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Joachim Funke, Jan Rummel & Andreas Voss

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Content

Keynote Lectures

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

Asher Koriat
University of Haifa, Israel

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

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

Eric-Jan Wagenmakers
University of Amsterdam, Netherlands

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

Experimental evidence for major emotion theories:
A comparative survey

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Ludwig-Maximilians-Universität München
& Swiss Center for Affective Sciences, Geneva, Switzerland

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

Contributions

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

Magdalena Abel & Karl-Heinz T. Bäuml

University of Regensburg

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

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

Fabian Ache & Mandy Hütter

Eberhard-Karls-Universität Tübingen

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

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

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

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[a] Ludwig-Maximilians-University of Munich, [b] University of Potsdam, [c] University of Wuppertal

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

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

Stefan Ahrens[a], Oliver Behler[a], Anja Gieseler[a], Sarah Querbach[a], Carsten Giessing[a], Sebastian Markett[b], Thomas Breckel[a], Martin Reuter[b] & Christiane Thiel[a]

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

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

Statistical learning for psychologists

Johannes Albert-von der Gönna

Ludwig-Maximilians-Universität München

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

An exemplar-based random walk model for quantitative estimation

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

The cost of awareness: Attentional blink or awareness blink?

Eyal Alef Ophir[a] & Dominique Lamy[b]

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

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

Binocular rivalry: From emotion to psychopathology

Georg W. Alpers & Antje B.M. Gerdes

University of Mannheim

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

The role of the evaluative information ecology for social comparison processes

Hans Alves, Alex Koch & Christian Unkelbach

Universität zu Köln

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

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

Research Assistant - A mobile data collection and analysis framework

Ionut Andone

Rheinische Friedrich-Wilhelms-Universität Bonn

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

An explorative case study of representational change in problem solving

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

Time on task and pause effects on theta and alpha power

Stefan Arnau & Edmund Wascher

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

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

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

Denis Arnold, Florence Lopez, Tino Sering, Fabian Tomaschek & Harald Baayen

Eberhard-Karls-Universität Tübingen

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

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

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

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

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

Peter-Samuel Arslan & Klaus Fiedler

Heidelberg University

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

Similarities and differences in eye movements during valuation and choice

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Technion - Israel Institute of Technology

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

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

Adaptive memory: Animacy processing enhances young children`s retention

Alp Aslan

Martin Luther University Halle-Wittenberg

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

The revelation effect depends on task difficulty and placement

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

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

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

Frederik Aust & Christoph Stahl

University of Cologne

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

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

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

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

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Johannes Gutenberg University, Mainz

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

picture-picture pairs.

Dynamics of user experience and trust in websites

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

Evaluative conditioning for objectively supraliminal, but subjectively subliminal CSs

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

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

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

Facial attractiveness and the cone of gaze

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

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

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

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

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

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

Comfort inside an aircraft – A mixture of methods

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

Wahl ohne Qual – Der Einfluss von Farben auf die Entscheidungsfindung

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

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

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

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

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

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

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

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

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

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

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

Brain oscillatory signatures of voluntary resource allocation in working memory

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Olfaction and emotion

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

Mentalizing processes in aesthetic appreciation of conceptual art

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

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

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

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

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

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

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

Doing is for feeling

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A new global matching explanation for the revelation effect

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

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

Synaptic plasticity and motor learning in Tourette patients

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