



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

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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

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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

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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

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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 (3×3) 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.