  
 Montag, Christian, 176  
 Montant, Marie, 41  
 Moore, Cathleen M., 362  
 Morais, Ana S., 191  
 Morawetz, Carmen, 184  
 Moser, Ewald, 263  
 Moshagen, Morten, 361  
 Mossel, Annette, 153  
 Moura, Ricardo José, 315  
 Mozgovaya, Tatyana, 396  
 Muckli, Lars, 191  
 Muehlbacher, Dominik, 192  
 Muehlbacher, Stephan, 192  
 Mueller, Erik M., 144  
 Mügge, Dirk O., 397  
 Muhrer, Elke, 223  
 Müller, Christina, 252  
 Müller, Florian, 193  
 Müller, Hermann J., 53, 91, 248, 323, 399  
 Müller, Horst M., 243  
 Müller, Matthias M., 326, 338, 393, 402  
 Müller, Norbert, 113, 183  
 Müller, Romy, 207, 397  
 Müller, Stephanie, 35  
 Müller, Ulrich, 193

Müller, Veronika I., 337, 398  
 Müller, Wolfram, 156  
 Müller-Bardorff, Miriam, 398  
 Müller-Plath, Gisela, 23, 194  
 Münte, Thomas, 237  
 Munz, Michael, 194  
 Murphy, Ryan O., 15, 258  
 Muryy, Alexander A., 416  
 Musch, Jochen, 48, 59, 209, 300, 312, 364, 427, 441  
 Mussel, Patrick, 205  
 Müsseler, Jochen, 438, 443  
 Muth, Claudia, 195

**N**

Nadal, Marcos, 195, 304  
 Nagel, Jonas, 196  
 Nagler, Markus, 196  
 Nassar, Matthew R., 72  
 Nattkemper, Dieter, 197  
 Naujoks, Frederik, 197, 441  
 Naumann, Eva, 34  
 Naumer, Marcus J., 198  
 Nauroth, Peter, 198  
 Nause, Daniel, 86  
 Nederkoorn, Chantal, 307  
 Neidhardt, Eva, 199  
 Nejasmic, Jelica, 45, 399  
 Nelson, Jonathan D., 181, 199  
 Nerb, Josef, 400  
 Neth, Hansjörg, 191, 200  
 Nett, Nadine, 200, 395  
 Neubauer, Aljoscha, 68  
 Neuburger, Sarah, 220, 415  
 Neukum, Alexandra, 197, 441  
 Neumann, Roland, 380  
 Neuner, Frank, 367, 442  
 Neuper, Christa, 156, 379  
 Ni, Yujing, 169  
 Nichita, Anca, 151  
 Nicklisch, Andreas, 98  
 Nie, Qi-Yang, 399  
 Niedeggen, Michael, 186, 388, 429  
 Niederée, Ute, 201  
 Niedernhuber, Julia, 400  
 Niedtfeld, Inga, 437  
 Nielsen, Carsten, 289  
 Niesta-Kayser, Daniela, 201  
 Nilsson, Håkan, 135  
 Nobis, Manuela, 105  
 Noguchi, Takao, 119

## Author Index

Nowak, Patricia, 275  
Nuerk, Hans-Christoph, 80, 127, 146, 315  
Nürnbergger, Miriam, 400  
Nussbaumer, Daniela, 202

## O

Oberauer, Klaus, 112, 168, 270, 294  
Oberecker, Regine, 240  
Oberfeld-Twistel, Daniel, 148  
Obermeyer, Sven, 383  
Oehl, Michael, 401, 426  
Oeltze, Katharina, 202  
Oettingen, Gabriele, 177  
Ohl, Sven, 203  
Öhrlein, Linda, 205  
Olaru, Gabriel, 389  
Olk, Bettina, 203, 333  
Öllinger, Michael, 204  
Olschewski, Sebastian, 204  
Olsson, Henrik, 236  
Opfermann, Maria, 334  
Oppermann, Frank, 391  
Orfanos, Stelios, 377  
Ortmann, Leni, 64  
Osinsky, Roman, 205  
Osterheider, Michael, 411  
Oswald, Margit E., 158, 442  
Othersen, Ina, 205  
Öttl, Birgit, 401  
Otto, Thomas U., 206  
Overgaard, Morten, 339  
Ozturk-Szapora, Ayca, 206

## P

Pachur, Thorsten, 49, 103, 207, 258, 276,  
329  
Pakarinen, Satu, 308  
Paladino, Maria P., 180  
Pang, Cheuk-Yee, 402  
Pannasch, Sebastian, 207, 252, 362  
Pannekamp, Ann, 240  
Panzer, Stefan, 208  
Pape, Sören, 131, 208  
Papenberg, Martin, 209  
Pape-Neumann, Julia, 288  
Park, Sohee, 179  
Parkodsadze, Khatuna, 299  
Partetzke, Tara M., 395  
Paschke, Lena, 273, 402, 431  
Pastötter, Bernhard, 147, 209  
Paul, Matthew, 195

Paulus, Andrea, 210  
Pause, Bettina M., 171, 183  
Pearce, Marcus, 169  
Pedersen, Anya, 283  
Pedroni, Andreas, 210  
Peigneux, Philippe, 119  
Pekrun, Reinhard, 336, 428  
Penney, Trevor B., 211  
Peper, Martin, 403  
Perkins, Adam, 74, 211  
Perrett, David I., 76, 212  
Perugini, Marco, 212  
Petermann-Stock, Ina, 205  
Petersen, Anders, 213, 289  
Petersen, Gesa-Kristina, 213  
Petrova, Kalina, 214  
Petzold, Ulrike, 347  
Pfabigan, Daniela M., 214, 403  
Pfister, Hans-Rüdiger, 314, 401, 426  
Pfister, Roland, 60, 145, 215, 255, 313  
Philipp, Andrea M., 56, 215  
Phillips, Nathaniel, 216  
Pieczykolan, Aleksandra, 216  
Pieschl, Stephanie, 432  
Pintzinger, Nina M., 403  
Pittino, Ferdinand, 404  
Pleger, Burkhard, 124  
Plessow, Franziska, 241  
Plewan, Thorsten, 404  
Poellmann, Katja, 217  
Poglitisch, Christian, 318  
Pohl, Carsten, 145  
Polk, Thad A., 106  
Pollatos, Olga, 150  
Pollmann, Stefan, 27, 323  
Polzer, Christin, 253, 432  
Pomper, Ulrich, 405  
Post, Ruben, 217  
Pourtois, Gilles, 218  
Preis, André, 258  
Preuss, Nora, 218  
Prinz, Wolfgang, 234  
Pripfl, Jürgen, 219, 282  
Pröhl, Andrea, 219  
Puca, Rosa M., 230, 405  
Puls, Swantje, 164, 406  
Putzar, Lisa, 78

## Q

Quack, Benjamin, 406  
Quaiser-Pohl, Claudia, 220, 368, 415



Quednow, Boris B., 38  
 Quinn, Katrina R., 407

**R**

Raab, Marius, 107  
 Raab, Markus, 444  
 Radach, Ralph, 111, 220  
 Ragó, Anett, 428  
 Rahona López, Juan J., 407  
 Ramm, Markus, 403  
 Rand, Miya K., 410  
 Rasch, Björn, 299  
 Rasch, Dieter, 160  
 Rau, Anne K., 408  
 Rauchbauer, Birgit, 173  
 Re, Daniel E., 212  
 Rebitschek, Felix G., 221, 253  
 Recktenwald, Fabian, 349  
 Redies, Christoph, 221  
 Regel, Diemut, 222  
 Regenbogen, Christina, 372  
 Regenthal, Ralf, 193  
 Reichelt, Benjamin, 160  
 Reif, Julia, 213, 246  
 Reimer, Christina, 222  
 Reinacher, Ulrich, 343  
 Reinisch, Eva, 189, 223  
 Reinprecht, Klaus, 223  
 Reinweber, Matthias, 408  
 Reiprich, Frauke, 154  
 Reisenauer, Renate, 409  
 Reizenzein, Rainer, 137, 224  
 Reiser, Maximilian, 113, 183  
 Reishofer, Gernot, 156  
 Reissland, Jessika, 224  
 Reiterer, Susanne M., 409  
 Renkewitz, Frank, 225, 249  
 Renner, Fritz, 225  
 Renner, Rebekka S., 410  
 Rentsch, Sebastian, 410  
 Reuss, Heiko, 226  
 Reuter, Martin, 47, 176  
 Rey, Günter-Daniel, 226, 314  
 Rey-Mermet, Alodie, 182  
 Richlan, Fabio, 89, 227  
 Richter, Anni, 228  
 Richter, Michael, 228, 272  
 Richter, Sylvia, 227, 228, 325  
 Rieckansky, Igor, 229  
 Rieder, Cornelia, 411  
 Rieger, Martina, 229

Rieskamp, Jörg, 27, 120, 126, 135, 149,  
 190, 244  
 Riether, Nina, 411  
 Rimmele, Johanna, 30  
 Rinkenauer, Gerhard, 230  
 Rittger, Lena, 230  
 Roa Romero, Yadira, 412  
 Robbins, Cristina, 231  
 Roche, Fabienne, 192  
 Rockenbach, Bettina, 36  
 Rodway, Paul, 159  
 Roefs, Anne, 307  
 Röer, Jan P., 231  
 Roessel, Janin, 232, 252, 425, 445  
 Rohr, Michaela, 210, 232  
 Rolke, Bettina, 407, 412, 419, 426, 437  
 Rollett, Wolfram, 233  
 Röpke, Stefan, 254  
 Rose, James L., 413  
 Rosenberg, Raphael, 42  
 Röser, Florian, 342, 432  
 Rösler, Frank, 144  
 Rossmann, Constanze, 233  
 Roth, Gerhard, 46  
 Roth, Marcus, 118  
 Rothermund, Klaus, 97, 164, 193, 260,  
 333, 363, 430  
 Rothe-Wulf, Annelie, 234  
 Rothkirch, Marcus, 431  
 Rotzer, Stephanie, 108  
 Roy, Lucia, 324, 413  
 Rubaltelli, Enrico, 234  
 Rudert, Selma C., 252  
 Rudolph, Tina, 445  
 Rudolf, Sarah, 176  
 Ruff, Christian, 235  
 Ruffieux, Nicole, 414, 442  
 Ruge, Hannes, 235, 351, 450  
 Ruggeri, Azzurra, 236  
 Ruiz Fernández, Susana, 407, 414  
 Rummel, Jan, 82, 236, 252  
 Rummer, Ralf, 143, 237  
 Rüsseler, Jascha, 237  
 Ruthsatz, Vera, 220, 415  
 Rüttsche, Bruno, 238

**S**

Sachse, Katharina, 238  
 Sachse, Pierre, 392  
 Sachser, Cedric, 389  
 Sahakian, Barbara J., 193

## Author Index

- Salminen, Tiina, 239  
Samanez-Larkin, Gregory, 295  
Samland, Jana, 239  
Sander, Tilmann, 378  
Sanderson, Penny, 102  
SanMiguel, Iria, 438  
Sartori, Riccardo, 336, 343  
Sartory, Gudrun, 240  
Sass, Katharina, 288  
Saße, Julia, 54  
Sauer, Jan, 415  
Saupe, Katja, 338  
Sauseng, Paul, 327  
Schaadt, Gesa, 240  
Schaal, Nora K., 241  
Schabus, Manuel, 110, 119  
Schack, Thomas, 259, 316, 376, 429, 444  
Schade, Susann, 241  
Schäfer, Melanie, 242  
Schäffner, Lukas F., 416  
Schain, Cécile, 242  
Schalk, Lennart, 243  
Schaller, Franziska, 243  
Schandry, Rainer, 307  
Scharinger, Christian, 416  
Scharlau, Ingrid, 284, 304  
Scheele, Dirk, 131  
Scheibehenne, Benjamin, 244  
Scheiter, Katharina, 19  
Scherbaum, Stefan, 244, 345  
Scherer, Helmut, 26  
Scherer, Klaus, 355  
Scherndl, Thomas, 245  
Scheuplein, Anna-Lena, 245  
Schiebener, Johannes, 246  
Schiebler, Tom, 246  
Schienle, Anne, 247, 375, 386  
Schierz, Katharina, 141  
Schießl, Caroline, 202  
Schiller, Bastian, 27  
Schimpf, Nadine, 417  
Schinauer, Thomas, 247  
Schindler, Igor, 354  
Schlag, Bernhard, 305  
Schlagbauer, Bernhard, 248  
Schlegelmilch, René, 225, 237  
Schleicher, Susanne, 417  
Schlemmer, Alexander, 96  
Schlichting, Andreas, 418  
Schlögl, Alois, 379  
Schlosser, Nadine, 418  
Schlotthauer, Josefin, 76  
Schmechtig, Anne, 74  
Schmid, Antonia, 350  
Schmid, Kathrin, 415  
Schmid, Mareike, 419, 437  
Schmid, Michael C., 248  
Schmid, Philipp, 249  
Schmidt, Alexander F., 249  
Schmidt, Philipp, 250, 301  
Schmidt, Thomas, 104, 250  
Schmiedek, Florian, 251  
Schmitt, Hannah, 251  
Schmitz, Julian, 34  
Schmitz, Marcus, 230  
Schmitz, Melanie, 419  
Schneider, Daniel, 299  
Schneider, Frank, 372  
Schneider, Katja K., 420  
Schneider, Stefan, 422  
Schneider, Tobias M., 420  
Schnieder, Sebastian, 55, 157  
Schnitzspahn, Katharina M., 252, 361  
Schnürch, Martin, 421  
Schoel, Christiane, 232, 252  
Schöler, Tobias, 253  
Schöllhorn, Wolfgang, 363, 390, 393  
Scholz, Agnes, 221, 253  
Schönenberg, Michael, 369, 421  
Schöngassner, Florian, 375  
Schönwiesner, Marc, 438  
Schorch, Tanja, 422  
Schorn, Robert, 254  
Schott, Björn H., 228, 254, 325, 427  
Schreiber, Cornell, 422  
Schroeder, Philipp A., 255  
Schröger, Erich, 308, 338, 377, 438  
Schröter, Hannes, 255, 330  
Schrott, Raoul, 11  
Schubert, Anna-Lena, 178  
Schubert, Torsten, 222, 239, 402  
Schubö, Anna, 256, 349  
Schubotz, Ricarda I., 365  
Schuch, Stefanie, 256  
Schuck, Nicolas W., 106, 306  
Schueler, Anne, 19  
Schuenemann, Leonard, 257  
Schüller, Thomas, 423  
Schulreich, Stefan, 257  
Schult, Janette, 81  
Schulte-Mecklenbeck, Michael, 103, 258  
Schultz, Wolfram, 99

- Schultze, Thomas, 109, 396  
 Schulz, Claudia, 258  
 Schulz, Johannes, 362, 423  
 Schulze, Benjamin, 324, 424  
 Schulze, Ralf, 240  
 Schulz-Hardt, Stefan, 109, 396  
 Schumacher, Barbara, 436  
 Schürholt, Benjamin, 240, 340  
 Schurz, Matthias, 227  
 Schuster, Carolin, 177  
 Schuster, Sarah, 394  
 Schütz, Alexander C., 259  
 Schütz, Christoph, 259  
 Schwager, Susanne, 260  
 Schwan, Stephan, 354, 414, 446  
 Schwarz, Marcus A., 261  
 Schwarz, Wolf, 260  
 Schwarze, Anke, 261  
 Schwarzer, Gudrun, 136  
 Schwarzkopp, Tina, 262  
 Schwedes, Charlotte, 424  
 Schweiger Gallo, Inge, 425  
 Schweinberger, Stefan R., i, 141, 153, 258, 267, 299, 310, 317, 417  
 Schweitzer, Kerstin, 156  
 Schweitzer, Nicola, 307  
 Schweppe, Judith, 143  
 Scocchia, Lisa, 344  
 Sczesny, Sabine, 184  
 Sedlmeier, Peter, 43, 261  
 Seegelke, Christian, 130, 262  
 Seeger, Svenja, 425  
 Seemüller, Anna C., 144  
 Seibold, Julia, 389  
 Seibold, Verena C., 412, 426  
 Seidel, Eva-Maria, 214, 263  
 Seidenbecher, Constanze I., 228, 325  
 Seifritz, Erich, 38  
 Seitz, Rüdiger, 340  
 Seligman, Sarah C., 398  
 Sellaro, Roberta, 264  
 Senkowski, Daniel, 405  
 Serfas, Benjamin G., 264  
 Shea, Charles H., 208  
 Shi, Zhuanghua, 91, 265, 323  
 Shing, Yee Lee, 77  
 Sichelschmidt, Lorenz, 29  
 Siebert, Felix W., 401, 426  
 Silani, Giorgia, 263, 265  
 Silvestrini, Nicolas, 94  
 Simpson, Adrian P., 370  
 Singer, Tania, 272  
 Singer, Wolf, 93, 152  
 Singh, Jay P., 129  
 Singh, Nandini C., 409  
 Singmann, Henrik, 142, 266  
 Sixtus, Elena S., 266  
 Sjöström, Arne, 267  
 Skuk, Verena G., 267, 317  
 Slana, Anka, 268  
 Slovic, Paul, 50, 290  
 Smith, Alastair, 269  
 Smith, Kevin, 268  
 Smulders, Fren, 435  
 Soch, Joram, 228, 325, 427  
 Söllner, Anke, 269  
 Sommer, Jana, 427  
 Sommer, Werner, 379  
 Sommerville, Jessica A., 21  
 Somos, Eszter, 428  
 Souza, Alessandra D., 270  
 Spachtholz, Philipp, 428  
 Spada, Hans, 131, 208  
 Sparing, Roland, 324, 413  
 Spechea, Raoul, 445  
 Spence, Charles, 308  
 Sperlich, Anja, 270  
 Spiegel, Marnie A., 429  
 Sprengel, Michael, 429  
 Spruyt, Adriaan, 111, 271  
 Spyra, Karla, 417  
 Srowig, Annie, 430  
 Stahl, Christoph, 18, 61  
 Stahl, Jutta, 271  
 Stahl, Laura, 430  
 Stahlberg, Dagmar, 232, 252, 425, 445  
 Stamenova, Vessela, 168  
 Stamm-Balderjahn, Sabine, 417  
 Stanek, Joséphine, 228, 272  
 Stangl, Matthias, 379  
 Starcke, Katrin, 253, 283, 367  
 Stefanel, Delia, 431  
 Steffens, Melanie, 81, 370, 371  
 Steib, Nadine, 226  
 Steimke, Rosa, 273, 402, 431  
 Stein, Timo, 347  
 Steinbeis, Nikolaus, 272  
 Steinberg, Fabian, 324, 424  
 Steinborn, Michael B., 354  
 Steinbrink, Claudia, 51, 284  
 Steindorf, Lena, 421  
 Steinfeld, Jan, 105

## Author Index

Steinhauser, Marco, 73, 273  
Stelzel, Christine, 273, 402, 431  
Stelzer, Ralph H., 410  
Stenneken, Prisca, 303  
Stenzel, Anna, 274, 375  
Stephan, Denise N., 274, 369  
Stern, Elsbeth, 202  
Sterr, Annette, 327  
Sterzer, Philipp, 347  
Stieger, Stefan, 335  
Stöckel, Tino, 275  
Stodt, Benjamin, 432  
Stoll, Julia, 109  
Stolzmann, Wolfgang, 369  
Straßer, Irene, 153  
Strauß, Sabine, 153  
Streicher, Mathias, 254  
Strickrodt, Marianne, 432  
Strobach, Tilo, 222, 239  
Strozyk, Jessica V., 433  
Struck, Steffi, 275  
Struckmann, Wiebke B., 433  
Studte, Sara, 434  
Sturmeit, Peter, 305  
Su, Yi-Huang, 434  
Suchotzki, Kristina, 435  
Suessenbach, Sophie, 276  
Sülzenbrück, Sandra, 353, 435  
Sumathi, T. A., 409  
Süssenbach, Sophie, 146  
Suter, Renata, 276  
Svenson, Ola, 73, 277  
Swinnen, Stephan, 158  
Szöllösi, Aba, 83

## T

Takács, Szilvia, 436  
Takashima, Atsuko, 180  
Tanguay, Annick F., 168  
Taube, Julia, 436  
Taubner, Svenja, 46  
Tavano, Alessandro, 377  
Teige-Mocigemba, Sarah, 277  
Telle, Nils-Torge, 401  
Tempel, Tobias, 278  
Teodorescu, Kinneret, 278  
Tervaniemi, Mari, 308  
Thaler, Hannah, 263  
Thiel, Carolin, 445  
Thielmann, Isabel, 437  
Thoben, Deborah F., 113, 279

Thoma, Volker, 159  
Thomaschke, Roland, 279  
Thon, Franziska M., 280  
Thöne-Otto, Angelika, 302  
Thorn, Paul D., 280  
Thornton, Wendy L., 21  
Thüring, Manfred, 66, 292  
Tiemann, Sonja, 419, 437  
Tiggelbeck, Jens A., 438  
Timm, Jana, 438  
Tittgemeyer, Marc, 71  
Tkalych, Marianna, 439  
Tobinski, David A., 281  
Tomaschek, Anne, 109  
Tomaszewski, Michael, 281  
Tomova, Livia, 282  
Topolinski, Sascha, 58  
Totzke, Ingo, 282, 293  
Touiron, Dayna R., 161, 236, 364  
Toygat, Timur K., 377  
Trakowski, Anatina, 439  
Traue, Harald, 148  
Trautmann, Mireille, 440  
Trautner, Peter, 116  
Trecani, Barbara, 264  
Tripathi, Vivek, 129  
Trotzke, Patrick, 283, 367  
Trübswetter, Nicole, 440  
Trumpp, Natalie M., 283  
Tsang, Pui Kei J., 169  
Tscharn, Robert, 441  
Tünnermann, Jan, 284  
Turetsky, Bruce I., 398  
Tuschen-Caffier, Brunna, 34

## U

Ueltzhöffer, Kai, 19  
Uengoer, Metin, 388  
Ullrich, Sebastian, 441  
Ulrich, Martin, 144  
Ulrich, Rolf, 68, 255, 330, 341, 346, 407  
Ulshöfer, Corina T., 414, 442  
Ulytska, Bogdana, 284  
Umbach, Nora, 285  
Undorf, Monika, 285, 357  
Unkelbach, Christian, 286  
Urschler, David, 286

## V

Vaes, Jeroen, 180  
Valuch, Christian, 287

Van den Wildenberg, Wery, 122  
 Van der Linden, Dimitri, 339  
 Van der Meer, Elke, 240  
 Van Dick, Rolf, 87  
 Van Eimeren, Lucia, 303  
 Van Ermingen-Marbach, Muna, 111, 288  
 Vangkilde, Signe, 289  
 Van Hell, Janet, 180  
 Van Leeuwen, Cees, 163  
 Van Maanen, Leendert, 36  
 Van Rijn, Hedderik, 36, 289, 378  
 Varga, Máté, 428  
 Vartak, Devavrat, 28  
 Västfjäll, Daniel, 290  
 Vaterrodt, Bianca, 356  
 Vázquez, Carmelo, 407  
 Velichkovsky, Boris M., 207, 361, 362,  
 384, 410, 423  
 Veltkamp, Marina, 247  
 Verschuere, Bruno, 341, 435  
 Vervliet, Bram, 92  
 Vida, Péter, 428  
 Villringer, Arno, 124  
 Virányi, Zsófia, 290  
 Vitouch, Oliver, 154, 358  
 Viviani, Roberto, 46  
 Vo, Melissa L., 291  
 Vocke, Sebastian, 377  
 Voelcker-Rehage, Claudia, 440  
 Vogel, Carina M., 161  
 Vogel, Edward, 179  
 Vogel, Marlene, 292  
 Vogel, Tobias, 291  
 Voigt, Gesine, 176  
 Volberg, Gregor, 292  
 Volk, Madeline, 282, 293  
 Vollrath, Mark, 86, 117, 201, 223, 275,  
 293, 313, 314  
 Volz, Kirsten G., 294, 329, 365, 449  
 Von Bastian, Claudia C., 294  
 Von Hammerstein, Ruth, 350  
 Von Helversen, Bettina, 120, 295  
 Von Kriegstein, Katharina, 33  
 Von Mühlennen, Adrian, 53, 295  
 Von Sydow, Momme, 296  
 Vorberg, Dirk, 96  
 Vorstius, Christian, 220  
 Voß, Andreas, 96, 152, 166, 196, 296  
 Votinov, Mikhail, 297

**W**

Wabnitz, Pascal, 367, 442  
 Wachtmeister, Jana, 395  
 Wagner, Ullrich, 298  
 Wagner, Valentin, 132, 297  
 Waldmann, Michael R., 196, 200, 239,  
 406  
 Walser, Moritz, 298  
 Walter, Henrik, 273, 298, 402, 431  
 Walter, Maik, 72  
 Walter, Stefan, 443  
 Walther, Christian, i, 299  
 Walther, Katrin, 350  
 Wang, Chenbo, 155  
 Wang, Lei, 443  
 Wänke, Michaela, 94, 185  
 Wascher, Edmund, 299  
 Wassenberg, Annette, 377  
 Wassiliwizky, Eugen, 132  
 Watrin, Luc, 127  
 Watson, Sarah, 98  
 Waubert de Puiseau, Berenike, 300  
 Weaver, Kristin, 211  
 Weber, Andrea, 25  
 Weber, Andreas, 301  
 Weber, Bernd, 116, 176  
 Weber, Stefanie, 300, 418  
 Wegerer, Melanie, 301  
 Wegmann, Elisa, 246  
 Weichselgartner, Erich, 302  
 Weicker, Juliane, 302  
 Weidenfeld, Caren, 377  
 Weidner, Ralph, 215, 404  
 Weidner, Wiebke, 425  
 Weigelt, Matthias, 114, 130, 316  
 Weiland, Peter, 302  
 Weilharter, Marina, 132  
 Weinreich, André, 394  
 Weinzierl, Christian, 303  
 Weinzierl, Christiane, 303  
 Weiss, Daniel, 316  
 Weiß, Katharina, 104, 304  
 Welchman, Andrew E., 416  
 Welleditsch, David, 304  
 Weller, Gert, 305  
 Wenderoth, Nicole, 158  
 Wendt, Mike, 305  
 Wenke, Dorit, 306, 387  
 Wentura, Dirk, 84, 172, 210, 214, 232,  
 306, 419, 424  
 Wenz, Hans-Jürgen, 26

## Author Index

Werheid, Katja, 83, 130  
Werkle-Bergner, Markus, 186  
Werneke, Julia, 117, 313  
Werner, Karsten, 444  
Werner, Natalie S., 307, 345  
Werthmann, Jessica, 307  
Wesslein, Ann-Katrin, 308  
Westerholz, Jan, 444  
Wetter, Thomas C., 38  
Weyers, Peter, 35  
Widmann, Andreas, 308  
Wiegand, Iris, 309  
Wienecke, Beate, 433  
Wienrich, Carolin, 309  
Wiers, Reinout W., 310  
Wiese, Holger, 153, 310  
Wiggins, Geraint, 169  
Wild, Claudia, 311  
Wildbrett, Jan, 445  
Wilhelm, Frank H., 227, 301  
Wilke, Andreas, 295  
Will, Sebastian, 311  
Williams, Steven C., 74, 211  
Williamson, Victoria J., 241  
Willing, Sonja, 312  
Willmes, Klaus, 127, 146, 315  
Wilson, Robert C., 72  
Wiltfang, Jörg, 26  
Wimmer, Lena, 312  
Windischberger, Christian, 263  
Winkler, Isabell, 445  
Winkler, Susann, 293, 313  
Wirth, Caroline N., 446  
Wirth, Maria, 446  
Wirth, Robert, 215, 313  
Wirzberger, Maria, 314  
Witteman, Marijt J., 25  
Wolfensteller, Uta, 351, 450  
Wollstaedter, Sabine, 314  
Wolter, Sibylla, 447  
Woltin, Karl-Andrew H., 315  
Wood, Guilherme, 315

Wörner, Rike, 155  
Woud, Marcella, 406  
Wozny, David R., 223  
Wu, Esther, 211  
Wucherer, Anna M., 214  
Wulff, Dirk U., 316  
Wunsch, Kathrin, 114, 130, 316  
Wurm, Moritz F., 365  
Wüstenberg, Torsten, 228, 254  
Wutz, Andreas, 292, 447

## Y

Yen, Shih Cheng, 211  
Yuan, Chunrong, 349  
Yuras, Gabriel, 127, 448  
Yzerbyt, Vincent Y., 315

## Z

Zaiser, Ann-Kathrin, 448  
Zanardi, Alain, 67  
Zander, Thea, 449  
Zang, Xuelian, 449  
Zäske, Romi, 317, 417  
Zehetleitner, Michael, 248, 368  
Zeithofer, Josef, 110  
Zekveld, Adriana, 317  
Zeldovich, Marina, 450  
Zettler, Ingo, 118  
Zhang, Kai, 155  
Zhuanghua, Shi, 449  
Ziegler, Johannes, 41  
Zierdt, Andreas, 354  
Zihl, Josef, 350  
Zill, Peter, 113  
Zimmer, Ulrike, 318  
Zimmermann, Kerstin, 425  
Zimmermann, Lena, 154  
Zink, Janina, 107  
Zrinzo, Ludvic, 376  
Zwanzger, Peter, 63  
Zwitserslood, Pienie, 44, 64, 96  
Zwosta, Katharina, 450