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Content

Keynote Lectures

Neurocognitive Mechanisms of Contextual Adjustments in Cognitive Control

Tobias Enger
Duke University

When routine behavior runs into trouble, "cognitive control" processes are recruited to bring information processing in line with current demands. For instance, encountering an almost-accident on our commute will reinforce our attentional focus on the traffic and away from the radio. How does the brain accomplish this? In this talk, I will present behavioral, neuroimaging, and neuro-stimulation data that delineate the cognitive and neural mechanisms underlying our ability to adapt to changing task demands. Specifically, I will present a "control learning" perspective that views cognitive control as being guided by learning and memory mechanisms, exploiting statistical regularities in our environment to anticipate the need for control. Control learning not only adapts attentional sets to changing demands over time, but it can also directly associate appropriate top-down attentional sets with specific bottom-up cues. This type of learning holds the promise of combining the speed of automatic processing with the flexibility of controlled processing, and could form the basis of novel interventions in clinical conditions that involve impaired cognitive control.

Social signalling as a framework for understanding human non-verbal behaviour

Antonia Hamilton
University College London

Face to face social interactions between two people involve a rich exchange of verbal and non-verbal signals, but the cognitive and neural mechanisms supporting dynamic interactions remain poorly understood. This talk will use a social signalling framework to make sense of one particularly social behaviour – imitation – which has been described as a 'social glue' that causes affiliation and liking. However, it is not clear what cognitive and brain mechanisms could link imitation to affiliation. By placing the 'social glue' hypothesis within a signalling framework, it is possible to make specific testable predictions for how and why we imitate. First, to act as social glue, imitation should be produced when another person is watching and can receive the imitation signal. Second, the person watching should change their evaluation of the imitator. I will describe a series of studies which test the first of these predictions in detail, using a behavioural and neuroimaging methods with infants, children, typical adults and adults with autism spectrum condition. The results converge in showing that being watched increases the tendency to imitate, and supports the interpretation of imitation as a signalling behaviour.

Building on this, the second part of this talk describes the new methods available to explore social signalling behaviour in live interactions. Using detailed motion capture together with wavelets analysis, we can track and quantify precise patterns of natural mimicry behaviour and other social cues in two person conversation. Using functional near-infrared spectroscopy, we can record neural signatures of imitating and being imitated while freely-moving attendees are engaged in naturalistic tasks. These new approaches can give deeper insights into the details of social behaviour and allow us to define the neural mechanisms of dynamic social interactions. Applying these methods and interpreting them within the context of a social signalling framework shows how we can turn the idea of 'second person neuroscience' into a concrete reality.

Ecological Language: A Multimodal Approach to Language Learning and Processing

Gabriella Vigliocco
University College London

The human brain has evolved the ability to support communication in complex and dynamic environments. In such environments, language is learned, and mostly used in face-to-face contexts in which processing and learning is based on multiple cues both linguistic and non-linguistic. Yet, our understanding of how language is learnt and processed comes for the most from reductionist approaches in which the multimodal signal is reduced to speech or text. I will introduce our current programme of research that investigates language in real-world settings in which learning and processing are intertwined and the listener/learner has access to – and therefore can take advantage of – the multiple cues provided by the speaker. I will then describe studies that aim at characterising the distribution of the multimodal cues in the language used by caregivers when interacting with their children (mostly 2-3 years old) and provide data concerning how these cues are differentially distributed depending upon whether the child knows the objects being talked about (allowing us to more clearly isolate learning episodes), and whether the objects are present (ostensive vs. non-ostensive). I will then move to a study using EEG addressing the question of how discourse but crucially also the non-linguistic cues modulate predictions about the next word in a sentence. I will conclude discussing the insights we have and (especially) can gain using this real world, more ecologically valid, approach to the study of language.

Contributions

On the limited impact of media source credibility on social judgments based on emotional headlines

Rasha Abdel Rahman[1] & Julia Baum
[1] *Humboldt-Universität zu Berlin, rasha.abdel.rahman@hu-berlin.de*

Since news spreads rapidly and reaches millions, the ability to distinguish between credible and less credible media sources may be more crucial than ever. Yet, recent behavioral and electrophysiological evidence suggests that social judgments are primarily based on emotional contents of headlines independent of source credibility. Here we investigate influences of emotional headlines and source credibility on pupil size as a measure of exerted cognitive effort, and on behavioral measures of confidence related to social judgments. Thirty participants read headlines about the social behavior of depicted unfamiliar persons from websites of well-known German news media that are perceived as credible or less credible. Persons paired with emotional headlines were judged more negative or positive than persons associated with neutral headlines, and emotional judgments were faster and made with more confidence than neutral judgments. None of these effects was modulated by source credibility. Pupil dilation during social judgments was reduced for emotional relative to neutral judgments, and less credible sources were associated with larger pupil dilatation relative to credible sources only in response to neutral headlines. These findings complement recent electrophysiological evidence in demonstrating a dominant influence of emotional contents of headlines independent of source credibility. They also shed light on a potential mechanism. Cognitive resources to evaluate the credibility of news may primarily be allocated to neutral, but not to emotional contents.

Voluntary forgetting of outdated information across prolonged delay: Testing theoretical accounts of list-method directed forgetting

Magdalena Abel[1] & Karl-Heinz T. Bäuml
[1] *Universität Regensburg, magdalena.abel@ur.de*

People can purposefully forget information that is irrelevant and no longer needed. In the lab, such forgetting of outdated information is often examined by means of list-method directed forgetting (LMDF). Several accounts have been proposed to explain LMDF, but despite decades of research, there is still no agreement concerning the mechanism(s) mediating it. Here, we used prolonged retention intervals to examine two specific accounts of LMDF, namely mental context change and selective rehearsal. Experiment 1 probed the mental context change account by contrasting LMDF with context-dependent forgetting across two delay intervals. The results showed intact LMDF, but eliminated context-dependent forgetting with longer delay, which is inconsistent with the context-change account. Experiment 2 probed the selective-rehearsal account by contrasting the longevity of LMDF across intentional and incidental encoding. The results showed persistent LMDF for both types of encoding, which indicates that selective rehearsal is not critical for the persistence of LMDF. Together, the findings indicate that context change and selective rehearsal cannot account for persistent LMDF, thus more generally challenging contemporary noninhibitory accounts of LMDF.

Denktraining 2.0: Macht die Trainingsperson den Unterschied?

Laura Ackermann[1] & Heiner Rindermann
[1] *Technische Universität Chemnitz, laura.ackermann@psychologie.tu-chemnitz.de*

Die Denktrainings von K. J. Klauer zur Schulung induktiven Denkens gelten als die empirisch am besten geprüften kognitiven Trainings im deutschsprachigen Raum (Hasselhorn, XXXX). Das Trainingsprogramm „Keiner ist so schlau wie ich" (KISSWI; Klauer, 2007/2009/2011) stellt eine zeitgemäße und ökonomische Version für Kinder im Vorschul- und Schuleintrittsalter dar. Allerdings wurde das KISSWI ursprünglich als Einzeltraining konzipiert. Ein Dissertationsprojekt an der TU Chemnitz untersucht nun, inwieweit dieses Trainingsprogramm auch bei einer Durchführung in Gruppen von ca. zehn Kindern wirksam ist. Die vorliegende Teilstudie überprüft drei Hypothesen: (H1) Das Gruppentraining erzielt im Vergleich zum Einzeltraining ähnlich hohe Effekte auf die kognitiven Fähigkeiten der trainierten Kinder. (H2) Das Gruppentraining erzielt, wenn es von (geschulten) Psychologiestudierenden durchgeführt wird, im Vergleich zu einer Leitung durch Erzieherinnen, ähnlich hohe Effekte. (H3) Das Gruppentraining erzielt vergleichbare Ergebnisse bei Kindern im Vorschul- und Schuleintrittsalter. Die Effekte des Gruppentrainings wurden mit einer Wartekontrollgruppen-Studie im Prä-Post-Design bei Vorschul- und Grundschulkindern der ersten Klasse getestet. Die Vorschul-Stichprobe umfasste 127 Kinder (M=6;3 Jahre). 60 der Kinder wurden von Ihren BezugserzieherInnen aus der Kita trainiert (31 Kinder in der Experimentalgruppe [EG]; 29 Kinder in der Wartekontrollgruppe [WKG]). Die verbleibenden 67 Vorschulkinder (EG=33; WKG=34) wurden von geschulten Master-Studierenden der Psychologie trainiert. In der Grundschul-Stichprobe waren 128 Kinder (M=7;1 Jahre). 59 der Grundschulkinder (EG=29; WKG=30) wurden von ihren betreuenden HorterzieherInnen trainiert und 69 Kinder (EG=36; WKG=33) erhielten das Training von geschulten Master-Studierenden der Psychologie. Die gewonnenen Daten werden aktuell noch analysiert, die Ergebnisse liegen im Januar 2020 vor.

Trait empathy affects expectancy and subsequent neural processing of observed actions

Christine Albrecht[1] & Christian Bellebaum
[1] *Heinrich-Heine-Universität Düsseldorf, christine.albrecht@hhu.de*

Accumulating evidence suggests that activity in the anterior cingulate cortex after observed actions reflects an action prediction error rather than, as previously thought, the coding of response accuracy. This process seems to be modulated by trait empathy, but the underlying mechanisms remain to be explored. In this study we aimed to examine these mechanisms further by applying a paradigm in which observer participants' expectations concerning the outcome of the actions of an observed person were modulated by two experimental manipulations. These were true vs. false-belief of the observed person, which we expected to be especially dependent on empathy (as was shown by previous studies on false-belief tasks) as well as task difficulty (easy vs. hard), which we expected to be less dependent on empathy. Empathy and expectation affected event-related-potential amplitudes between 100 and 250 ms after the observed response: less expected events, that is, correct answers in the false-belief condition and incorrect answers in the true-belief condition, led to higher amplitudes compared to more expected events in easy trials, but this effect emerged only for highly empathic individuals. Interestingly, behavioral measures of expectation were similarly affected by empathy, suggesting that empathy helps expectation formation and that these expectations then affect electrophysiological responses.

Liking and perceived colour of abstract art

Carolin S. Altmann[1], Anselm Brachmann & Christoph Redies
[1] *Universitätsklinikum Jena, Friedrich-Schiller-Universität Jena, carolin.altmann@uni-jena.de*

Colour has been a defining feature of paintings throughout art history. Despite the great diversity in the use of colour between epochs, there are some surprisingly stable and unifying features in chromatic properties across visual artworks. For example, artists' palettes seem to be biased towards the yellow-red range of the spectrum. Here, we assess the impact of a global colour manipulation (i.e. rotating the colour gamut) on aesthetic liking and perceived colourfulness of abstract paintings. We presented six versions each of 100 abstract artworks that differed only in the rotational degree of their colour gamut within the CIELAB colour space. Results indicated a very stable preference for the original colour compositions – both on a participant level and on an item level. Furthermore, participants perceived original colour compositions as more colourful than rotated versions. This effect remained robust even when the exact number of different colours – among other chromatic features – were taken into account in covariate analyses. Thus, it seems that original colour compositions are inherently special. Specifically, it seems that the aesthetic appeal of original artworks arises from non-trivial colour features, which are characterized by their distribution within the visible spectrum. We assume that the rotation manipulation may change the perception of some colours more strongly than others due to differences in sensitivity of our visual system to these hues. We discuss these findings with respect to this category-specific colour perception as a potential contender for a neurobiological foundation of the observed effects.

The indirect task advantage on low-level sensory input: new insights on unconscious priming

Catarina Amado[1], Sascha Meyen, Iris Zerweck & Volker Franz
[1] *Eberhard Karls University Tübingen, catarina.amado@uni-tuebingen.de*

In unconscious priming a masked prime stimulus influences the behavioural and neural responses of a subsequent target stimulus (indirect task) even though participants are close to chance-level when directly discriminating the prime (direct task). Many studies report such effects on various tasks and stimuli with high- and low-level properties, interpreting it as an advantage of the indirect task over the direct task; a pattern we dubbed "indirect task advantage" (ITA). Typically, an ITA is interpreted as evidence for probing preserved unconscious processing of the prime in the indirect task, while absence of conscious awareness of the prime was established in the direct task. However, we demonstrated that the predominant statistical rationale used in the literature to infer an ITA is flawed and can lead to erroneous conclusions. Only when there is a good indirect discrimination of the prime stimuli (determined by using the priming effect to discriminate the primes) and a poor direct prime discrimination, we can state that there is an advantage of the indirect task over the direct task. In six experiments (total N=96), we tested whether an ITA exists for low-level stimuli (Gabor patches) and investigated the role of masking technique and peripheral presentation. Overall, we found in almost all conditions no evidence for an ITA if appropriate methods are used. This stands in stark contrast to the literature that has reported ITAs as being almost ubiquitous.

A study of the factors influencing the perceived temporal order of action and sensory events

Desantis Andrea[1]
[1] *ONERA, andrea.desantis@onera.fr*

Time perception and causality are intimately connected. For instance, people are more likely to report two events as causally linked if they follow each other closely in time than if they are separated by a long delay. In addition, causes must precede effects and effects cannot precede causes. However, humans do not have a sense dedicated to timing. How then does the brain determine the temporal gap separating two events and how does it decide which one came first? Research suggests that the brain meets this challenge by combining and comparing available sensory information to internal representations such as prior expectations. I will present a series of studies investigating whether the temporal order of action and sensory events is altered by internal representations such as action preparatory processes, sensory prediction and causal assumptions. These studies suggest that the perception of the temporal order of actions and sensory events is shaped by prior causal expectation and action preparatory processes. However, sensory prediction impacts time perception only if causality is preserved.

Is this real Horror? Comparing Virtual Reality based Stress Induction to Real-Life Scenarios

Albert Anoschin[1], Kai Achtermann, David Daxberger, Maike Lindhaus, Jarek Krajewski & Sebastian Schnieder
[1] *Institut für Experimentelle Psychophysiologie, a.anoschin@ixp-duesseldorf.de*

The Trier Social Stress Test (TSST) is a standardized paradigm simulating a job application interview and is currently one of the most used methods to elicit high levels of stress in experimental laboratory settings. However, the disadvantages of this procedure are the context-specific stress induction, the interindividual fluctuations in effectiveness, and the required personnel resources. We asked whether high immersive virtual reality (VR) environments can induce comparable or even higher amounts of intrapersonal stress in a more resource efficient way and compared both approaches using objective psychological and physiological measurement methods. For this purpose, we recorded electrodermal activity (EDA) and electrocardiographic (ECG) data in a sample of N = 60 Caucasian adults playing a commercially available VR horror game and participating in the TSST. In addition to the objective physiological measures, subjective ratings of valence and arousal were collected after each task. Our results provide promising insights into the suitability of VR applications as easily applicable solutions for emotion and stress induction in experimental settings and potentially for development of stress-management settings.

The role of motor-sensory and inter-sensory components in motor-sensory recalibration

Belkis Ezgi Arikan[1], Bianca Van Kemenade, Katja Fiehler, Tilo Kircher, Knut Drewing & Benjamin Straube

[1] *Justus Liebig University Giessen, Ezgi.Arikan.Seefeldt@psychol.uni-giessen.de*

Adaptation to systematic temporal lags between our actions and their sensory feedback is known as motor-sensory recalibration. The exact mechanism underlying motor-sensory recalibration remains to be investigated. First, the contribution efferent vs. re-afferent feedback needs to be examined. Second, it is not clear whether recalibration is present only for the adapted sensory modality or whether it transfers across senses. In this study, we investigated the role of efferent vs. re-afferent feedback on motor-sensory recalibration, and whether it transfers across sensory modalities. Participants initiated button presses triggering an auditory or a visual stimulus that was either presented immediately or lagged in time (150ms). The button was pressed by the participant either actively or passively by a passive movement device (passive button). The participants were then asked to detect variable delays between the button presses and the subsequent sensory feedback. The test stimulus could be either within the recalibrated modality or the other modality (cross-modal). We found motor-sensory recalibration within the adapted modality irrespective of the type of sensory feedback when the movement during recalibration was active. For passive movements, recalibration was present only for the visual modality. Moreover, participants were more precise for active than passive movements at recalibration. Our results show motor-sensory recalibration within the adapted sensory modality highlighting the importance of learned action-feedback associations. Although efferent feedback alone does not seem to drive motor-sensory recalibration, our results demonstrate more robust motor-sensory recalibration effects when efferent feedback is present.

Overshadowing in Contingency Learning and Stimulus-Response Binding and Retrieval

Mrudula Arunkumar[1] & Carina G. Giesen

[1] *Friedrich-Schiller-Universität Jena, Germany, mrudula.arunkumar@uni-jena.de*

Storage and retrieval of episodic stimulus-response (SR) bindings are core mechanisms of action regulation. Yet, it is an unresolved issue how these transient SR bindings relate to longer lasting learning effects. Empirical findings are scarce and unsystematic so far. The present talk explores the relation between transient SR bindings and principles of Pavlovian Conditioning. A series of experiments addresses to which extent SR binding and learning effects reflect similar or different mechanisms. We used an overshadowing procedure to test whether transient binding effects for distractors "mimic" typical overshadowing effects, that is, whether binding effects are attenuated for a distractor presented together with another, but more salient, distractor. This approach has the potential to unravel how processes of selective prioritization will impact on SR binding. Furthermore, it will provide first insight to which extent transient SR bindings might be understood as the "cognitive bases" of longer lasting learning effects.

Discomfort detection in autonomous driving using artificial neural networks

Roghayyeh Assarzadeh[1], Franziska Hartwich, Julien Vitay & Franziska Bocklisch
[1] *TU Chemnitz, roghayyeh.assarzadeh@informatik.tu-chemnitz.de*

With the role change from driver to passenger inhered in driving automation, human factors such as driving comfort are considered important requirements for the broad acceptance and usage of this technology. The real-time detection of discomfort during automated driving could provide the basis for strategies to improve driving comfort, for instance via information presentation or driving style. Potential indicators of discomfort include physiological, environmental and vehicle parameters from different sensors. The reliable detection of discomfort based on a combination of such indicators contains a lot of complexity. Artificial intelligence advances lead to rapid solving of problems with high complexity and artificial neural networks suggest the ability to deal with these challenges. Based on sensor data of a driving simulator study with 25 participants who experienced several uncomfortable traffic situations (e.g. intersections with conflict potential), we aimed to (a) identify suitable parameters to detect discomfort using neural networks and (b) identify the best model (MLP vs. LSTM and simple vs. cascade models) to detect discomfort using these parameters. Overall, LSTM models show better performances and cascade models outperform simple models.

Let's tailor models to research, not vice versa

Andre Aßfalg[1] & Karl Christoph Klauer
[1] *Albert-Ludwigs-Universität Freiburg, andre.assfalg@psychologie.uni-freiburg.de*

In several contexts, it is useful to know whether there is consensus among a group of people. Such consensus may concern eyewitnesses reporting about the details of a crime, voters expressing their political views, or experts suggesting best practices for their field. Specifically, if each member of a group answers a set of questions, consensus analysis offers estimates of whether there is a group consensus, what this consensus is, and to what degree each respondent answered in line with the consensus. In previous consensus-analysis models, each model focused on a specific response format such as dichotomous yes-no responses or numerical continuous responses. Consequently, researchers had to adapt all questions to a specific response format—with mixed results. Dissatisfied with the constraints this placed on our research, we developed an extension of consensus analysis that allows the flexible mixture of response formats within a question set. This enables researchers to choose which response format best fits the content of each question rather than forcing the content into the constraints of the model. We present the conceptual foundations of the model and the results of model-validation studies. We conclude with a brief discussion about the implementation of varying response formats in measurement models and substantive models in Psychology.

Spontaneous vicarious perception of another´s visual perspective: social and non-social influences

Patric Bach[1], Eleanor Ward & Giorgio Ganis
[1] *University of Plymouth, patric.bach@plymouth.ac.uk*

Visual perspective taking (VPT) provides people with direct insights into how the environment looks from another's point of view. Here, I will review evidence for a recent series of studies that VPT can be understood as a (quasi-)perceptual phenomenon, in which another's perspective "stands in" for own sensory input and drive perceptual decision making. Using a variant of the mental rotation task, these studies show that participants can recognize items oriented away from themselves more rapidly when these items appear in a more canonical orientation to an incidentally presented another person (and slower when oriented even further away from them). These effects are of large effect size and observed even when the other person is completely passive and task-irrelevant. They therefore show that people spontaneously derive the content of another's perspective in a form that can drive perceptual processing like one's sensory input. They are affected by several social and non-social factors, such as whether participants explicitly take the other's perspective or do so spontaneously, whether the other person attends to the same object as oneself , or whether one is in the presence of another human or an object to which various levels of mental states can be ascribed (e.g. robots, inanimate objects). Together, these findings argue for a framework in which perceptual anticipations of another's perspective underlie social cognition, helping us to understand not only how other's view the world, but also letting us vicariously explore how they would respond to it.

The main effect of US valence in relational EC paradigms is a propositional phenomenon

Karoline Bading[1], Frederik Aust, Klaus Rothermund & Christoph Stahl
[1] *University of Cologne, kbading@uni-koeln.de*

Evaluative conditioning (EC) refers to a change in valence brought about by stimulus pairings. A traditional EC procedure consists of repeated pairings of neutral "conditioned" stimuli (CSs) with positive or negative "unconditioned" stimuli (USs) and does not provide additional information on the meaning of these pairings. By contrast, relational EC paradigms combine a manipulation of US valence with an additional manipulation of CS-US relations which specifies the meaning of the CS-US pairings. Whereas traditional EC procedures typically yield a main effect of US valence, the most common finding in relational EC paradigms is an interaction of US valence and CS-US relation; specifically, a regular EC effect when CS-US pairings are accompanied by an assimilating relation (e.g. cause), and a reversed EC effect when CS-US pairings are accompanied by a contrasting relation (e.g. prevent). Whereas this interaction unequivocally demonstrates the role of propositional learning in EC, the additional finding of a main effect of US valence is interpreted as evidence for a parallel influence of association formation. This main effect is due to the fact that the reversed EC effect in the contrasting condition is in absolute terms smaller than the regular EC effect in the assimilating condition. Whereas dual-process accounts of EC can explain this pattern as the result of the presence of evaluative proposition as well as associations, we present data suggesting that the main effect of US valence is a propositional phenomenon and does not provide evidence for association formation.

How skewed! The role of one's own body positions on the Simon task

Pamela Baess[1] & Christina Bermeitinger
[1] *University of Hildesheim, baessp@uni-hildesheim.de*

In spatial compatibility tasks such as the Simon task, faster responses are observed when the stimulus code and the response code overlap. It was previously shown that the (non-) alignment of stimulus position and response position, i.e. by rotating either one, modulated the size of the observed Simon effects. However, the role of one's own body position in spatial compatibility tasks has not yet been considered so far. Using a human gyroscope, the participants performed a variant of the Simon task with stick-figure manikins holding a colored ball in one hand allowing the formation of multiple spatial (i.e. based on manikin's screen position and ball position) and non-spatial perceptual reference frame (based on the amount of manikins simultaneously shown on the screen, 1-manikin vs. 9-manikin display). The participant's own body position was rotated block-wise during the Simon task, i.e. upright, 20° shifted to the left and right side of the body axis, respectively. Two experiments were conducted using this setup. In Experiment 1, both manikin displays were presented within one block. Experiment 2 used, in contrast, a block-wise presentation of the different manikin displays. Simultaneous Simon effects based on manikin's ball and screen position were only yielded for the upright body position in the 1-manikin display. Rotating the participant's body position to the horizontal axis abolished the Simon effect based on ball position. Consequently, considering one's own body position offers a new perspective on the cognitive representations underlying spatial compatibility.

The spatial self: On the interplay between the self and spatial cognition

Pamela Baess[1]
[1] *University of Hildesheim, baessp@uni-hildesheim.de*

In this talk, we present evidence from two experimental lines combining spatial compatibility tasks such as the Simon task with task-irrelevant self-related stimulus material. In Experiment 1, participants responded to the color of a dot superimposed on photos of different faces (one's own, co-actor's face, stranger's face) presented on the left or right side of the screen's center. In Experiment 2, whole-body photos of different humans (one's own, stranger's photo) holding a colored ball in either hand presented on either side of the screen's center were utilized. In both experiments, the task-relevant feature required a classification based on the stimulus color whereas the stimulus location was task-irrelevant. Therefore, two kinds of compatibility effects could be considered, i.e. based on the spatial compatibility between the stimulus location and the response (i.e. the Simon Effect) and based on the compatibility between the identity of the actor on the photo and the responding agent (i.e. Photo-Agent Effect). In Experiment 1, the spatial compatibility effect was more salient than the identity-based compatibility effect. Experiment 2 found evidence for both, i.e. spatial and identity-based compatibility effects. Using both, i.e. task-irrelevant self-relatedness and task-irrelevant spatial location, shifted the cognitive weights associated with the spatial and identity-based compatibility.

The relation between bottom-up attention and awareness in visual masking

Diane Baier[1], Florian Goller & Ulrich Ansorge
[1] *University of Vienna, diane.baier@univie.ac.at*

Spatial attention and awareness are both mechanisms involved in the selection and processing of visual stimuli. If—or under what circumstances—these mechanisms interact or work independently, has been a prominent research subject in recent years. We put this relationship to another test by conducting three experiments, where we combined bottom-up spatial attention with a manipulation of awareness. This was realized by object substitution masking (Exp. 1) and metacontrast masking (Exp. 2a and 2b). We found effects depending on the position of a color singleton among the masked stimuli in all three experiments. In line with bottom-up capture by salient color singletons, in Experiments 1 and 2a, we found enhanced performance if the target was a color singleton and impaired performance if a distractor was a color singleton (compared to a condition without singletons). To both replicate our findings and to ensure that attention was indeed captured by the singletons, we included a spatial cueing task as a second task besides target discrimination in each trial of Experiment 2b. The results were in line with the findings of Experiments 1 and 2a, and we additionally found validity effects depending on the position of the color singleton. The effects of the spatial attentional capture induced by the singleton manipulation were statistically independent from the level of awareness in all three experiments; these results provide new evidence that bottom-up attention and awareness are independent processes.

Temporal Preparation Facilitates Spatial Selection via an Increase in Bottom-Up Salience

Janina Balke[1], Bettina Rolke & Verena C. Seibold
[1] *University of Tuebingen, janina-hannah.balke@uni-tuebingen.de*

Previous studies have shown that temporal preparation facilitates the target selection in visual search. In two experiments, we investigated whether this selection benefit might be due to a change in the salience of stimuli. We required participants to search for a colour pop-out (the target) amongst homogenously coloured distractors. To manipulate temporal preparation, we employed a blocked foreperiod paradigm in which a warning signal precedes the search display by either a short or a long interval (high versus low temporal preparation, respectively). To manipulate the salience of the target, we varied the set-size within the search display (low versus high salience). In the first, behavioural experiment (N = 24), we observed a RT advantage in case of high temporal preparation and high target salience, but no interaction between the two factors. In the second, ERP experiment (N = 24), the target-evoked N2pc as an index of spatial selection revealed an interaction between temporal preparation and target salience. Specifically, we observed that the N2pc was enhanced by high temporal preparation, and this effect was stronger in the low salience condition than in the high salience condition. Based on the ERP results, we conclude that temporal preparation increases bottom-up salience of stimuli so that spatial selection of targets benefits especially from temporal preparation if the local feature contrast between the target and the surrounding stimuli is low.

Scaling the Mental Number Line

Ann-Kathrin Beck[1], Andrey Nikolaev, Steffen Theobald, Thomas Lachmann & Cees Van Leeuwen
[1] *Technische Universität Kaiserslautern, Ann-Kathrin.Beck@sowi.uni-kl.de*

Size congruity, Spatial Numerical Association of Response Codes (SNARC), and numerical distance effects are distinct instances of how spatial constituents enter the symbolic number representation. Behavioral studies have suggested that these effects involve distinct processing stages but in electroencephalogram (EEG) evoked potentials are selective to all. To settle the question of their interdependence, we applied a factorial design encompassing all three effects, combined with EEG measurement, comparing across identical visual stimuli for the numerical distance and SNARC condition. The results show that all effects arise early, around 100 ms, with a hemispheric specificity. Whereas no dependency between size congruity and SNARC effects was found, the numerical distance effect was influenced by the lateralized response conditions of the SNARC effect. These results suggest independence of size congruity and SNARC effect, but dependency between numerical distance and SNARC effect. The lateralized character of the effects may therefore be the key to their (in)dependency.

There's more to life than "positive": Non-evaluative semantic stimulus relations in the Evaluative Decision Task, revisited

Manuel Becker[1], Marie Jakob & K. Christoph Klauer
[1] *Albert-Ludwigs-Universität Freiburg, manuel.becker@psychologie.uni-freiburg.de*

A recurrent debate centers on the malleability of the Evaluative Decision Task (EDT; Fazio et al., 1986) to the influence of non-evaluative semantic stimulus relations: There is little empirical agreement on whether and how evaluative and non-evaluative semantic stimulus relations (interact to) produce evaluative priming effects in the EDT, and there is not even agreement on whether evaluative priming effects emerge in the absence of non-evaluative semantic stimulus relations. A lack of priming effects in conditions where stimuli are only evaluatively related would be surprising inasmuch as it is hardly reconcilable with the dominant theories explaining evaluative priming effects via response activation. Resolving these conflicting results would thus greatly inform theorizing on the mechanisms behind evaluative priming. In addition, it would have implications for sound measurement in the EDT, since in many applied studies, stimuli do not only vary on the evaluative dimension. In a first study (N=81), we suggest that research on this topic so far has suffered from a confound that renders the EDT's measurement outcome difficult to interpret. In a second study (N=80), we show that in a research design that does not suffer from this confound, evaluative and non-evaluative semantic stimulus relations co-determine the EDT's measurement outcome, and evaluative priming effects also emerge in the (relative) absence of non-evaluative semantic stimulus relations.

Competition among levels of representation: Do retrieval-induced forgetting and ownership cancel each other out?

Corinna Beckmann[1], Julia Englert & Nexhmedin Morina
[1] *Universität Münster, corinna.beckmann@uni-muenster.de*

Retrieval-induced forgetting (RIF) occurs when retrieval practice of a subset of previously learned items impairs memory for unpracticed items from the same set (Anderson, Bjork, & Bjork, 1994). Self-involvement has been shown to enhance memory (Symons & Johnson, 1997), as in the case of the Mere Ownership effect (MOE; Cunningham, Turk & Macdonald, 2008), and to interfere with RIF under some circumstances (Macrae & Roseveare, 2002; Wessel & Hauer, 2006). Self-involvement may accomplish this via organizational processes in memory, by providing a strong category structure for learning materials. However, this structure can be in competition with other organizing principles, such as semantic categories (Englert & Wentura, 2016; Symons & Johnson, 1997). Likewise, associative or organizational grouping of items from the same category appears to be a prerequisite for RIF. This suggests that in the presence of competing organizational principles, RIF may be at odds with self-memory advantages. Building on earlier research (Englert, Tempel & Wentura, 2018), we obtained seemingly conflicting results: Either an MOE or RIF were observed, but never both. We discuss theoretical and methodological implications, including experimental procedures that selectively encourage either self-related or semantic organization.

Look at Me, When I'm Talking – Impact of Audio-Visual Speech on Spatial Switching in a Multi-Talker Cocktail-Party Situation

Alexandra Begau[1] & Stephan Getzmann
[1] *IfADo – Leibniz Research Centre for Working Environment and Human Factors, begau@ifado.de*

Comprehending speech in a "cocktail-party" situation can be challenging especially for elderly adults. They experience stronger distraction by task-irrelevant stimuli compared to younger adults, for example when target speaker positions change. This is particularly important in attention reorientation and refocusing after distractions. We investigated the benefit of additional visual speech information in a dynamic "cocktail-party" paradigm. Older and younger participants were presented a forced-choice two-alternative discrimination task, in which they responded to target words spoken by one of three talkers in a horizontal array. Stimuli were displayed in three audio-visual conditions (still face, unspecific and congruent mouth movement). In the constant condition, targets were always displayed centrally. In the dynamic condition, targets were displayed centrally in standard (80%), but laterally shifted in deviant trials (20%). We analyzed behavioral performance and event-related brain potentials such as mismatch and reorienting negativity. We expected congruent audio-visual speech to offer the biggest benefits compared to the other conditions. Also, post-deviant reorientation should be easiest within this condition. Older participants should profit in particular. First results show the expected age-specific differences in audio-visual speech. They indicate a facilitated speech processing when congruent multimodal speech is presented. This benefit seems especially evident with a fixed talker position, although performance declines are most pronounced when the position switches. Hence, post-deviance distraction is stronger, however participants are able to restore their benefit. Summarizing, audio-visual speech indeed has a positive impact when attending a talker's speech.

Physiological Indicators of Discomfort in Automated Driving – Results of two Driving Simulator Studies

Matthias Beggiato[1], Franziska Hartwich & Josef Krems
[1] *Chemnitz University of Technology, matthias.beggiato@psychologie.tu-chemnitz.de*

Due to the role change from driver to passenger in automated vehicles, human perception of driving changes. Not being in control of the driving task in addition to new activity options can provoke discomfort up to motion sickness. Physiological parameters could serve as early indicators of user discomfort, allowing for preventive actions such as changes in driving style or information presentation. To investigate the potential of physiological parameters in uncomfortable driving situations, two driving simulator studies have been carried out with 40 and 41 participants aging from 24 to 84 years. All participants experienced a highly automated trip including three very close approaches to a truck driving ahead. Perceived discomfort was assessed continuously using a handset control. The smartband MS Band 2 was used to measure Heart Rate (HR) and Skin Conductance Level (SCL), eye-tracking glasses captured pupil diameter and eyeblinks, and a seat pressure mat recorded body movements. Consistent effects of both studies showed a situation-specific increase of pupil diameter, reduction of eye blinks and a "push back" movement of the body. A decrease in HR could be observed if the HR-sensor was placed at the (more sensitive) inner side of the wrist, not if the MS Band 2 was turned by 180 degrees. SCL showed a steeper increase during discomfort situations, with more pronounced effects when measured at the inner side of the wrist. To conclude, physiological parameters have the potential of providing reliable and useful discomfort information in these close approach situations.

Source monitoring and advertising: Effects of source credibility

Raoul Bell[1], Laura Mieth & Axel Buchner
[1] *Heinrich Heine University Düsseldorf, raoul.bell@hhu.de*

In modern digital environments, people are exposed to information from a wide variety of sources, some of which are trustworthy while others are not. Having to deal with a large proportion of information from untrustworthy sources poses challenges to human information processing. Specifically, discriminating between information from trustworthy and untrustworthy sources places high demands on source monitoring processes. Advertising can be viewed as an untrustworthy source because advertisers have an economic self-interest in presenting the advertised products in a biased way. In two experiments, the proportion of messages from trustworthy and untrustworthy sources was manipulated so that participants encountered a high or low proportion of information from untrustworthy sources. In a third experiment, one group of participants saw only information from trustworthy sources while another group encountered information from a trustworthy as well as from an untrustworthy source. The exposure to a large amount of information from an untrustworthy source stimulated increased source monitoring at the cost of decreased processing of the content of the messages. When a source was not remembered, participants showed a guessing bias towards attributing the message to the untrustworthy source. These findings suggest that having to deal with a large amount of information from untrustworthy sources changes how information is encoded and remembered in a potentially costly way.

Negativity bias in evaluative (counter-)conditioning

Taylor Benedict[1], Anne Gast & Jehan Sparks
[1] *University of Cologne, taylor.benedict@uni-koeln.de*

Negative attitudes tend to be "stickier", or more difficult to reverse, than positive attitudes. We tested if this is also true when attitudes are conditioned via evaluative conditioning (EC), which is a change in the liking of a stimulus (conditioned stimulus; CS) due to its previous pairings with another stimulus (unconditioned stimulus; US). In a preregistered study, we paired CSs with either positive or negative USs in an initial conditioning procedure; then, in a counter-conditioning procedure, we paired the same CSs with USs of the opposite valence that they had previously been paired with. We hypothesized a larger attitude change for positively conditioned and negatively counter-conditioned CSs compared to negatively conditioned and positively counter-conditioned CSs. In other words, we hypothesized a larger attitude change (from pre-counter-conditioning to post-counter-conditioning) for positive-to-negatively paired CSs than negative-to-positively paired CSs. Results showed a significant change in attitudes for both initially positive and initially negative paired CSs. In line with our hypothesis, there was a significantly greater attitude change for initially positively conditioned and negatively counter-conditioned CSs compared to initially negatively conditioned and positively counter-conditioned CSs. Results support previous findings in sequential (re)framing literature by revealing a negativity bias in evaluative counter-conditioning. Our research also suggests that attitudes are not stable over time, but they seem to rather be based on multiple pieces of information and the order that the information is received matters.

Exploring Binding of Irrelevant Features through Task Switching Paradigms

Elena Benini[1], Iring Koch, Susanne Mayr, Christian Frings & Andrea M. Philipp
[1] *RWTH Aachen University, elena.benini@psych.rwth-aachen.de*

Different accounts in the literature propose that executed responses are bound together with the triggering stimulus in a memory trace or "event file". It is further proposed that whenever a feature is encountered that belongs to an event file, the other features are automatically retrieved. The overarching question of our study is whether binding is sensitive to task-relevant features only or whether task-irrelevant features are also bound into an event file. Our approach was to manipulate task-irrelevant contextual features in a task switching paradigm. In our studies, we had participants alternating between two tasks having two possible responses, while we orthogonally manipulated the task-irrelevant context. In two experiments (N= 32 each), context was differentially operationalized, in order to pinpoint the variables that affect integration of irrelevant features into event files. Specifically, context could either be an irrelevant feature of the cue, namely its colour, or a feature of the background, namely the colour of an empty frame surrounding cue and stimulus. We are interested in parsing how performance is affected by the three-way interaction between response switching, task switching and context switching. If context was bound in the event file, its repetition would retrieve actions and objects of the previous trial. We will discuss our results in terms of cognitive mechanisms in task switching and we will integrate them in an overarching framework of binding and retrieval in action control.

Influence of BDNF Val66Met polymorphism on semantic priming: Analyses with drift-diffusion models

Alexander Berger[1], Simon Sanwald, Christian Montag & Markus Kiefer
[1] *Ulm University, alexander.berger@uni-ulm.de*

Masked semantic priming paradigms are widely used to investigate unconscious semantic processing. The magnitude of semantic priming effects have been found to be associated with executive functions in earlier studies. The BDNF Val66Met polymorphism plays a role in the growth and survival of neurons and has also been shown to be associated with executive functions. Using drift-diffusion models, we tested whether the BDNF Val66Met polymorphism influences semantic processing in a lexical decision task preceded by masked primes. Drift-diffusion models offer the advantage of a joint analysis of reaction times and error rates in two-choice-decision tasks. Drift-diffusion models consist of three main parameters: v, the drift parameter, a, the distance of the two decision thresholds and t0, the non-decisional process. N = 155 healthy participants performed a lexical decision task using a masked semantic priming paradigm. Participants were genotyped with regard to BDNF Val66Met polymorphism. We compared parameters of the model between homozygous Val/Val carriers (N = 98) and carriers of one or two Met alleles (N = 57). The drift parameter v reflected priming similar in both groups. The Met carriers showed an in general lower threshold a than the Val/Val group, especially for non-related prime-target pairs. There were no differences for the parameter t0. While priming as reflected by the drift parameter was not affected by this polymorphism, Met carriers, which supposedly exhibit inferior executive functions, seem to have a more superficial processing style leading to their lowered decision threshold.

Der Einfluss von Einmündungsmerkmalen und Erwartungshaltung auf das Blick- und Annäherungsverhalten von Autofahrern an bidirektionalen Radwegen

Frauke Luise Berghoefer[1], Anja Katharina Huemer & Mark Vollrath
[1] *TU Braunschweig, f.berghoefer@tu-braunschweig.de*

Ein besonders häufiger Radfahrunfall entsteht, wenn Pkw-Fahrer nach rechts abbiegen und dabei rechts querende Radfahrer übersehen. Im Hinblick auf Unfallprävention wurde in einer Fahrsimulatorstudie untersucht, inwiefern bauliche Merkmale der Einmündung und Änderungen in der Erwartungshaltung des Autofahrers das Blick- und Annäherungsverhalten an Kreuzungen beeinflussen. N = 66 Probanden bogen als Autofahrer an T-Kreuzungen nach rechts ab, welche sich in Sicht und Radfurtmarkierung unterschieden. Der Radweg wurde gar nicht markiert, mit weißer Fahrstreifenmarkierung plus Fahrradsymbol versehen, rot eingefärbt, rot umrahmt oder aufgepflastert. Die Einsicht in die Kreuzung betrug entweder 30m oder 10m. Die Erwartung wurde durch Erfahrung manipuliert, indem einer Hälfte der Probanden regelmäßig ein von links kommender und der anderen Hälfte ein von rechts kommender Radfahrer präsentiert wurde. Die Ergebnisse zeigten einen durchweg positiven Effekt von rot eingefärbten Radwegen auf das Blickverhalten, das Fahrverhalten sowie auf das subjektive Sicherheitsempfinden der Autofahrer. Interessanterweise zeigte die Aufpflasterung keinen signifikanten Effekt. Sichteinschränkungen gingen einher mit einem stärkeren Blickverhalten nach rechts und einem reduzierten Sicherheitsempfinden. Sie hatten aber keinen größeren Einfluss auf das Fahrverhalten der Autofahrer. Die Erfahrung mit Radfahrern von rechts zeigte keinerlei Einfluss. Eine Markierung der Fahrbahn, die dem Autofahrer verdeutlicht, dass in dieser aktuellen Situation Radfahrer kommen könnten, scheint wirkungsvoller zu einem adäquaten Situationsbewusstsein beizutragen als eine allgemeine Erwartung, dass man im Verkehr mit Radfahrern rechnen muss. Die Aufpflasterung könnte dagegen zu wenig mit Radfahrern assoziiert sein. Insgesamt zeigt sich damit, dass situationsspezifische Erwartungen der Autofahrer im Sinne des Situationsbewusstseins ganz wesentlich für ein sicheres Verhalten sind.

Kinetosis mitigation via light-based HMI motion cues in automated vehicles

Max Bergholz[1], Marc Wilbrink, Uwe Drewitz & Michael Oehl
[1] *Universität Trier, s1maberg@uni-trier.de*

With the development and deployment of automated vehicles in traffic, kinetosis or so called "motion sickness" will become an important psychological issue to be dealt with, as passengers are more likely to experience kinetosis in automated vehicles than in manually driven ones. As one promising solution anticipatory motion cues provided via light-based in-car Human-Machine Interfaces (HMI) have been shown to potentially alleviate kinetosis. However, questions of design and user experience of these HMI solutions are still open. In this experimental simulation study with repeated measurements we assessed the design and user experience of light-based HMI designs. Participants experienced a drive in an automated vehicle in an urban scenario, both with and without the HMI providing information about the vehicle's directional changes. The two conditions were balanced and tested on separate days to avoid carryover effects. The degree of experienced kinetosis and user experience ratings were assessed. Contrary to our hypothesis, participants did not experience generally less kinetosis in the motion cue condition with HMI. However, there was a significantly pronounced habituation effect for participants who were exposed to the non-motion cue condition first and the motion cue condition second in comparison to participants who were exposed to these both conditions in the opposite order. Additionally, the system's design received favourable user experience ratings from participants. Implications for subsequent studies involving physical vehicles and the design of light-based motion cues to prevent kinetosis will be discussed.

You see it and you do it: Perceived and one's own motion in response priming

Christina Bermeitinger[1], Matthis Stiegemeyer, Ryan P. M. Hackländer, Marie Kollek & Alexandra E. Tränkner
[1] *Universität Hildesheim, bermeitinger@uni-hildesheim.de*

By use of the response priming paradigm with moving primes, the interaction of perceived and one's own motion can be investigated. In response priming, motor pre-activations from a first event (i.e., the prime) to the response to a second event (i.e., the target) can be measured. Typically, two conditions are of interest: prime and target call for the same response (i.e., they are compatible) or prime and target call for different responses (i.e., they are incompatible). When using moving primes and static arrow targets, the results strongly depend on the stimulus onset asynchrony between prime and target: with short SOAs (up to 200 ms), there were faster responses to compatible than incompatible targets, with longer SOAs (above 300 ms), a reversed effect occurs. However, this reversal was not found with more biological motions (e.g., point light walkers). In the current study, subjects now performed a response priming task with moving prime stimuli while in motion themselves. Across 3 experiments, we used two different own motions (walking on a treadmill; rotating in a human gyroscope) and two different perceived stimulus types (rows-of-dots moving vs. static; point light displays with more or less biological motions). Compatibility effects depended on the stimulus type, the velocity of one's own motion, and several interactions of perceived and own motion. We discuss our findings with respect to previous findings as well as theories on response priming and perception-motion interaction.

The effect of vertical perspective change on distance perception in a visual comparison task

Christoph Bernhard[1], Christoph Freiherr Von Castell & Heiko Hecht
[1] *Johannes Gutenberg-Universität Mainz, christoph.bernhard@uni-mainz.de*

Past research has shown that vertical perspective can affect distance perception. Higher vantage points lead to underestimation as compared to lower vantage points. In previous studies, we replicated this effect for conditions with static and restricted field-of-view. However, we used metric judgements to measure perceived distance, which can vary strongly for large distances. Our goal was to replicate our results with a more robust, indirect measure of distance. In two experiments, 48 participants compared the distance of a comparison object to the distance of the same object in a standard stimulus in a two-interval, two-alternative forced-choice paradigm. Each stimulus depicted a vehicle placed on a straight road. In the comparison, the vehicle was placed closer or farther away than the standard vehicle. The egocentric distance of the standard vehicle (16, 32, 48 m) and the vertical perspective in the comparison stimulus (standard, high, low) changed from trial to trial. Data were analyzed by calculating the point of subjective equality and difference limen (DL) for each condition. In Experiment 1, the standard always preceded the comparison. We found distance underestimation for high, but no effect for low perspective. In Experiment 2, both stimuli were presented simultaneously. This time, the expected effects surfaced for both perspectives. The DL did not differ between high and low perspective in either experiment. In sum, the effect of perspective shift on distance estimation seems to be a robust perceptual phenomenon, which should be accounted for, especially in indirect and restricted vision.

Applying MPT models to gain new insights into the sleep benefit in episodic memory

Sabrina Berres[1] & Edgar Erdfelder
[1] *University of Mannheim, sberres@mail.uni-mannheim.de*

Multinomial processing tree (MPT) models are measurement models to estimate the probabilities of latent cognitive processes. Using MPT models, we analyze data from two experiments to test theoretical assumptions regarding the underlying cognitive mechanisms of the sleep benefit in episodic memory. First, we tested different explanations of the sleep benefit by applying the Encoding-Maintenance-Retrieval model (Küpper-Tetzel & Erdfelder, 2012). This model is tailored to a free then cued recall paradigm. It allows us to disentangle encoding, storage, and retrieval contributions by providing separate measures for successful encoding of word-pair associations (e), maintaining encoded associations across the retention interval (m), and retrieving stored associations (r) in free recall. Second, we tested whether there is a sleep benefit also in source memory. For a fine-graded analysis of the underlying cognitive processes, we applied a variant of the Multidimensional Source Recognition MPT model (Boywitt & Meiser, 2012; Meiser, 2014). This model makes use of the remember-know recognition task in combination with a source monitoring test. It provides parameters for both dependent and independent retrieval of multiple source features. Based on our findings we show that MPT models are powerful tools to disentangle the cognitive processes that produce the sleep benefit in episodic memory. Implications for theories of the sleep benefit in episodic memory will be discussed.

The effects of perceptual disfluency for news items on metacognitive judgments and memory

Miri Besken[1], Ezgi Ersen & Elif Cemre Solmaz
[1] *Bilkent University, mbesken@bilkent.edu.tr*

Perceptual fluency is the subjective feeling of ease, experienced during the perception of a stimulus. Previous studies have shown that perceptual fluency both affects metacognitive judgments and actual memory performance. These studies have typically used simple materials in the visual modality. Yet, in daily life, most stimuli (news, paragraphs, events) are more complex, transmitted us through auditory modality. This set of studies examined how more complex materials presented in auditory modality affect metacognitive judgments of truth, judgments of learning, as well as free recall performance. In a set of experiments, participants were presented with perceptually fluent or disfluent news items in a within-subjects design. In the perceptually fluent condition, participants listened to intact news items. For the perceptually disfluent condition, participants listened to news items which were interspliced with static white noise, as if participants are listening the news on the radio with low radio signal reception. Participants made judgments of truth or judgments of learning after each news item. In a subsequent free-recall test, participants recalled both the topics and the details of all news items. Results revealed that static white noise manipulation influenced both metacognitive judgments of truth and judgments of learning. When the white noise was obvious to the participants, participants produced higher judgments of truth and learning for intact news items than news items that are interspliced with static noise. The effect of perceptual disfluency manipulation on actual memory performance was limited, typically with memory performance being similar across encoding conditions.

Semantic Interference in the Picture-Word Interference Task: Is there a Pre-Lexical, Conceptual Contribution to the Effect?

Hanna S. Bethcke[1], Marie C. Beaupain, Stefan Wöhner & Jörg D. Jescheniak
[1] *Leipzig University, h.bethcke@studserv.uni-leipzig.de*

Picture naming takes longer in the presence of a semantic-categorically related distractor word compared to an unrelated distractor word. This semantic interference effect in the picture-word interference (PWI) task is an empirical cornerstone in speech production research and of central importance in theory development and evaluation. Prominent models locate the effect at an abstract lexical level, yet only few studies have tested for a possible pre-lexical, conceptual contribution. Moreover, those studies that did are not conclusive. We re-explored the locus of semantic interference by contrasting two task versions that were implemented as parallel as possible, but differed with respect to the processing stages involved: naming pictures (requiring conceptual processing and lexical processing) and deciding on their natural size (requiring conceptual processing only). We predicted semantic interference in naming, replicating the standard effect. If part of the effect is localized at the conceptual level, we predicted interference in size decision, too. We found semantic effects in both tasks but with different polarity – interference in naming and facilitation in size decision. This pattern supports the view that semantic interference in PWI has its locus at the lexical level and its origin at the conceptual level.

The Interaction Game: Development and Validation of an Experimental Paradigm for Manipulating Social Distance

Marco Biella[1] & Mandy Hütter
[1] *University of Tuebingen, marco.biella@uni-tuebingen.de*

Perceived social distance can affect a multitude of outcomes, from economic decision-making to helping behavior. However, a paradigm that allows for experimental manipulation of social distance, and thereby strong causal inference, is still lacking. Researchers have to rely on hypothetical judgments or on decisions made towards known or unknown third parties. While hypothetical decisions may not translate into actual behaviors, the latter approach requires comparisons that may fail to investigate social distance (comparing decisions towards equally close third parties) or that suffer from a confound with acquaintanceship (comparing decisions towards an unknown third party and towards a less distant acquaintance). To fill this gap, we developed and validated the Interaction Game. Such an experimental paradigm is suitable for within-subjects designs, making the game a powerful and useful tool for researchers for manipulating social distance between the experimental subject and other targets. Three pre-registered experiments (N1 = 110, N2 = 109, N3 = 107) demonstrate that our paradigm asymmetrically affects social distance between the experimental subject and two interaction partners. Such manipulation allows for direct comparisons of judgment and behaviors toward a socially close and a socially distant target. Moreover, we collected evidence showing that the Interaction Game does not influence Need to Belong and exerts negligible effects on emotions (relying on both discrete and dimensional models of emotions). In sum, the Interaction Game constitutes a valid and promising research paradigm for investigating the effects of social distance.

Visual and auditory context binding in working memory

Katrin Bittrich[1], Patrick Khader & Kerstin Jost
[1] *Medizinische Hochschule Brandenburg Theodor Fontane, katrin.bittrich@mhb-fontane.de*

Intact working memory not only means to retrieve items of a memory set, but also to remember in which episodic (spatial and temoral) context they have been presented. There is evidence that this context binding is specifically limited and that an increased rate of binding errors can be considered as a cognitive marker in early stages of dementia. Research on context binding focused primarily on the visual modality and the binding of a stimulus feature (e.g., color) to its spatial context (i.e., location). We here expand this research in two ways. First, we compare binding to a spatial context with binding to a temporal context. Second, we explore modality-specific aspects of binding by contrasting vision and audition. In a two-step delayed-reproduction task, participants were required to recognize a probe item as being part of the memory set (identity task) and, if so, to reproduce either the spatial or the temporal position (binding task). In the visual modality, a varying number of colored squares were presented either simultaneously at different locations or sequentially at the same location. In the auditory modality, either color names or tones were presented sequentially. Results showed the expected set-size effect for all conditions and tasks. For the visual modality, identity performance was unaffected by presentation context. Binding performance, however, was better for spatial than for temporal context. In the auditory modality, performance differed between materials. These results strengthen the necessity to investigate modality- and context-specific aspects of binding in working memory.

The representation of face-prior precision in the human brain

Helen Blank[1] & Christian Büchel
[1] *University Medical Center Hamburg-Eppendorf, hblank@uke.de*

Perception is an active inference in which perceptual priors are combined with sensory input. It is still unclear how the precision of prior expectations is represented in the human brain. Prior precision could be represented with prior content itself in sensory regions. Alternatively, there could be distinct, specialized brain regions that represent precision separately from the content of the prior. Here, we used multivariate functional resonance imaging to test whether the precision of face priors can be measured together with expected face identity in face-sensitive regions. Participants were trained to relate images of scenes and faces. Each scene predicted three faces: one with low, one with intermediate, and one with high probability (10, 30, or 60 %). Behavioural results showed that participants correctly associated the three scenes and faces with the corresponding low, intermediate, and high probabilities. An independent functional localizer run was recorded before the training to define face-sensitive regions of interest. We used representational similarity analysis (RSA) to test whether multivariate pattern similarity between presented and expected faces depends on the prior strength (Nili et al., 2014). During face anticipation, representations of expected face identity increased with prior precision in the face-sensitive anterior temporal lobe. In contrast, during face presentation, representations of face identity increased with surprise in the insula. Our findings suggest that precision of face priors is represented in higher-level face areas. These priors seem to influence the representation of face input in specialized brain regions which signal surprise to unexpected stimuli.

Kortikale Antwort von SchizophreniepatientInnen auf soziale und monetäre Belohnung und Bestrafung

Klara Blauth[1], Angelina Weitkämper, Frank Neuner & Benjamin Iffland
[1] *Universität Bielefeld, klara.blauth@uni-bielefeld.de*

PatientInnen mit einer Diagnose aus dem Schizophreniespektrum zeigen im Vergleich zu Gesunden eine veränderte Verarbeitung von Belohnung. Im Zuge der Negativsymptomatik weisen sie zudem starke soziale Beeinträchtigungen auf. Die vorliegende Studie untersuchte daher, inwiefern sich eine veränderte kortikale Verarbeitung bei monetärer verglichen mit sozialer Belohnung zeigt. Weiter wurde untersucht, ob sich veränderte Verarbeitungsmuster auch bei monetärer und sozialer Bestrafung finden. Es nahmen 26 PatientInnen mit einer Diagnose aus dem Schizophreniespektrum und 26 gesunde Kontrollpersonen an der Studie teil. Als Paradigma wurde die Incentive Delay Task mit zwei unterschiedlichen Feedback-Bedingungen („monetary incentive delay task“ und „social incentive delay task“) verwendet und um eine Bestrafungskomponente erweitert. Während der Aufgabe sollten die TeilnehmerInnen so schnell wie möglich auf einen Zielreiz reagieren. In Abhängigkeit ihrer Reaktionszeit erhielten sie einen positiven, negativen oder neutralen Reiz als Feedback (monetär oder sozial). Währenddessen wurden Reaktionszeiten und EKPs in Reaktion auf das Feedback aufgezeichnet und hinsichtlich verschiedener Komponenten näher untersucht (P100, P200, N170, EPN und LPP). In beiden Bedingungen reagierten die PatientInnen signifikant langsamer als die Kontrollpersonen. Darüber hinaus wiesen die PatientInnen in beiden Bedingungen (monetär, sozial) geringere EKP-Amplituden in frühen und späteren Komponenten auf als die Kontrollpersonen. Außerdem zeigten sich differentielle Effekte der Bedingungen bezüglich der kortikalen Verarbeitung des negativen, positiven oder neutralen Feedbacks. Die Ergebnisse deuten darauf hin, dass sowohl Aufmerksamkeits- (P200), Reizverarbeitungs- (N170) als auch Emotionsverarbeitungsprozesse (EPN, LPP) bei SchizophreniepatientInnen verändert sind. Hinsichtlich der Verarbeitung von Belohnung und Bestrafung lassen die Ergebnisse die Aktivierung unterschiedlicher kognitiver Prozesse bei sozialem und monetärem Feedback vermuten.

Modelling RT-based attention paradigms with TVA

Steven Blurton[1], Søren Kyllingsbæk & Claus Bundesen
[1] *University of Copenhagen/Department of Psychology, steven.blurton@psy.ku.dk*

We present recent theoretical advancements in TVA that provide an account for response time (RT) distributions in attention-based tasks. Although the scope of TVA is more general, TVA-based research so far has focused on accuracy-based tasks using highly discriminable stimuli to investigate effects of attention on selection of categories (pigeonholing) and selection of elements (filtering). The new RT model—we called it Poisson Random Walk—is a parallel processing model that can explain RT distributions in speeded RT tasks by describing response selection in mutually confusable stimuli. It is compatible with many other theories serving as a front-end to explain the processing rates underlying the decisions. Using TVA as a front-end, we have tested the new model with data from single stimulus recognition tasks with two or more perceptual categories. Here, we present new applications to speeded responses to targets presented among distractors. The first application is visual search. The Poisson Random Walk can account well for simple (feature) search distributions by incorporating the filtering mechanism of TVA. Conjunction search times, on the other hand, require an introduction of another set of weights that describe possible serial processing. With these new weights, we also include a central idea of Guided Search into the TVA-based model. The second application is a speeded target recognition task with multiple distractors. This task is a variant of the standard speeded 2-alternative forced choice task combined with partial report. We close our presentation with an outlook on future directions.

A cognition-based human–machine interaction approach for thermal spraying

Franziska Bocklisch[1], Pia Kutschmann, Rico Drehmann & Thomas Lampke
[1] *Technische Universität Chemnitz, franziska.bocklisch@psychologie.tu-chemnitz.de*

The development of cyber-physical production systems and industry 4.0 is a central goal of the German research initiative (High-Tech Strategy 2025). Complementary to this aim, we propose a cognition-based human–machine interaction approach including (1) a holistic analysis of complex human–machine systems and interaction processes and (2) modeling of cognitive processes. This approach is applied in the context of manufacturing, specifically, coating technology (i.e., atmospheric plasma spraying). Thermal spraying is widely used, for instance, for wear and corrosion resistance and thermal barrier coatings. To analyze technical and cognitive processing, operators' glance behavior was tracked during thermal spraying. Operators' expert knowledge was collected using a retrospective think-aloud technique. Afterwards, eye-tracking data were matched to relevant expert knowledge. This combined data- and expert-driven method reveals insights into the operator's attention and information search processes. These processes are central to an understanding of human monitoring and control of the thermal spraying process and are the basis for the development of technical assistant systems. Further, we discuss possibilities for data modelling (e.g., fuzzy pattern classification) and show how the presented cognition-based human–machine interaction approach contributes to the development of advanced interaction displays as well as self-optimizing automation systems, with applications in production and other areas of human factors.

When inclusion results in exclusion: Outgroups suffer from being disliked, as soon as we like one

Ronja M. J. Boege[1], Gerd Bohner & Laura Lender
[1] *Bielefeld University, ronja.boege@uni-bielefeld.de*

In this preregistered study, a subtle method was tested to reduce prejudice against one outgroup (Arabs) and generalize its effects to another non-targeted outgroup (Eastern Europeans). Students read a pretested alleged letter addressed to their university insisting on certain changes of the university's infrastructure. Participants then signed a letter on a page that contained signatures of either only German students or German and Arab students. Combining elements of the contact hypothesis (institutional support, common goal, equal status, and cooperation) without inducing actual vis-á-vis contact, we hypothesized that the German and Arab condition (vs. the German only condition) (H1) would increase positive attitudes toward Arabs and (H2) that this effect would generalize to attitudes toward Eastern Europeans. Dependent variables were explicit evaluations, specific prejudices, and implicit associations toward both target groups. Social dominance orientation (SDO) and authoritarianism (RWA) were assessed as potential moderators. Supporting hypothesis H1, participants explicitly evaluated Arabs more positively in the German and Arab condition. However, opposite to hypothesis H2, participants tended to evaluate Eastern Europeans less positively in that condition, which resulted in an interaction effect of condition and target group. The prejudice measure and the implicit measure showed no effects. SDO and RWA were correlated with the dependent variables but did not moderate the effect of experimental condition. Results will be discussed in light of the contact hypothesis and social identity theory.

The short, the long, and the binding: Evidence for metric integration of response duration

Johanna Bogon[1], Katrin Köllnberger, Roland Thomaschke, Roland Pfister & Gesine Dreisbach
[1] *Universität Regensburg, johanna.bogon@ur.de*

Reacting to stimuli in the environment creates so-called event files that temporarily bind perceptual and/or action features. Here we ask whether the duration of an action becomes integrated in addition to typically studied features such as effector or location. There are indeed many situations in which the duration of an action is critical to accomplish specific goals. As an example, turning off a mobile phone often requires a long button press whereas a short press on the same button might lock the phone instead. The present study addresses the integration of response duration and the precision level of the integrated temporal information. Participants responded to visual prime and probe stimuli. Critically, a response cue indicated whether the prime stimulus had to be answered with a short or long key press. The probe response was a speeded short or long key press that was indicated by the shape of the probe stimulus. Analyses of response time and error data revealed partial repetition costs indicating binding of response duration: performance was better when stimulus shape and response duration category both repeated or switched from prime to probe relative to partial repetitions in which one factor repeated while the other switched. Additional analyses revealed that for response category repetitions, the actual durations of the prime response and the probe response were more similar for shape repetitions than for shape switches. This indicates that the precision level of integrated response duration goes beyond a mere categorical level and draws on metric representations instead.

Now More Than Ever! Political Polarization as a Result of Exposure to Fake News

Deliah Sarah Bolesta[1], Lena Winkler & Thomas Kessler
[1] *Friedrich-Schiller-Universität Jena, Germany, deliah.sarah.bolesta@uni-jena.de*

"Fake News" – the term that The American Dialect Society elected Word of the Year 2017, became one of the most discussed phenomena among scholars and the public alike. While there is research on dissemination mechanisms and prevalence (Guess, Nagler, & Tucker, 2019), potential interventions (Lazer et al., 2018) and susceptibility to fake news (Pennycook & Rand, 2019) there are no empirical studies on how exposure to fake news affects individuals on a cognitive level. Previous studies show that corrections of political misperceptions can fail to reduce these misperceptions among the targeted ideological group (Nyhan & Reifler, 2010) and potentially increase ingroup identification when the sender is perceived an ingroup member (McKimmie et al., 2003). We suggest that this principle could also hold true for fake news and that exposure to and subsequent correction of fake news can lead to affective and attitudinal polarization. In an experimental between-subjects setting four fake news stimuli were displayed. The information that the respective stimulus was factually wrong was disclosed either early on or at the end of the study. We find that if the sender of the message is perceived an ingroup member and if identification with that ingroup is high, individuals displayed more extreme policy attitudes when fake news information was disclosed early (Study 1). A similar pattern was true for affective polarization where the distance between ingroup-like and outgroup-dislike was maximized (Study 2). Among other things, these results highlight the importance of social identity processes in political polarization.

The impact of novelty and emotion on attention-related ERPs and pupil responses in children

Carolina Bonmassar[1], Andreas Widmann & Nicole Wetzel
[1] *Leibniz-Institut für Neurobiologie Magdeburg, Carolina.Bonmassar@lin-magdeburg.de*

The unexpected occurrence of task-irrelevant sounds can involuntarily capture attention and can impair performance. A distinctive sequence of components in the event-related potentials (ERPs) in the EEG has been associated with different steps of attention capture. Moreover, event-related changes in pupil size enable conclusions on the activity of the locus coeruleus-norepinephrine system that modulates attention. The present work aimed to examine attentional orienting/evaluation and reorienting mechanisms in response to emotional distractor sounds in 7 to 10-year-old children (n=32) and adults (n=32). We simultaneously registered ERPs and changes in pupil diameter in response to frequent repeated standard sounds and rare emotional and neutral novel sounds. Participants were asked to ignore the sound sequence and to watch a silent video. Emotional compared to neutral distractor sounds evoked larger amplitudes of ERP-components associated with attentional orienting and larger pupil dilation responses in both groups. Attention-related ERP amplitudes to novelty were enhanced in children compared to adults. ERP results indicate an ongoing maturation of involuntary attention in the context of novelty processing in 7 to 10-year-old children. In contrast, processing of the emotional content of novel sounds did not differ between children and adults. Importantly, our results support the idea of a correspondence between the pupil dilation response and attention-related ERPs in the framework of attentional orienting in children. Results demonstrate that pupillometry is a suitable method to investigate the development of involuntary attention mechanisms that might be applied to sensitive groups.

Developing a research framework to investigate problem-solving skills in IT security experts

Martin Bordewieck[1] & Malte Elson
[1] *Ruhr University Bochum, martin.bordewieck@rub.de*

Attacks on cyber-physical systems have become a major matter of concern to society. Accordingly, the ubiquity of such systems (Smart devices, Internet of Things, etc.) has made IT security the prime venue for an arms race of attackers and defenders. Complementing the extensive research on technical factors in IT security, the project introduced in this talk aims at exploring human factors in this field. The focus of this research is on reverse engineering, a particular type of problem solving that entails the extraction of a system's structural and functional information, which most often involves creating alternate and more abstract visual representations of the system. Highly proficient IT experts such as reverse engineers or hackers excel through superior cognitive processing and special skills in the domain of Computational Thinking comprising, for example, abstraction, pattern recognition, decomposition and algorithm design. In the talk, we present a problem-solving task using incomplete Boolean circuits and information provided in different visual representations to help fill in the missing circuit components. The planned study is an attempt to shed light on the role of visual representations in the processing of simple networks. The experiment is conceived as building block of a research framework that is intended to help gain new insights into cognitive styles, properties and processes relevant to the work of IT security experts. At TeaP, we would like to discuss the planned study along with other approaches to develop this framework.

Audiovisual Speech Processing in Adult Subjects with Asperger's Syndrome

Anna Borgolte[1], Christopher Sinke, Mandy Roy, Daniel Wiswede, Stefan Bleich & Gregor Szycik
[1] *Hannover Medical School, borgolte.anna@mh-hannover.de*

Introduction: Autism spectrum disorders (ASD) are characterized by deficits in social interaction and communication as well as stereotyped and restricted patterns of behavior. Asperger's syndrome (AS) is a highly functional type of ASD that does not comprise any delay in language development. Research indicates that children with AS show difficulties in speech perception. These difficulties became particularly evident in acoustically deprived conditions. To this day, it is uncertain whether those deficits persist into adulthood. Associated neural mechanisms are also unacquainted. However, those underlying mechanisms are highly significant since social interaction is mainly affected by speech perception. Methods: 17 adult AS and 18 healthy controls (HC) were examined. We used a paradigm in which audiovisual speech stimuli were presented in acoustically deprived conditions. Subject's performance was quantified by measuring stimulus comprehension. During this task, EEG was recorded from 32 electrodes according to the international 10-20-system. Analysis of EEG-data was performed by BESA research. Results/Discussion: In the present sample, differences in speech comprehension were found between AS and HC. Adult AS continuously showed deficits in speech perception in acoustically deprived conditions. EEG-analysis revealed increased P2 at parietocentral electrodes. This finding was independent of acoustical deprivation. The results indicate enhanced attentional processes in adult AS. These may be used as a compensatory mechanism towards deficits in speech perception. However, a fully normative performance level cannot be achieved. Speech perception remains impaired in acoustically deprived environments.

Automated and Video-driven Inference of Personality Characteristics based on Compound Feature Extraction and multivariate Transition-Flows

Mats Bosshammer[1], David Daxberger, Jarek Krajewski & Sebastian Schnieder
[1] *Institute of experimental psychophysiology, m.bosshammer@ixp-duesseldorf.de*

Previous research results show that recruiters' assessments of personality traits are regularly invalid or unreliable (Patton & Haugland, 2000; Cole et al, 2009). Self-confident appearance and presentation is a central requirement in many professional positions and is therefore an integral part of many assessment centers. The accurate and automated measurement of self-confidence and other relevant personality features could increase the objectivity of assessment centers and other application processes by relying on physiological measurement approaches instead of subjective judgements. Therefore, we present an explorative two-step approach which aims at the automated and objective extraction of job-relevant personality features (e.g. interpersonal competence, confidence, communication skills) from short application videos. For this purpose, we conducted and recorded structured application interviews on a demographically representative sample of N = 100 male and female participants of various age groups. In addition to rating the applicants interview performance, all videos were annotated along a comprehensive behavioural catalogue of 137 different basal gestures, postures and facial expressions, which are in a first step used to identify complex compound features and to predict various personality characteristics. A second step is concerned with an automated detection and classification of relevant gestures and expression, based on the annotated labels. Here we present univariate and multivariate associations and dynamic transition flows between relevant features as well as a preliminary classification model. Future models could be used within the framework of online based platforms for an objective and ecologically valid form of video applications or personal self-assessments.

On the "Rationality" of Illusory Correlations and Pseudocontingencies

Franziska M. Bott[1], David Kellen & Karl Christoph Klauer
[1] *Universität Mannheim, f.bott@uni-mannheim.de*

In order to mathematically quantify a contingency between two binary variables, their joint frequencies need to be considered. For a long time, research has presupposed that individuals infer contingencies in a similar way, by taking the frequency of the variables' joint occurrences into account. Yet, a wide range of studies demonstrated that individuals' contingency inferences are biased and deviate from mathematical quantifications like the Δp measure or φ coefficient of contingency. Instead, contingency judgments are based on more aggregate information in terms of skewed marginal frequencies: According to the Pseudocontingency account, individuals heuristically associate frequent categories with each other as well as infrequent categories. Illusory Correlations occur when individuals infer a contingency when there is no association at all (e.g., Hamilton & Gifford, 1976), while research on Pseudocontingencies showed that such inferences can even override existing true contingencies (e.g., Fiedler, Freytag, & Meiser, 2009). Hence, illusory correlations and pseudocontingencies are often discussed as being irrational or illogical. Recently, however, a normative account of illusory correlations has been proposed by Costello and Watts (2019) who argue that illusory correlations follow probability theory and are the "rational" consequence of applying Laplace's Rule of Succession. Even though we discuss several limitations of the Rule of Succession, we propose an alternative normative account which succeeds not only in producing illusory correlations, too, but also in producing pseudocontingencies and in accounting for qualitative patterns found in published data which the Rule of Succession fails to do.

Which components of working memory is the best predictor of multiplication skills of 3rd grade children?

Selma Boz[1] & Münire Erden
[1] *Eötvös Loránd University, selmaboz85@gmail.com*

The development of the four basic arithmetic operation skills is the main objectives of the primary school mathematics (math) curricula. Recent research shows that these skills are related to working memory capacity of the students. In line with these findings, the purpose of this research is to determine the impacts of the working memory components on the multiplication skills of 3rd graders. The study was carried out with 60 third grade students (23 female and 37 male) at a private primary school in Istanbul. In order to measure the participants' capacity of working memory due to its components, the tasks named as the counting recall test, digit span test, block recall test were designed and administered on computer programs. In addition, participants' multiplication skills were measured by multiplication tests. Linear multiple regression was used to analyze the data. The results of analysis revealed that the best predictor variable of multiplication skills was the central executive component of working memory. However, the phonological loop (PL) and the visuo-spatial sketchpad (VSSP) components of the working memory were not significant predictors for multiplication skills of the 3rd grade students.

The Ageing Brain: Examining the effect of age on real world and lab-based social attention tasks

Elisabeth Bradford[1] & Heather Ferguson
[1] *University of Kent, E.E.Bradford@kent.ac.uk*

Perspective-taking, including social attention, plays a crucial role in everyday life, allowing successful interactions to occur. In this talk, we will present data examining how capacities such as social attention may change across adulthood, in a large sample of participants aged 20-90 years old. Two groups of participants were recruited; one group completed a lab-based referential-communication task (the 'Director Task'), with behavioural and eye-tracking measures. Results revealed a quadratic fit of age in egocentric errors; performance on the task improved between 20 and 40 years old, but showed substantial decline from 40 years onwards. A similar pattern was seen in eye-tracking outcomes, which demonstrated that advancing age led to a decrease in target-bias; i.e., older adults were more distracted by a hidden competitor object, and were therefore delayed in orienting attention to the correct (mutually available) target object. A second group of participants completed two tasks – an interview-style conversation with an experimenter, and a navigation task (following a map during a short walk outside the lab) – whilst wearing mobile eye-tracking glasses, to provide a more 'real-world' measure of social attention. Using these real-world methodologies, results showed that across both tasks, advancing age significantly reduced the amount of time spent fixating on people, with more time spent looking at background features. The results of these studies indicate that advancing age can lead to less efficient social attention engagement, demonstrated in both lab-based and real-world task contexts.

Effects of a 6-Week Cognitive-Postural Multitasking Training in Old Age

Markus Brahms[1], Christine Stelzel, Gunnar Wahmkow, Stephan Heinzel, Michael Rapp & Urs Granacher
[1] *Uni Potsdam, markus.brahms@uni-potsdam.de*

Previous research has shown that older adults exhibit decreased cognitive and balance performance under cognitive-motor dual-task conditions compared to single-task conditions (Beurskens et al., 2012). Additionally, compatibility of modality mappings in cognitive tasks has been shown to substantially modulate dual-task costs in both domains (Stelzel et al., 2017). Previous training studies provide evidence for the effectiveness of cognitive-motor multitasking training in old age (Wollesen et al., 2014). Here, we tested whether the pronounced effects of modality mapping compatibility in old age can also be reversed by a cognitive-motor training procedure. Twenty-one older participants (11f, range = 63-83 yrs) were randomly assigned to either a modality-compatible or modality-incompatible training group. Participants performed spatial single or dual one-back tasks in sitting or standing position at three times. After baseline testing (T0), participants underwent a 6-week control period before being tested again (T1). They then performed the randomized cognitive-motor multitasking intervention three times per week for six weeks, followed by a post-training assessment (T2). Throughout the intervention, participants gradually increased working-memory load and reduced the base of support (e.g. two-legged stance, semi-tandem stance, tandem stance, with/without balance pad). Our results indicate a general increase in working-memory performance over time, which, however was not specific to the applied training. Mean balance performance did not improve over time. However, the cohort demonstrated notable interindividual variability in training responses, which was related to neuropsychological performance at baseline. The results of this study will be discussed in the context of age-related heterogeneity and learning effects.

'In Case of Doubt for the Suspicion?' – A Memory Bias from Fact toward Uncertainty in News Headlines

Ann-Kathrin Brand[1], Annika Scholl & Hauke S. Meyerhoff
[1] *Leibniz-Institut für Wissensmedien Tübingen, a.brand@iwm-tuebingen.de*

Modern media reports news remarkably fast; mostly before the reported information is confirmed. Even if such early reports correctly identify information as suspicions rather than facts, however, it is possible that the preliminary nature of the information is not accurately considered by readers. Linguistic theories suggest that the process of understanding a suspicion requires its reconstruction as factual assertion which can later be erroneously remembered. This should result in the tendency to falsely remember suspicions more often as facts than vice versa. In a series of experiments, however, we demonstrate the opposite result pattern. We asked participants to read headlines reporting explanations for distinct events either as factual or suspicion (i.e. as being under investigation). Our results indicate that participants' belief in the correctness of these explanations was equally affected by formerly read suspected vs. factual formulations. However, contrary to the predictions from linguistic theories, our results point to a reverse distortion: A bias to falsely remember and treat the "fact" as if it was merely suspected. Possible explanations for this reversed memory tendency are discussed.

Validating the EmpaToM-Y: A new instrument to assess social understanding in adolescents

Christina Breil[1] & Anne Böckler
[1] *University of Würzburg, christina.breil@uni-wuerzburg.de*

Empathy and Theory of Mind (ToM) are two core components of social understanding. The EmpaToM (Kanske et al., 2015) is a validated social video task that allows for independent manipulation and assessment of the two capacities in adults. First applications revealed that empathy and ToM are clearly dissociable constructs on a neuronal as well as on a behavioral level. As the EmpaToM has been designed for the assessment of social understanding in adults, it has a high degree of complexity and comprises issues that are inadequate for minors. Here, we present a new version of the EmpaToM that is especially suited to measure empathy and ToM in youths. In a first step, the EmpaToM-Y has been successfully validated on the original EmpaToM in an adult sample (N = 62). In a second step, it is assessed whether the EmpaToM-Y is an appropriate instrument to investigate social understanding in adolescent samples. In a group of 40 teenagers (14-18 years), the feasibility and validity of the new instrument is tested by adding standardized measures of ToM and empathy. Additionally, gaze behavior (Eye-Tracking) and electro-dermal activity (EDA) are recorded to collect physiological indicators of attention and arousal.

Saccadic eye movements and postural control: Evidence for age-related prioritization?

Maximilian Davide Broda[1], Méline Wölfel & Jutta Billino
[1] *Justus Liebig University Giessen, Maximilian.Broda@psychol.uni-giessen.de*

Reduced postural control increases the risk of falling and represents a critical issue for older adults. Although keeping balance is considered to be primarily an automatic process, stability can be modulated by secondary tasks that impose cognitive demands. Notably, saccadic eye movements seem to boost postural stability. We investigated age effects on interferences between oculomotor and postural control. We measured mean velocity of postural sway in 3 eye movement conditions, i.e. fixation, prosaccades, and antisaccades, and varied postural demands by standing positions, i.e. Standard Romberg and Semi-Tandem Romberg. In addition, we assessed individual differences in cognitive as well as in physical fitness abilities. A total of 24 younger (19-33 yrs) and 24 older (60-78 yrs) adults participated in our study. Older adults overall showed a higher mean velocity of sway and were more challenged by standing position demands. We observed beneficial effects of saccades across both age groups. Furthermore, our data supported that postural sway during saccades is increased if cognitive demands are enhanced. Interestingly, our results indicate that in younger adults saccadic eye movements modulate postural sway consistently across standing positions, while in older adults modulation was absent in the more challenging standing position. Additionally, we determined a significant link between cognitive as well as physical abilities and postural sway. Our findings suggest that older adults might prioritize postural control in challenging standing positions to minimize the risk of falling and that higher cognitive as well as physical fitness provide a stabilizing resource.

The role of prediction in somatosensory suppression during grasping

Maximilian Davide Broda[1], Katja Fiehler & Dimitris Voudouris
[1] *Justus Liebig University Giessen, Maximilian.Broda@psychol.uni-giessen.de*

Somatosensory stimuli are suppressed on a moving limb during reaching and grasping. This suppression is mainly explained by a forward model that predicts future sensory states based on the according motor command, though postdictive mechanisms are also involved. It is still unclear if suppression can be modulated by the predictability of movement-relevant target features and how much of this suppression could be explained by backward masking. In a series of experiments, we addressed these by having participants grasp and lift as straight as possible an object of different mass distributions. The mass distribution was either predictable or it randomly changed across trials. At the moment of object contact, a vibrotactile stimulation of different intensities was presented on the moving hand and participants indicated whether they felt it or not. We found clear somatosensory suppression during movement compared to rest, as reflected in elevated detection thresholds. Participants grasped the object in the predictable trials by anticipatorily tailoring their kinematics. Stronger predictive control also led to stronger suppression in the predictable than unpredictable blocks. Lastly, we examined whether suppression increases with increased motor noise levels by having participants grasp objects of different masses and, thus, by manipulating their applied forces. Although participants grasped the heavier object with greater forces, this did not influence suppression. We suggest that somatosensory suppression depends on the reliability of the established predictions and that motor noise has negligible effects.

Cue integration in metamemory judgments for pictures

Arndt Bröder[1] & Monika Undorf
[1] *Universität Mannheim, broeder@uni-mannheim.de*

Memory for naturalistic pictures is exceptionally good. However, little is known about people's ability to monitor the memorability of naturalistic pictures. We report the first systematic investigation into the accuracy and basis of metamemory in this domain. People studied pictures of naturalistic scenes, predicted their chances of recognizing each picture at a later test (judgment of learning, JOL), and completed a recognition memory test. Across three experiments, people's JOLs revealed substantial accuracy. This accuracy was due to people basing their JOLs on multiple cues that predicted recognition memory. In Experiments 1 and 2 (2 simultaneously manipulated cues), the majority of participants based their JOLs on both cues. In Experiment 3 (5 simultaneously manipulated cues), the majority of participants integrated three or more cues in their JOLs. Identified cues included semantic intrinsic picture attributes (is peaceful, has story, has person) and extrinsic aspects of the study situation or the stimuli (color, semantic distinctiveness, presentation frequency). This work provides a better understanding of metamemory for pictures, and it demonstrates close parallels between metamemory for naturalistic scenes and verbal materials.

Weighted influence of metacontrol bias vs. task adaptivity on subsequent dual-task performance

Laura Bröker[1], Harald Ewolds, Stefan Künzell, Rita F. De Oliveira & Markus Raab
[1] *Deutsche Sporthochschule Köln, l.broeker@dshs-koeln.de*

Persistence and flexibility represent two antagonistic cognitive control states. It has been argued that individuals have a trait-like bias towards either, but also that they can flexibly switch between control states to adapt to different task demands (Mekern&Hommel, 2019). Reward has been shown to promote flexibility, but it has been pointed out that people's baseline state matters for the extent of the effect (Dreisbach&Fröber, 2019). This study aimed at contributing to the debate about weighted influence of stable individual differences vs. task-dependent adaptivity, and examined the influence of both states on subsequent dual-task performance. Participants first completed an unrewarded dual-task, were then divided into two groups completing tasks promoting either flexibility or persistence, and finally repeated the dual-task with reward conditions. On day two, participants passed through the same procedure but changed from the flexibility to the persistence induction and vice versa. This within-subjects design allowed us to test both the intra-individual responsivity to cognitive state inductions, as well as the differential impact of flexibility vs. persistence on unrewarded and rewarded dual-task performance. If we consider switch rate as a direct marker of flexibility, and presume that individuals adapt to task demands, we should find higher switch rates in the dual task after participants have completed the flexibility compared to the persistence induction. If we presume an influence of trait-like biases towards one state, there should be no major differences between testing days. Data collection will be finished until conference presentation.

Are individually preferred response strategies in multitasking stable? – Evidence from free concurrent dual-tasking with varied between-task crosstalk

Jovita Brüning[1], Roman Reinert & Dietrich Manzey
[1] *TU Berlin, jovita.bruening@tu-berlin.de*

Recent studies on individual differences in multitasking demonstrated that individuals differ considerably to what extent they voluntarily prefer to separate or interleave the performance of two tasks. These preferred response strategies (i.e., so-called blocking, switching or response grouping) can be identified in the free concurrent dual-tasking (FCDT) paradigm, where individuals may choose the order of their responses to two independent task threads. Previous reports indicated that the individually preferred strategy is highly stable, even when the interleaved performance of two tasks is facilitated by reduced task similarity resulting in improved dual-task performance. Here, we examined whether this stability of individual preferences for response strategies also holds true for task characteristics that deteriorate rather than facilitate the interleaved performance of tasks. For this purpose, we tested 57 participants under two conditions of varying risk of between-task crosstalk in the FCDT paradigm. In the condition of low risk of crosstalk, participants performed two tasks concurrently involving univalent stimuli (i.e., classified digits and letters). The condition of high risk of crosstalk included bivalent stimuli (i.e., two letter classification tasks with different rules). Despite the increased risk of interference between tasks, almost all individuals preferred the same strategy of response organization in the high crosstalk compared to the low crosstalk condition, even though clear detrimental effects on the efficiency of switching and response grouping strategies in both crosstalk conditions were found. The study, thus, underlines the stability of individual preferences for specific strategies of response organization independent of task characteristics.

TVA-based parameter changes in multiple sclerosis: relationship to visual impairment

Peter Bublak[1]
[1] *Universitätsklinikum Jena, peter.bublak@med.uni-jena.de*

Multiple sclerosis (MS) is characterized by both visual and cognitive deficits. White and grey matter pathologies caused by the disease can affect the visual system at any point from peripheral to central processing stages. In recent TVA-based studies assessing MS patients, a marked decrease of visual processing capacity was found. In particular, the parameter reflecting visual threshold was increased at later disease stages and related to cognitive ability. However, possible relationships to markers of sensory visual dysfunction were not considered in these studies. In the present study, therefore, we assessed visual processing capacity in a whole report paradigm based on TVA in a sample of 60 MS patients. Data on visual contrast sensitivity and visual evoked potentials were collected as measures reflecting the degree of visual impairment. Significant correlations were found between these measures and TVA parameters visual threshold and processing rate, but not visual short-term memory storage capacity. The implications of these results for TVA-based assessment of visual processing capacity as a tool for identifying cognitive impairment in MS will be discussed.

The interaction of face identity and emotion processing as a function of verbal threat and safety learning

Florian Bublatzky[1] & Pedro Guerra
[1] *Central Institute of Mental Health Mannheim / University of Landau, Florian.Bublatzky@zi-mannheim.de*

The human face informs about the identity and emotion of other people. Responding to such social signals depends on what we have previously learned about these persons. Combining instructed threat and reversal learning paradigms, three studies examined the capability of facial information (person identity and emotional expression) as signals for threat-of-shock or safety. To this end, threat/safety contingencies were verbally instructed (e.g., Person A and B indicate threat, C and D safety), and partially reversed across the experiment (e.g., now Person B cues safety and D threat). Study 1 examined whether facial expressions are equally effective in cueing threat or safety. Study 2 focused on electrocortical processing while viewing face identities that were explicitly instructed as threat or safety cues, and Study 3 followed up on psychophysiological responding to attachment figures (i.e., pictures of loved people) serving as threat or safety-cues. Taken together, main effects of threat instructions and facial emotion were confirmed (e.g., threat-potentiated startle reflex; emotion-enhanced EPN and LPP components). Moreover, happy and angry facial expressions served equally well as instructed threat cues (Study 1). Regarding perceptual processing (Study 2), facilitated face encoding of instructed and reversed threat-cues was observed (e.g., indicated by N170 and EPN). Finally, threat instructions do not spare beloved ones (Study 3), who may serve as threat cues similar as pictures of unknown people. In conclusion, perceptual processing and responding to facial information varies according to the mere verbal communication about whether a person is dangerous or safe.

Interaction of top down and bottom attention in capture to threatening stimuli: insight from electrophysiology

Nicolas Burra[1]
[1] *Université de Genève, Switzerland, nicolas.Burra@unige.ch*

Many studies support the existence of a general bias for the detection of threat in humans. In particular, the threat-capture account claims that attentional resources are captured by threat-related stimuli, mainly based on behavioral evidence. However, these studies do not inform us about how the detection of such stimuli in the visual space influences the spatial orienting of attention. In fact, the capture of attention by a threatening item in the environment should automatically activate information about its spatial location to elicit a proper reaction, giving the localization of threat and an enhanced selection or suppression of a threatening item. Electrophysiological indexes, specifically the N2pc or the Pd component, are well suited for detecting this early attentional selection of threat signals. In this talk, I will show how these components provide interesting evidence of the threat-capture account. I will also discuss their limits, as well as the limits of the threat-capture account, specifically the impact of top-down processing on the capture of attention by threatening items.

Searching for Two Colors in Single- vs. Dual-Task Versions of the Contingent-Capture Protocol

Christian Büsel[1], Christian Valuch & Ulrich Ansorge
[1] *Universität Innsbruck, christian.buesel@uibk.ac.at*

Contingent-capture effects are taken to demonstrate that visual attention is guided by top-down search templates. That is, when searching for a specific color, only those irrelevant stimuli (cues) that are similar to the searched for target show evidence for attention capture, whereas target-dissimilar cues show no evidence for attention capture. Recent research is divided over the question whether or not several features can guide visual search simultaneously. A variety of effects has been used to distinguish between these two possibilities: (a) comparisons of contingent-capture effects in single- vs. dual-target color versions of the contingent-capture protocol (the size of validity effects by target-colored cues relative to validity effects by irrelevant colored cues), (b) switch costs (performance decrements in trial-by-trial target-color switch compared to trial-by-trial target-color repetition conditions), (c) mixing costs (performance decrements in trial-by-trial target-color repetition conditions compared to single target-color search blocks), and (d) within-trial-cue-target-congruence effects (slower responses in cue-target-incongruent compared to cue-target-congruent trials). In the present study, we directly compared these effects under single- and dual-task conditions. Our results suggest that switch and mixing costs, as well as within-trial-cue-target-congruence effects can be taken as robust criteria for distinguishing between parallel and sequential search for two colors, whereas the size of contingent-capture effects does not seem to reliably distinguish between parallel and sequential search in two-color search conditions.

Effect of acquired grasp-object manipulation associations on grasp selection

Thomas Camus[1] & Oliver Herbort
[1] *Julius Maximilians University of Würzburg, tomcamus@gmail.com*

It has been shown that the mere presentation of objects primes the associated grasps. If object movements are likewise associated to certain grasps, as assumed by the ideomotor account, also the presentation of object motion should prime specific grasps. As it is commonly observed that one uses different grasps for different object manipulations ("end-state comfort effect"), it could be expected that different object movements would prime different grasps. To test this, we created a series of experiments in which participants had to grasp (but not manipulate) an object in different ways. The stimuli used for the instruction of the grasp either corresponded to an object manipulation that could easily or hardly be achieved with the selected grasp. On the table was a fixed bar which could be grasped with either a palm-up or palm-down grasp. In the compatible condition, a clockwise tilted stimulus instructed a palm-down grasp and a counterclockwise tilted one a palm-up grasp. In the incompatible condition, this mapping was reversed. If the object motion implied by the stimulus is indeed associated with the appropriate grasp, reaction times should be lower in the compatible condition than in the incompatible condition. The results of those experiments will be discussed with regards to the modern accounts of ideomotor theories and constrain models of grasp selection for object manipulation.

Grunting noises modulate predictions of ball flight in tennis

Rouwen Cañal-Bruland[1], Lars Jauernig & Florian Müller
[1] *Friedrich-Schiller-Universität Jena, Germany, rouwen.canal.bruland@uni-jena.de*

Many tennis players, including Roger Federer and Martina Navratilova, argue that grunting in tennis is a form of cheating and/or unsportsmanlike. Grunts are said to distract and irritate opponents. Sinnett and Kingstone (2010) provided first evidence showing that grunting decreases the predictability on an opponent's shot direction. One of two competing hypotheses to explain this deterioration in anticipation performance, dubbed the distraction account, proposes that grunts distract by capturing attentional resources that are essential for the anticipation of ball flight trajectories. The second hypothesis, referred to as the multisensory integration account, posits that the grunt contains auditory features that may be systematically integrated to inform the anticipation of ball flight trajectory (Cañal-Bruland, Müller, Lach & Spence, 2018). In the current study we put these competing accounts to test. Experienced tennis players were presented with temporally occluded videos of tennis rallies in which the final grunt (i.e., the grunt accompanying the to-be-predicted shot) was experimentally amplified, attenuated, or muted. Participants were asked to indicate the predicted ball landing position. Results showed that higher the grunt intensities (i.e., louder grunts) were systematically associated with longer estimates of ball flight trajectories. Yet, there was no relationship between radial prediction errors and grunt intensity. This latter finding speaks against the distraction account of grunting, whereas the systematic bias towards longer ball estimates with increasing grunt intensities supports the multisensory integration account.

CRT generator: Study on item behavior

Deborah Alexis Canales Romero[1], Pablo Garaizar & Ulf-Dietrich Reips
[1] *Universität Konstanz, deborah.canales@uni-konstanz.de*

The Cognitive Reflection Test (CRT) is a widely used measure of analytic versus heuristic processing. The main feature of these items is their ability to "trick" respondents into giving an intuitive but incorrect answer, whilst having an actual correct answer that one can arrive at only by purportedly engaging in more reflective thinking. However, the test's popularity has resulted in participants becoming familiar with it. Although disputed, studies have yielded that familiarity with the CRT raised participant scores on the CRT significantly. As a measure against familiarity, researchers have contributed new items, which are isomorphic to the original three CRT items, thus increasing the item pool available for new studies. Nevertheless, because of the few numbers, these new items risk undergoing the same fate as the original CRT items. To solve the issue, we created the CRT generator, an online tool that generates original CRT-type items and variations of traditional CRT-items. We now present an analysis of the quality of these isomorphic items, as well as on the new graphical items with lures, to compare and contrast. The analysis is based on data obtained from an experimental online study performed on a sample of 360 German university students and participants from Prolific Academic.

The Experiential Basis of Compatibility Effects in Reading-by-Rotating Paradigms

Francesca Capuano[1], Berry Claus & Barbara Kaup
[1] *Eberhard Karls University of Tübingen, francesca.capuano@uni-tuebingen.de*

The literature on the simulation view suggests that language comprehension activates traces of related motor experience. In the reading-by-rotating paradigm (Zwaan & Taylor, 2006), participants read sentences on a frame-by-frame basis, by rotating a knob either clockwise or counterclockwise (e.g. He/turned down/the/volume). RTs were shorter when the described actions involved a direction of rotation matching the required direction of rotation of the knob (match advantage). However, a study by Claus (2015) with sentences describing two characters opening or closing containers with screw lids (e.g. bottles) produced the opposite result pattern (mismatch advantage). There are two main differences between these studies that might be responsible for the opposite results: different knob device and different number of characters. We ran an experiment with the knob device employed by Claus but changed the sentences to describe only one character. We did not find a significant difference between the match and the mismatch conditions. Interestingly, we observed differences between two groups of participants: those who typically use their right hand on the lid when opening/closing bottles showed a significant match advantage, whereas those with the left hand on the lid showed a significant mismatch advantage. We could replicate these results in an additional experiment with a slightly different task. The findings of our experiments indicate that neither the number of characters nor the device is a decisive factor. Rather, they suggest that readers re-activate their individual motor experiences while reading, providing support for a simulation view of language comprehension.

Everything Starts with a Handshake – Effects of Character Design and Interactions on Social Presence in Virtual Reality

Jakub Edward Cichor[1], Maxim Egorov, David Plecher, Claudia Peus & Franziska Emmerling
[1] *Technische Universität München - TUM School of Management, jakub.cichor@tum.de*

The use of innovative and engaging learning methods in various training contexts (e.g., leadership development) is steadily increasing. Video games have been shown to have positive effects on motivation and learning outcomes through the immersive experience they create, which can be further amplified by Virtual Reality (VR). Crucial to the perception of presence in VR is the acceptance of implemented virtual characters, which can be negatively impacted by the Uncanny Valley (UV) effect. The UV is primarily influenced through a character's design (e.g. facial expressions) and the interactions with a character. We investigated how VR applications can be optimized for enabling engaging experiences in the context of leadership development. We, therefore, implemented a leadership scenario in VR and systematically investigated the UV effect. In an experimental study with a 2x2 between-subjects design, we implemented four versions of a VR experience to examine effects of character design (cartoon vs. semi-realistic) and character interactions (handshake vs. no handshake) on social presence. Results (N = 51) show that interaction effects between character design and character interactions influence the UV ($F(1,44) = 7.18$, $p = 0.01$), which in turn impacts perceptions of social presence ($F(1,44) = 12.25$, $p = 0.001$). Social presence was especially pronounced when participants encountered the cartoonish character ($M = 2.33$, $SD = .48$) compared to the semi-realistic character ($M = 1.87$, $SD = .48$). Our findings advance the optimization of character design and interaction in VR implementations, not only for leadership development but training contexts in general.

I, Robot – or Leader? Investigating Transformational and Transactional Behavior in Robot Leaders

Jakub Edward Cichor[1], Sylvia Hubner, Claudia Peus & Franziska Emmerling
[1] *Technische Universität München - TUM School of Management, jakub.cichor@tum.de*

As digitalization increasingly generates challenges and opportunities for future leaders, organizations attempt to navigate these novel environments by leveraging promising technologies. One emerging technology is social robotics, in which robots with the capability of human-like interactions are used to augment day-to-day experiences. Prior studies have shown that humans i) enjoy being led by robots as long as it increases their efficiency and ii) are willing to be motivated by a robot if they perceive it as displaying authority. While first evidence suggests that robot leadership can be successful, specific leadership styles – fundament of leadership success in human leaders – have not yet been studied in robot leaders. To fill this empirical gap, we implemented three leadership styles in robot (Pepper by SoftBank Robotics) behavior (i.e., transformational leadership, transactional leadership, and minimal leadership as control) and tested how Executive MBA students (N = 67) reacted to those leaders in a between-subjects design. Preliminary results show that participants who engaged with the transformational robot perceive the robot to be significantly more competent ($F(2,64) = 3.19$, $p < 0.05$) and trustworthy ($F(2,64) = 3.97$, $p < 0.05$) than the other two groups. These results indicate that the perceptions evoked by transformational robots are similar to those of transformational human leaders. Upon completion of data collection, we will investigate how different leadership styles influence followers' task engagement and performance. Our study is a first step in establishing whether evidence based on human leaders applies to robot leaders as well.

Adaptive risk-taking with endogenous imprecision in real-time

Simon Ciranka[1]
[1] *Max Planck Institute for Human Development, Ciranka@mpib-berlin.mpg.de*

Humans' behaviours under risk and uncertainty are often characterized as irrational, in that they over- or underweight outcome probabilities and treat missing information suboptimally. Such behaviours are routinely observed in lab-based tasks involving discrete choices, e.g., between monetary gambles. However, the risks associated with many real-life activities depend not only on extrinsic parameters but also on intrinsic capacities. How human risk-taking integrates endogenous action precision is poorly understood. Here, we designed a task to disentangle endogenous and extrinsic sources of outcome variability in real-time risk-taking. While recording electroencephalography, participants race an imaginary car across a virtual track to accumulate rewards, but without overshooting a certain point after which a massive loss is incurred. On any given trial, the car's properties are either known or unknown, varying the role of intrinsic versus extrinsic sources of uncertainty. For either source, we examine the extent to which subjects adopt boundedly rational risk-taking policies that maximize rewards under the respective uncertainty levels. Preliminary data indicate that participants adopt a moderately risk-averse strategy to protect from inherent driving imprecision, and a more risk-averse strategy in the face of uncertainty about the environment, both of which appear paradoxically optimal in maximizing long-term returns. Turning to the EEG data, we use multivariate pattern analysis to examine whether these adaptive behaviours are mediated by the endogenous sampling of anticipated outcomes (gain, loss) and/or by preferential representations of worst-case environmental states in the face of uncertainty.

Distortions of numerical magnitude in decisions from sequential samples: When are extreme values over- or underweighted?

Verena Clarmann Von Clarenau[1], Stefan Appelhoff, Thorsten Pachur & Bernhard Spitzer
[1] *Max Planck Institute for Human Development, Berlin, clarmann@mpib-berlin.mpg.de*

Humans routinely make decisions based on sequential samples of numerical values, for instance, when deciding which of two online shops is cheaper. A common conclusion from analyses based on descriptive models in behavioral economics (e.g., Cumulative Prospect Theory, CPT) is that numerical values are subjectively compressed, such that extreme values weigh relatively less than prescribed by normative theory. However, several recent psychophysical studies of sequential number comparison instead showed anti-compression, that is, a relative overweighting of extreme values. Here, we examine possible reasons for this apparent discrepancy in findings across research traditions. Does it result from the use of different formal analysis frameworks and/or from experimental factors, such as the distribution of number samples (uniform or non-uniform), or the use of an economic vs non-economic task? To address these questions, we analyze existing and newly collected data sets, using both economic (CPT) and psychophysical (sample-level) analysis models. The results show that the two modeling frameworks converge on indicating compression in a traditional economic sampling task, but anti-compression in an equivalent task with distinct sample distribution (uniform-discrete). These findings suggest that distortions in number weighting may flexibly adapt to properties of the to-be-explored sample space.

Effects of evaluative conditioning on the selection from iconic memory

Alexandra Clausen[1], Florian Kattner & Karla Salazar-Vogel
[1] *TU Darmstadt, clausen@psychologie.tu-darmstadt.de*

Affective stimuli may either capture visual attention or lead to withdrawal of attention and avoidance behaviour. In the present two experiments (n = 40 and n = 44, respectively), we tested whether learned affective associations lead to attentional biases in terms of a prioritization or inhibition at the level of early visual processing. Therefore, neutral stimuli were paired with either positive, neutral, or negative images using an evaluative conditioning procedure. These conditioned stimuli were then used as targets in an iconic memory task, in which an array of eight stimuli was briefly presented (136 ms), and participants were asked to recall a target after a variable delay. In both experiments, the proportion of correct answers for the successfully conditioned stimuli was lower for negative targets than for neutral and positive targets. It appears that learned negative information can lead to a withdrawal of visual attention, as it was previously reported for unconditioned negative stimuli. It should be further investigated why, in some cases negative targets are prioritized or inhibited, compared to neutral or positive targets.

The Role of Working Memory in Multiple-Target Visual Search at the Airport Security Check

Anna Conci[1], Robert Gaschler & Merim Bilalić
[1] *Alpen-Adria Universität Klagenfurt, anna.conci@aau.at*

The visual search involves identifying specific objects, called targets, among numerous other objects, called distractors. This task is an essential skill in many lifesaving professions (e.g. radiologists, airport security screeners). It has been found that even experts make mistakes when there are two targets to be found (Berbaum et al., 2010). Once a target has been found, it happens that even experts do not find the second target. This fact can have serious consequences if, for example "a water bottle and a small gun are in hand baggage" (Cain & Mitroff, 2013). One reason why people miss the subsequent object once they had found another one may be, that the position and shape of the first found target exhaust the resources of working memory (WM; resource depletion account). We used real x-rayed hand baggages to investigate this effect. People had to remember a position and the identity of an object before searching a forbidden item in a hand baggage (experimental condition). In the control condition there was no memory item before the visual search task. We found no difference in the reaction time or in the accuracy between both conditions. The analysis from the eye movements shows that participants rarely look at the position in the baggage where the memory object was presented before. Interestingly, people look back in the area close to the object but avoid the exact position from the object.

Stimulus-driven updating of an attentional bias from statistical context learning in visual search

Markus Conci[1]
[1] *Ludwig-Maximilians-Universität München, conci@psy.lmu.de*

Attentional orienting in our complex visual environment is supported by statistical learning of regularities. For instance, visual search for a target is faster when a layout of nontarget items is repeatedly encountered, illustrating that learned contextual invariances can improve attentional guidance (contextual cueing; Chun & Jiang, 1998). While contextual learning is usually relatively efficient, relocating the target to an unexpected location (within an otherwise unchanged layout of nontarget items) typically abolishes contextual cueing and the benefits deriving from the invariant context recover only slowly with extensive training (Zellin et al., 2014). The current experiments show that such context-based learning is associated with an attentional bias that emerges during early visual processing and persists even after a change of the target. Two additional experiments explored whether bottom-up attentional guidance can mediate this bias from contextual memory. In the experiments, an initial learning phase was followed by a subsequent relocation phase that introduced target location changes. This location change was accompanied by transient attention-guiding signals that either up-modulated the changed target location, or which provided an inhibitory tag to down-modulate the initial target location. The results showed reliable contextual cueing both before and after the target location change, which suggests that attentional guidance (by transient stimulus-driven facilitatory and inhibitory signals) enhances the flexibility of contextual learning and can thus update a persistent bias from context memory.

The influence of morphological configuration in language switching

Carla Elizabeth Contreras Saavedra[1], Klaus Willmes, Iring Koch, Stefanie Schuch & Andrea M. Philipp
[1] *RWTH Aachen University, carla.contreras@psych.rwth-aachen.de*

In the present study, we examined the influence of morphological configuration (i.e., the structure of morphemes in a word) in language switching. We conducted several experiments in which not only the relevant language (German, English or Spanish) varied between trials but also the rule for the morphological configuration of a word. In Experiment 1 and 2, we used two-digit numbers because the morphological configuration (i.e., the composition rule of the number words) varies between languages (e.g. inverted composition rule with unit before decade vs. non-inverted composition rule with decade before unit). Experiment 1, participants (n=36) had to name a visually presented two-digit number, whereas the numbers were presented auditorily in Experiment 2 and participants (n=48) had to determine the numerical distance (i.e. 2, 3 or 4) between the numbers in the current and the previous trial. In Experiment 3, participants (n=48) had to name compound words for which the morphological configuration (verb+noun vs. noun+verb) differed between languages. The results of all experiments demonstrated language-switch costs, which is a better performance in language-repetition trials than in language-switch trials. Importantly, language-switch costs were modulated by repeating or switching the morphological configuration. More specifically, a language-repetition benefit (i.e., switch cost) was observed when the morphological configuration repeated in two successive trials but was reduced or even reversed when the morphological configuration switched. Our results indicate that the morphological configuration plays a critical role in the representation and the production of compound words in language switching.

Automatic imitation of multiple agents: A computational model

Emiel Cracco[1] & Richard P. Cooper
[1] *Universiteit Gent, emiel.cracco@ugent.be*

There is accumulating evidence that the actions of others are represented in the motor system, leading to automatic imitation. Whereas early work focused mainly on the effects of observing a single agent, recent studies indicate that the actions of multiple agents can be represented simultaneously. Yet, theorizing has lagged behind. In my talk, I will present a computational model of automatic imitation that is able to include multiple agents and will demonstrate that this model is able to capture four critical multi-agent effects. Importantly, to do so, it was necessary to augment the model with a control mechanism regulating response inhibition based on the number of observed actions. Furthermore, additional simulations indicated that this mechanism could be driven by response conflict. Together, our results demonstrate how theories of automatic imitation can be extended from single- to multi-agent settings. As such, they constitute an important step towards a mechanistic understanding of social interaction beyond the dyad.

Effects of Time-on-Task on movement preparation and movement execution

Arpad Csatho[1], Andras Matuz, Andras Zsido & István Hernádi
[1] *University of Pecs, arpad.csatho@aok.pte.hu*

Capacity limited cognitive functions seem to be particularly sensitive to the detrimental effects of mental fatigue induced by increasing Time-on-Task (ToT). Previous studies have also suggested that movement behavior, especially the preparatory phase, is costly in term of cognitive capacity. Yet effects of ToT specific to the different phases of movements have received little attention. Therefore, in two experiments, we assessed the effect of ToT on a visually guided pointing task. In both experiments, participants (n = 23 and 23) were instructed to point to targets by moving the cursor from the center to the peripheral target. In experiment 1, targets appeared at one of the four positions. In experiment 2, there were 16 target positions enhancing the uncertainty about movement direction. The first three blocks of trials lasted 15 minutes without rest. Participants then had a 2-min break followed by an additional block. Data of movement preparation time, movement execution, and subjective fatigue were recorded. Movement execution was measured as movement time, movement error, peak velocity, path length-task axis length ratio etc. Gaze position recording was also used to control fixation. In both experiments, the most robust finding was that movement preparation became slower with increasing ToT. In contrast, movement execution was associated with decreasing speed-accuracy trade-off: fatigued participants made faster but more erroneous movements. To conclude, the results suggest that enhanced level of mental fatigue is manifested in a slow preparatory phase followed by a faster but often more erroneous movement execution.

Rules are made to be broken! -- Cognitive conflict underlying conditional rule-breaking

Leidy Yurani Cubillos-Pinilla[1], Roland Pfister & Franziska Emmerling
[1] *Technische Universität München - TUM School of Management, leidy.cubillos-pinilla@tum.de*

Conditional rule-breaking is the skill to intentionally decide whether to follow or break an imposed rule in a certain situation according to the expected consequence (e.g.,expecting greater earnings or benefits) and the internal goals of the rule breaker. When breaking the rule, cognitive conflict is induced as a result of the contradiction of behaving according to ones internal goals, while contrary to what is commonly acknowledged as appropriate (i.e., rule following). In computerised paradigms, cognitive conflict is reflected in behavioural measures, such as slower reaction times and more complex movement trajectories as compared to rule-based responses. To validate the construct of conditional rule-breaking, we developed a controlled laboratory paradigm. In a sample of 133 participants, 38% unconditionally (i.e. always) followed the rule, 12% unconditionally broke the rule, and 50% conditionally broke the rule in accordance with anticipated benefits and internal goals. As expected, conditional rule breakers obtained larger payoffs than unconditional rule-followers and unconditional rule breakers[(F(2,130)=145.99,p=0.00)]. Moreover, when comparing conditional rule-breakers to unconditional rule-followers, the former showed cognitive conflict as reflected by prolonged reaction times [(Mean1=972.8,193.1),(Mean2=732.5,SD=158.8).1,t=-7.51,p=0.00)], as well as larger and more complex movement trajectories(e.g.,Maximum absolute distance:[(Mean1=20.3,SD=34),(Mean2=9.3,SD=25.9),t=-4.43,p=0.00]). In particular, we found cognitive conflict to occur mainly during the motor-planning stage of the decision-making process and specifically when rule breaking leads to benefits. Our study has a significant impact on cognitive-research because its innovative approach to studying the cognitive mechanisms underpinning specific sub-forms of rule-breaking behaviour and intentionality.

The degree of randomness in a free-choice learning tasks predicts action-effect learning

Yevhen Damanskyy[1] & Torsten Martiny-Huenger
[1] *The Arctic University of Norway, yevhen.damanskyy@uit.no*

The action-effect paradigm suggests that actions are controlled through bidirectional associations between motor patterns and their perceivable consequences. With the present experiment (N = 37) we aimed to provide a conceptual replication of a classical action-effect paradigm with whole arm responses instead of finger button presses. In a free-choice response task (learning phase), participants experienced a co-occurrence of left and right arm push movements performed on two joysticks and background color change to green and red. In the test phase, the same background colors preceded responses in a categorization task. The main analysis did not provide statistical evidence that response times and errors in the test phase depended on previously learned associations between background color and response. However, post-hoc analyses indicate that the degree of randomness of the free-choice responses in the learning task influenced the response pattern in the test phase. The more random the participant responded, the more was the result pattern in line with action-effect principles – color facilitated the respective previously associated response. Such findings contribute to the argument that involvement of participants (e.g., through a more salient response representation) in the learning phase may be an important pre-requirement for action-effect learning.

The Role of Recognition in the Directed Forgetting of Incidentally-Learned Stimulus-Response Associations

Hannah Dames[1], Marco Ragni, Andrea Kiesel & Christina Pfeuffer
[1] *University of Freiburg, damesh@cs.uni-freiburg.de*

Using the directed forgetting (DF) paradigm, various studies have demonstrated that humans are able to intentionally forget previously learned information. Yet, few studies have explored whether DF affects motor representations or incidentally-learned information. Adapting the list-method of DF, the present study investigated the DF effect on incidentally-learned stimulus–response (S-R) associations while simultaneously considering item recognition memory. In two lists, L1 and L2, participants were instructed to memorize and classify everyday objects as containing a mechanism or not by pressing a left/right key (four S-R pairings per stimulus). After L1, participants were either instructed to forget L1 (forget-condition) or to keep L1 in memory (remember-condition) before learning L2. In a later recognition test, participants indicated whether an object was presented in the learning phase of L1/L2 or was a novel item by, again, pressing left/right keys. Crucially, the required response could item-specifically repeat or switch between L1/L2 and the test phase. We predicted that item-specific S-R retrieval effects for L1 should be reduced in the forget condition as compared to the remember condition while exploring the relation of this pattern to recognition memory of to-be-forgotten stimuli. The results of mixed model analyses did not support our predictions, but instead indicated that recognition interfered with S-R retrieval. Nevertheless, we observed robust repetition priming effects across stimulus repetitions in L1 and L2 suggesting that item-specific DF effects may have been obstructed or overshadowed by processes associated with stimulus recognition.

Evaluating the Endocrinological Impacts of Human Centric Lighting in a Field Study with Elderly Dementia Patients

David Daxberger[1], Maike Lindhaus, Dunja Storch, Jarek Krajewski & Sebastian Schnieder
[1] *Institut für Experimentelle Psychophysiologie, d.daxberger@ixp-duesseldorf.de*

Previous research results indicate that an increased proportion of blue light has a physiologically activating and emotionally stabilizing effect – nonetheless, its impact in patients with neurodegenerative diseases as confounding factors remains unclear. In the present study, the psychophysiological influences of a chronobiologically adapted light-system with variable amounts of low- and high-frequency light components was investigated in 50 elderly patients with dementia (as measured with MoCA). Besides a multidimensional psychological evaluation, an objective steroidal analysis was carried out based on hair segments that had grown over the course of a month. The values of 31 seniors from an assisted-living facility with an adaptive lighting system (intervention group) were compared with those of 19 seniors from an independent control facility with a regular lighting system (control group). After controlling for environmental and intrapersonal confounders, a significant higher level of corticosteroids was observed in the intervention group (11.4 pg/ml), compared to the control group (5.9 pg/ml), corresponding to that of a younger and healthier sample. Further, the intervention group reported significantly less daytime sleepiness, higher levels of physiological activity, energy and an overall greater satisfaction with environmental lighting-conditions. Regarding general sleep quality (KSS, PSQI), depressiveness (GDS), stress perception (PSS) and anxiety (STAI), no significant group differences could be observed. Overall, the results suggest a physiological impact of chronobiologically adapted lighting in patients with dementia, which can be interpreted as a protective factor in the intervention facility.

Adaptation aftereffects reveal representations for encoding of contingent social actions

Stephan De La Rosa[1]
[1] *FOM University of Applied Sciences, stephan@stephandelarosa.de*

Why is it so easy for humans to interact with each other? In social interactions, humans coordinate their actions with each other nonverbally. For example, dance partners need to relate their actions to each other to coordinate their movements. The underlying neurocognitive mechanisms supporting this ability are surprisingly poorly understood. Here we use a behavioral adaptation paradigm to examine the functional properties of neural processes encoding social interactions. We show that neural processes exist that are sensitive to pairs of matching actions that make up a social interaction. Specifically, we demonstrate that social interaction encoding processes exhibit sensitivity to a primary action (e.g. "throwing") and importantly to a matching contingent action (e.g., "catching"). Control experiments demonstrate that the sensitivity of action recognition processes to contingent actions cannot be explained by lower-level visual features or amodal semantic adaptation. Moreover, we show that action recognition processes are sensitive only to contingent actions, but not to noncontingent actions, demonstrating their selective sensitivity to contingent actions. The findings show the selective coding mechanism for action contingencies by action-sensitive processes and demonstrate how the representations of individual actions in social interactions can be linked in a unified representation. These findings provide insights into the perceptual architecture that helps humans to relate actions to each other and are in contrast to the common view that action-sensitive units are sensitive to one action only.

The omission response reflects specific and unspecific predictions in action-effect couplings

Tjerk Dercksen[1], Andreas Widmann & Nicole Wetzel
[1] *Leibniz-Institut für Neurobiologie Magdeburg, tjerk.dercksen@lin-magdeburg.de*

When people expect a sound to happen but it is unexpectedly omitted, a response to omission can be recorded using EEG. Recent models of perception state that this response is the result of error signaling caused by a prediction of a sound that is not met by any input. SanMiguel and colleagues (2013) used button presses coupled with sounds to induce auditory predictions in two conditions: in one condition button presses were coupled with a single sound, where in the other condition the sound changed after every button press. When sounds were unexpectedly omitted, ERPs showed oN1, oN2 and oP3 prediction error-related responses to omission only in the single sound condition, while no such responses were observed in the changing sound condition. The authors therefore concluded that a prediction can only be formed when the identity of the upcoming stimulus is known. Given the importance of omission responses for understanding the role of prediction in perception, we replicated the study of SanMiguel and colleagues (2013). We used double the number of participants to enhance power, and Principal Component Analysis to extract components. Our results replicate the effects observed in the single sound condition, but we additionally observed smaller oN1 and oP3 responses in the changing sound condition. This suggests that an unspecific prediction - some sound is expected at a certain time - is formed even if no identity information is available about the upcoming stimulus. Significant amplitude differences between conditions imply that sound identity nevertheless plays an important role.

It's all about the fit: The influence of application context on the usefulness of overclaiming questionnaires in hiring situations

Birk Diedenhofen[1] & Adrian Hoffmann
[1] *University of Duesseldorf, birk.diedenhofen@uni-duesseldorf.de*

Overclaiming is the tendency to overstate one's knowledge, a behavior that is frequently encountered in personnel selection contexts. To identify applicant faking behavior, overclaiming questionnaires (OCQs) capture whether applicants claim to know vocabulary that does not actually exist. Studies investigating the usefulness of OCQs in assessing faking behavior reported mixed results. However, previous studies neglected the fit between OCQ and selection context. Applicants may not perceive a good result in the OCQ as crucial to their success in the application procedure if the fit of the questionnaire to job requirements is poor. In such cases, the OCQ may not contribute to the identification of faking behavior. To examine the influence of the fit between OCQ and selection context on overclaiming, we manipulated the selection context in a simulated application procedure which included an OCQ on general knowledge. A total of 432 participants answered the questionnaire either while applying for a job as a science journalist (good fit), while applying for a job as a psychological therapist (poor fit), or without application context (control). Participants overclaimed most when general knowledge was most relevant, that is, when applying for the job as a science journalist. If participants applied for the job as a therapist, they still overclaimed more than without any application context. We conclude that the fit between OCQ and application context is important and should be considered when evaluating the usefulness of OCQs in detecting faking behavior.

The effects of biological motion information on spatial navigation performance in the elderly

Nadine Diersch[1], Martin Riemer, Paul-Christian Bürkner & Thomas Wolbers
[1] *DZNE, nadine.diersch@dzne.de*

It is well known that older adults have problems in spatial navigation, which is often tested empirically by using virtual reality (VR) setups. However, such studies typically implement their tasks in empty environments, although evidence from animal research suggests that the brain's navigation system maps spatial information about conspecifics and that observational learning has similar effects on the acquisition of spatial knowledge as the actual exploration. Moreover, successfully navigating in VR requires a certain degree of immersion, which can be facilitated by the presence of an avatar. Here, we tested whether biological motion information supports navigational learning in older adults in a virtual city-like environment. In several learning phases, participants traveled along a route while an avatar or a point-light walker was moving in front of them. A condition with scrambled motion and traveling in an empty environment served as controls. During retrieval, participants traveled short route segments, either in the same (repetition trials) or opposite direction (retrace trials) as during learning and performed a route intersection task and a pointing task. Results confirm that performance in both tasks was better during repetition trials, particularly at the beginning of learning. By using a Bayesian implementation of a multilevel model with or without motion condition as predictor, we show that biological motion information does not influence performance suggesting that an avatar may not help older adults to perform in VR. Using eye tracking, we further checked whether focusing on landmark or biological motion information during learning affects learning performance.

Binding of action-effect intervals

David Dignath[1], Roland Thomaschke, Andrea Kiesel & Johanna Bogon
[1] *Freiburg University, dignath.david@gmail.com*

One of the challenges of human action control is to understand how the brain links features of actions and feature of their outcomes despite a temporal distance between the two events. Most of the actions that we perform in our everyday life are goal-direct, yet the outcomes or effects that follow from our actions are often delayed. For instance, in many human-computer interactions there is a considerable delay between the action of the human agent (e.g., a click on the print button) and the action-effect of the computer system (e.g., printing a paper). The present talk is concerned with the micro genesis of the acquisition and retrieval of delayed action-effects. A series of experiments will be presented that investigate the binding and retrieval of actions and their delayed action-effects. More specifically, we ask whether repetition of a response from one trial to the next retrieves information about when an action-effect occurred in the previous trial. Results provide evidence for the claim that temporal delays between actions and action-effects are integrated into cognitive action representations and retrieved later on. This observation encourages the notion that temporal information is not just a catalyst that fosters or hinders binding of actions and their effects, but rather, it suggests that temporal delays can become the content binding.

Disentangling the effect of working memory load on different postural subsystems

Tanja Dirks[1], Sebastian Kübler, Tarini Singh, Rene Schwesig, Andreas Lauenroth & Torsten Schubert
[1] *Martin-Luther-Universität Halle-Wittenberg, tanja.dirks@student.uni-halle.de*

In daily life, maintaining postural balance in an upright position seems to be a highly practiced task that is executed more or less automatically without the requirement for additional cognitive resources. In contrast, a plethora of studies employing motor-cognitive dual-task (DT) paradigms indicates that additional cognitive demands can affect postural control in the elderly as well as in younger adults. This can be shown, for example, by decreased postural stability or an increased risk for falls under DT compared to single-task conditions. Although maintaining balance requires the processing and integration of multiple types of sensory input, in most of the studies in the field, however, postural control is operationalized as a single product measure without considering the interplay of different postural subsystems. In the current study, thus, our aim was to disentangle the effect of cognitive load on these subsystems. For this purpose, we progressively reduced participants' sensory input in order to identify the visual, the peripheral-vestibular, the somatosensory, the nigrostriatal, and the cerebellar postural subsystems, while they were instructed to keep their balance on a force platform. Participants executed this balance task under single-task and DT conditions. For the latter, we concurrently applied an auditory working memory updating task. As a result, we found distinct effects of working memory load on the different postural subsystems. Our findings will be discussed in the context of shared resources between cognitive and motor-related domains in multitasking situations.

Training the facial sensory-motor network

Christian Dobel[1] & Carsten Klingner
[1] *Uniklinik Jena, christian.dobel@med.uni-jena.de*

Many theories describe how we learn limb movements. It is much less investigated if and how we learn to move facial muscles. We present here two new paradigms to investigate facial learning. In experiment 1, the mobility of the face was impaired by application of kinesio-tape to the corner of the mouth. In the treatment group, tape was applied with a downward pull, in the sham group without pull. Participants had to read aloud for 25 minutes to adapt to the reduced mobility. Resting-state fMRI recorded before and after reading demonstrated plastic changes in a network including striatal-, cerebellar- and somatosensory brain areas. However, in contrast to long-term learning, we did not find involvement of the cerebral motor cortex. In experiment 2, we used Botulinumtoxin A (BTX) to reduce the mobility of the face. Due to the paralytic effect of BTX, we assumed that faces of participants would be rated more negatively if presented dynamically (videos) compared to statically (photos). Our hypothesis was not confirmed. Participants were rated more positively especially in response to videos with neutral facial expression. The results suggest that participants were able to adapt to the reduced mobility. Taken together, our results stress the plastic abilities of the face and the underlying neural architecture. They seem to operate as fast as it was shown for limb movements.

Temporal structure of task interference between a go/no-go reaction time task and balance control

Falko Döhring[1] & Hermann Müller
[1] *Justus Liebig University Giessen, falko.doehring@sport.uni-giessen.de*

Previous findings suggest that cognitive tasks interfere with balance tasks when performed in a dual task. But it is rather unknown how processing demands of the cognitive task influence the motor task in different phases of processing. In order to study the temporal structure of task interference, we paired a go/no-go two choice reaction time stop-task with a balance-task. We recorded seven healthy subjects (age: 26.6 ± 3.6 years), each completing a total of 208 trials. While standing in a relaxed manner, subjects had to blink with the left or right eye as choice reaction to a visually presented stimulus. However, in case a stop-signal was presented shortly after the stimulus, the reaction had to be stopped. We also included control trials where no stimulus was presented and accordingly, subjects did not react. We used EMG recordings of the m. orbicularis oculi to measure blinking onset. Balance control was assessed with COP recordings of a force-plate. Before analyzing the data we filtered the force data with a fourth order lowpass-filter with 10 Hz cutoff. The data was split into subsets, according to the different conditions. We used a point-based resampling technique to compare pairs of subsets with respect to their temporal structure. Data show effects of the cognitive task on balance control. We find a shift in anterior-posterior direction in trials with correct reactions compared to erroneously reactions on a stop-signal.

How Linear Interpolation Influences Perceptions of Income Inequality

Jonas Ebert[1] & Roland Deutsch
[1] *Julius Maximilians University of Würzburg, jonas.ebert@uni-wuerzburg.de*

Economic inequality is a challenging feature of modern societies and a prominent topic in political debates all over the world. However, when asked about distributions of income and wealth people's perceptions are far from accurate. This poses a serious problem since correct perceptions about economic inequality are a necessary requirement for any objective debate or informed decision about the topic. Our research therefore targets the cognitive process underlying the perceptions of income inequality. More specific we focus on a heuristic called Anchoring and Linear Interpolation (ALI). According to ALI, people's perceptions of income distributions follow a linear trend between the lowest and the highest income remembered. Based on earlier studies, we presented subjects with a fictitious income distribution and then asked them to estimate the mean income of the four quartiles (the poorest, second-poorest, second-richest and richest quarter). We manipulated the skew and the range of the presented distributions. For both positively as well as negatively skewed distributions, participants mean quartile judgments were much more linear than appropriate and resulted in distinct patterns of estimation errors that are consistent with ALI. When the distribution's range is increased (without actually changing the correct quartile means) subjects' estimation errors increase significantly, underlining the influence of the distribution's endpoints for the underlying cognitive process. These findings support the assumptions of the ALI Heuristic and emphasize its influence on the perception of income distributions.

Fake News in Biofeedback: Sham Feedback on Skin Conductance Responses Influences Affective Processing

Jan Ehlers[1] & Janine Grimmer
[1] *Bauhaus-Universität Weimar, jan.ehlers@uni-weimar.de*

Biofeedback constitutes a well-established, non-invasive method to observe bodily activation changes in real-time, usually through visualization on a computer screen. It promotes the understanding of affective processing and enables voluntary interference in dysfunctional physiological reactions by means of cognitive strategies. Clinical studies provide ample evidence for a long-term reduction of anxiety symptoms; however, treatment durations exhibit strong inter-individual variations and first successes can often be achieved only after about twenty sessions. The current study explores a rather untapped approach to support biofeedback therapy by applying sham feedback that suggests weak autonomic reactions to fear-laden stimuli. Overall objective is to induce attitude changes and reduce the physiological responsiveness. We carried out two experiments and applied sham feedback on skin conductance responses and pupil size changes to auditory stimuli in 25 healthy, uninitiated participants. Results indicate considerably smaller skin conductance responses while viewing sham feedback compared to actual biofeedback. In contrast, sham feedback on pupil size changes does not influence event-related activity. Individual ratings, however, suggest high concordance between sham pupillary signals and interoceptive perception, indicating also a certain success in manipulation. Nonetheless, sham feedback on skin conductance responses seems to constitute a more appropriate measure to influence affective processing, probably due to clarity and better traceability of the associated dynamics.

A media intervention using vicarious contact improves explicit and implicit outgroup attitudes

Franziska Ehrke[1]
[1] *Universität Koblenz-Landau, Campus Landau, ehrke@uni-landau.de*

Social media have become important for minorities to share tolerance-promoting messages via the internet. Videos aiming to improve intergroup attitudes are widespread. But despite their popularity and advantage of being highly scalable as anti-prejudice interventions, there is a lack of research examining if and how such media-based interventions are effective. Therefore, this preregistered study evaluated the effectiveness of a YouTube-campaign video (Estatal LGTB, 2015) that used vicarious contact to improve attitudes towards gay men. Participants (N = 274 heterosexual adults, Mage = 42, SDage = 16, 53% employees, 55% women) were randomly allocated to a control-group design (campaign vs. control video). Whereas the campaign video (n = 125) presents a gay couple asking by-passers to translate an email that confronted them with anti-gay discrimination, in the control condition (n = 149) the same video was presented muted with alternative subtitles about two brothers facing corruption. As pre-registered the campaign video improved heterosexuals' explicit and implicit attitudes (IAT) towards gay men. Further, the video improved explicit attitudes via (a) inducing outgroup empathy with the gay protagonists and (b) via evoking perspective taking with the ingroup protagonists. However, neither perspective taking nor empathy with ingroup or outgroup protagonists explained the improved implicit attitudes, suggesting other working mechanisms that should be examined in future research.

Investigating how prediction errors make us remember

Isabelle Ehrlich[1], Javier Ortiz-Tudela, Yee Lee Shing & Sophie Nolden
[1] *Goethe-University Frankfurt, ehrlich@psych.uni-frankfurt.de*

In predictive processing, the brain makes use of environmental statistical regularities to derive predictions (i.e., prior) about future events. The mismatch (i.e., prediction error, PE) between predictions and sensory evidence is thought to be utilized to improve future predictions. Recently, predictive processing has been linked to memory and one particular question yet to answer is how different levels of PE affect episodic memory performance. Based on previous findings, we aim in the planned paradigm at testing a u-shaped relationship between the strength of PE and episodic memory performance. In phase 1 of the paradigm, participants will learn associations between scenes and prototypical artificial objects, which are shown in one of four locations on the screen. In phase 2, completely new scene-object pairings are shown in a similar manner. This time, associations get systematically confirmed or violated in order to induce different levels of PE. In phase 3, episodic memory for phase 2 objects and their locations will be assessed. To take consolidation effects into account, phase 4 assesses the same parameters one day later. A special feature of the paradigm is that the artificial object stimuli, which are used to manipulate the strength of PE, can be modified precisely along different feature dimensions. Thereby, we expect to get a more fine-grained characterization of the relationship between PE and memory. As a broader goal, we aim at including a lifespan perspective by comparing age groups and extending the applied methods to investigate the respective neural basis. future predictions.

Automatic detection of familiarity in face selective cortical areas: A cross-cultural study

Charlotta Marina Eick[1], Xiaoqian Yan, Bruno Rossion & Gyula Kovács
[1] *Friedrich-Schiller-Universität Jena, Germany, charlotta.eick@uni-jena.de*

This talk will outline our recent findings regarding differences between familiar and unfamiliar face processing. By using a Fast Periodic Visual Stimulation (FPVS) paradigm and measuring steady-state visual evoked potentials (ssVEP), different cortical responses were detected in the past for objects and faces as well as for identical or different faces. In the current study we tested if a differential ssVEP response is also present for familiar when compared to unfamiliar faces in two populations (German and Belgian) of participants (n = 30). We presented faces of celebrities either familiar (e.g. German celebrities to Germans) or unfamiliar (e.g. French celebrities to Germans; presentation frequency 0.85 Hz) among similar, but unknown faces (presentation rate 6 Hz) in two experiments. During the first experiment, multiple familiar faces were presented to evaluate familiarity while in the second experiment faces of one single familiar person were shown to test the differential ssVEP response to the individual identity. We could observe an enhanced ssVEP amplitude over the occipital-temporal (OT) regions to familiar when compared to unfamiliar faces in both participant groups. Importantly, we could demonstrate different ssVEP responses to the exact same face within the two cultural participant groups, signaling that familiarity determined the observed differential ssVEP responses. Moreover, a positive correlation between subjective familiarity rating and the magnitude of ssVEP response was found. Our results confirm further the theory that familiar and unfamiliar faces are processed differentially in the ventral stream.

Event Cognition - Do changes in backrground lead to forgetting

Svenja Eickemeier[1], Farina Rühs, Christina Bermeitinger & Ryan P. M. Hackländer
[1] *Universität Hildesheim, eickemei@uni-hildesheim.de*

Our memories are broken up into discrete events, even though we experience the world in a continuous manner. The Event Horizon Model (EHM; Radvansky, 2012) explains the discreteness of events in memory based on online segmentation or event shifts. One prediction of the EHM is that recently encountered information is more difficult to access in memory following an event shift. Previous experiments have shown larger rates of forgetting following spatial shifts, even when retention time was held constant; this is referred to as the Location Updating Effect (LUE). In two experiments we aimed to discover whether more basic changes in the environment would lead to similar effects as the LUE. In Experiment 1 subjects incidentally learned a list of words (with a task requiring a response to font style) and each list was followed by a memory probe for one of the words. On half of the trials the background color changed during the presentation of the list. Based on the EHM, we expected worse memory for words in trials with the color change. We found a nonsignificant trend supporting our prediction. In Experiment 2, which is still ongoing, we aimed to make the shift more salient by requiring a change in response keys to font style following a color change. As in Experiment 1, we predict larger rates of forgetting on trials with a background color shift. Furthermore, given the extra change (the response) we predict that the effects will be larger than those found in Experiment 1.

Increasing vaccination intentions with extended health knowledge: longitudinal experimental evidence

Sarah Eitze[1], Dorothee Heinemeier, Nora Katharina Küpke & Cornelia Betsch
[1] *University of Erfurt, sarah.eitze@uni-erfurt.de*

This study assesses whether an extended knowledge approach, based on theories of semantic network structures, helps to increase learning performance in older adults by connecting new information to activated, pre-existing knowledge. Providing information about risks, that links the primary diseases such as influenza, to secondary diseases (sequelae) such as pneumococci and sepsis – can decrease vaccine hesitancy in older adults and may serve as a new vaccine communication approach. In a pre-registered, longitudinal online experiment, 585 participants (>60 years of age) were randomly assigned to a 3 (time: before, after leaflet presentation, 3 months follow-up, within) x 3 (educational leaflet type: sepsis leaflet with extended knowledge concept, traditional leaflet without extended knowledge concept, control leaflet, between) mixed design. We assessed knowledge about influenza, pneumococci and sepsis, risk perceptions and their relations to immediate and long-term vaccination intentions and future behavior. Applying the extended knowledge approach increased older adults' immediate pneumococcal and sepsis knowledge and their long-term sepsis knowledge. Risk perceptions increased immediately after reading the sepsis leaflet. Both vaccination intentions (but not long-term behavior) increased after participants read the sepsis leaflet. A significant indirect effect in exploratory mediation analyses showed for both vaccinations that the sepsis leaflet increased immediate knowledge, which lead to increased risk perceptions and consequently increased vaccination intentions three months after the experiment. This study shows that vaccination intentions can be increased permanently by extended health knowledge. Doctors should provide targeted information shortly before patients are faced with important health decisions.

The predictive impact of contextual cues during action observation

Nadiya El-Sourani[1] & Ricarda Schubotz
[1] *University of Münster, n_elso02@uni-muenster.de*

In everyday life, we frequently observe other people acting and easily infer their goals. A large body of research has focused on the question of how we capture, simply by observation, what others aim to do. Barely surprising, action recognition strongly relies on the analysis of the actor's body movements and the recognition of manipulated objects. However, an increasing number of studies show that action observers also exploit contextual information, such as the environment in which the action takes place, actor-related cues, and unused objects nearby the action, i.e., contextual objects (CO). With regard to the latter, we tested the assumption that the brain's engagement in processing COs is not just driven by the COs' semantic congruency to the observed action, but rather to the CO's potential to inform expectations towards upcoming action steps. Based on previous findings, our neuroanatomical hypotheses particularly focused on the inferior frontal gyrus (IFG). Our results revealed the IFG to reflect the informational impact of COs on an observed action at several circumstances: either when the CO depicted a strong match so that the currently operating predictive model of the observed action could be updated and specified towards a particular outcome; or when the CO revealed a strong conflict with the observed manipulation, in which case the currently operating predictive model had to be reconsidered and possibly extended towards a new overarching action goal. Our findings support the view that when observing an action, the brain is particularly tuned to highly informative context.

The effect of a new (vs. conventional) speedometer: On accuracy and time needed to judge journey travel times

Gabriella Eriksson[1], John Maule & Wandi Bruine De Bruin
[1] *the Swedish National Road and Transport Research Institute and Leeds University Business School, gabriella.eriksson@vti.se*

Drivers overestimate how much time they save by speeding, because they mistakenly perceive a linear relationship between speeding and time. Drivers can make more accurate judgments when given an alternative speedometer, indicating the inverted speed (minutes per kilometer) instead of speed in kilometers per hour. Driving involves travelling at speeds that requires a driver to be prepared to act fast. The time that a driver takes to make decisions can have serious implications on safety. Dashboard tools need to be intuitive so that drivers can make fast decisions. Here, we examine the effect of the new vs. conventional speedometer on accuracy and time taken to make travel time judgements. An online survey with 242 drivers was conducted in the UK and Sweden. Drivers were randomly assigned to either the new speedometer showing minutes per 10 kilometers or a conventional speedometer showing kilometers per hour (miles in the UK version). Drivers were asked to use their assigned speedometer to judge travel time, time saved by speeding and average speed needed to arrive within a certain time for six journeys. The time spent on each problem was recorded. We found that drivers who used the alternative speedometer needed less time to judge journey travel time and gave more correct answers than those who received the conventional speedometer. We will discuss implications for dashboard tools and driver education.

Metacognitive performance predictions can be independent of objective performance

Sarah Esser[1], Clarissa Lustig & Hilde Haider
[1] *Universität zu Köln, sarah.esser@uni-koeln.de*

When we are to judge how well we will perform in an upcoming task, we might use knowledge about comparable past performances. Yet, objective and reliable performance measures are not always available and thus it might be helpful to base a performance prediction on past metacognitive judgments which can be independent of actual performance. In our study, we used a metacontrast priming task in which the time between the prime and the mask was varied (SOA). This manipulation has been shown to lead to situations where the objective performance is equal while the subjective feeling of correctness can vary (Lau & Passingham, 2006). Additionally, we paired the different SOAs with a preceding 100% predictive cue. In a subsequent test task, we found that the presentation of these cues led to a prediction of performance based on previous metacognitive judgments which can be independent of objective past performance.

A comparison of conflict diffusion models in the flanker task through pseudo-likelihood Bayes factors

Nathan Evans[1] & Mathieu Servant
[1] *University of Amsterdam, Nathan.J.Evans@uon.edu.au*

Conflict tasks are one of the most widely studied paradigms within cognitive psychology, where participants are required to respond based on relevant sources of information while ignoring conflicting irrelevant sources of information. The flanker task has been the focus of considerable modeling efforts, with only three models being able to provide a complete account of empirical choice response time distributions: the dual-stage two-phase model (DSTP), the shrinking spotlight model (SSP), and the diffusion model for conflict tasks (DMC). Although these models are grounded in different theoretical frameworks, can provide diverging measures of cognitive control, and are quantitatively distinguishable, no previous study has compared all three of these models in their ability to account for empirical data. Here, we perform a comparison of the precise quantitative predictions of these models through Bayes factors, using probability density approximation to generate a pseudo-likelihood estimate of the unknown probability density function, and thermodynamic integration via differential evolution to approximate the analytically intractable Bayes factors. We find that for every participant across three data sets, DMC provides an inferior account of the data to DSTP and SSP, which has important theoretical implications regarding cognitive processes engaged in the flanker task, and practical implications for applying the models to flanker data. More generally, we argue that our combination of probability density approximation with marginal likelihood approximation provides a crucial step forward for the future of model comparison, where Bayes factors can be calculated between any models that can be simulated.

More capture, more suppression: distractor suppression due to statistical regularities is determined by the magnitude of attentional capture

Michel Failing[1] & Jan Theeuwes
[1] *Charité - Universitätsmedizin Berlin, michelfailing.atwork@gmail.com*

Salient yet irrelevant objects often interfere with daily tasks by capturing attention against our best interests and intentions. Recent research showed that through implicit learning, distraction by a salient object can be reduced by suppressing the location where this distractor is likely to appear. Here, we investigated whether suppression of such high probability distractor locations is an all-or-none phenomenon or specifically tuned to the degree of interference caused by the distractor. In two experiments, we varied the salience of two task-irrelevant singleton distractors each of which was more likely to appear in one specific location in the visual field. We show that the magnitude of interference by a distractor determines the magnitude of suppression for its high probability location: the more salient a distractor, the more it becomes suppressed when appearing in its high probability location. We conclude that distractor suppression emerges as a consequence of the spatial regularities regarding the location of a distractor as well as its potency to interfere with attentional selection.

Age differences in false memory: The influence of perceptual and semantic similarity

Yana Fandakova[1] & Sandra Düzel
[1] *Max Planck Institute for Human Development, fandakova@mpib-berlin.mpg.de*

A number of studies have documented older adults' tendency to falsely remember past events that are in part or entirely false. Older adults' increased propensity for false memory has been documented in paradigms including semantic manipulations, across tasks that vary perceptual similarity of test items as well in paradigms relying on source memory. However, little is known about the degree to which the effects of semantic, perceptual or source similarity on false memory are comparable, or whether older adults are particularly vulnerable to some of those factors. We tested this question in older adults from the Berlin Aging Study who completed a verbal learning task, including a recognition test. During the recognition test older adults encountered studied words along with lure words that were either semantically related to the studied words, phonetically similar to those words, or were familiar from a previous task. Initial results suggest that the effects of lure similarity are indeed variable, with larger age-related increases in false alarms for familiar and phonetically similar lures than for semantically related lures. Further analyses demonstrated that individual differences in learning rates play an important role in predicting individual differences in false recognition. Taken together, while older adults show a general tendency for increased false memory, these effects may be rather nuanced and may critically depend on the type of information being tested.

Kindergarten children's numerical competencies, structural family background and quality of the Home Numeracy Environment

Jessica Feichtmayr[1], Simone Lehrl, Valérie-Danelle Berner, Lena Nürnberger, Lorenz Grolig & Frank Niklas
[1] *Ludwig-Maximilians-Universität München*

The aim of the present study was to investigate the association between the home numeracy environment (HNE) and the mathematical skills of kindergarten children. In this study, 140 kindergarten children and their parents were recruited from kindergartens in Bavaria, Germany. Children were 39 to 88 months old (M = 61.51) and 66 were girls. The assessments took place in the kindergarten and children were assessed in their non-verbal intelligence, numeracy and literacy competencies. Parents completed a questionnaire about the HNE, which also included a title-recognition-test of math games. The results indicate that the HNE is related to the numeracy competence of children, but not significantly. In addition, the title-recognition-test predicted the children's mathematical competencies. Whereas mathematical competencies did not differ significantly between children with or without a migration background, children from families with a high socioeconomic status showed greater competencies. Our findings have implications for future research on the association of the HNE with mathematical competencies of kindergarten children.

Disentangling predictive processing in the brain: a study in favour of a predictive network across sensory modalities

Linda Ficco[1], Lorenzo Mancuso, Jordi Manuello, Tommaso Costa, Franco Cauda & Gyula Kovács
[1] *University of Turin, linda.ficco@edu.unito.it*

Predictive coding is an increasingly established theoretical framework in cognitive science. The brain is constantly engaged in predicting its upcoming states and refining those predictions through error signal computation, with the purpose of creating internal models that best fit the sensory world. Despite extensive research has proven this mechanism at multiple levels of processing and in different sensory channels, to date no study has systematically investigated the presence of predictive coding across modalities in the whole brain. In this study, we adopt a meta-analytical approach to address this issue. We first investigated the brain correlates of prediction encoding and error using the Activation Likelihood Estimation technique, revealing the role of two brain regions (left IFG and left insula) in error computation. Moreover, with a novel meta-analytical method named Seed-Voxel Correlation Consensus, we brought evidence for a "predictive network" relative to both aspects of predictive processing. This bilateral network resembles the task positive network and it principally includes anterior insulae, frontal and parietal cortical regions, the precuneus, the fusiform gyri and the cerebellum. We concluded that predictive processing seems to be more typical of certain brain regions more than others when different sensory modalities are considered, these brain regions are concerned with salience and attentional control, and there appears to be no network-level distinction between error and prediction processing.

Fake news recognition in young and older adults

Petra Filkukova[1], Peter Ayton & Johannes Langguth
[1] *Simula Research Laboratory, petrafilkukova@simula.no*

We presented pen-and-paper questionnaires containing fake news items on crimes to a sample of young (M = 21.3 years, N = 281) and older adults (M = 70.7 years, N = 508) living in Norway. The origin of the perpetrator (Scandinavian vs immigrant) was varied in a between-Ss design. Participants evaluated on scales perceived credibility of each of the news items, their willingness to share them (face-to-face, online) and their emotions associated with the content of the articles (fear, anger, sadness, worry). They were asked about their political orientation, media use and trust in different types of media (newspapers, TV, radio, Internet). Participants' propensity to engage in analytic reasoning was measured by the Cognitive Reflection Test (CRT) and their emotional reactivity by the Perth Emotional Reactivity Scale – Short Form (PERS-S). Participants with a more negative attitude to refugees tended to feel emotional about, trust and share articles with an immigrant perpetrator and distrust articles with a Scandinavian perpetrator. In turn, participants with a more positive attitude to refugees showed the opposite pattern of results. Older adults trusted fake news items more than young adults did. Trust in fake news was positively associated with scores in the PERS-S and with trust in media in general.

Phasic alerting effects on visual processing speed in patient with amnestic Mild Cognitive Impairment (aMCI)

Kathrin Finke[1], Marleen Haupt, Christoph Preul, Steffen Jödecke, Christian Sorg & Otto W. Witte
[1] *Friedrich-Schiller-Universität Jena, kathrin.finke@med.uni-jena.de*

Visual processing speed, as assessed with whole report paradigms based on the theory of visual attention, decreases in healthy older compared to younger adults and more so in patients with amnestic Mild Cognitive Impairment (aMCI) at high risk for developing Alzheimer dementia. In a series of studies we showed that auditory cues increase visual processing speed for a limited period of time, in healthy younger and older participants. Such phasic adaptation is relevant in order to optimize performance in conditions where fast reactions to visual stimuli are required. It is not known, however, whether patients with aMCI also show such active perception effects. We will demonstrate that also aMCI patients can, to some degree, counteract their overall reduction in processing speed, when presented with auditory alerting cues.

Temporal weighting patterns in the judgment of stimuli of different sensory modalities

Alexander Fischenich[1], Alexandra Sekowski & Daniel Oberfeld-Twistel
[1] *Johannes Gutenberg-Universität Mainz, alexander.fischenich@uni-mainz.de*

Judgements of the subjective intensity (loudness) of sounds varying in level across time depend more strongly on early temporal portions of a sound than on later parts (primacy effect; e.g., Oberfeld, Hots & Verhey, 2018, JASA). A potential explanation for this pattern of temporal weights arises in the context of evidence-integration approaches, which assume that in discrimination tasks participants accumulate evidence over the time course of the stimulus until a decision threshold is reached. Because the sequential sampling process represents a supramodal decisional mechanism, an interesting prediction from this concept is that temporal weighting patterns for different sensory channels or different stimulus dimensions should be similar on an individual level. In two experiments, participants judged a) the loudness of time-varying sounds, b) the brightness of a sequence of rectangles varying in luminance, and c) the mean of a sequence of visually presented random numbers in a two-interval, two-alternative forced-choice (2I,AFC) task. The tasks were randomly interleaved within each block and were presented at the same level of difficulty. Temporal weights were estimated via multiple logistic regression with the response of the participants as the criterion and the varying stimulus properties as predictors. The results showed that the average pattern of temporal weights differed significantly between the tasks. Therefore, the role of a supramodal decisional mechanism as the underlying cause of the temporal weighting patterns is questionable. Correlations between the patterns of weights in the different tasks on an individual level are discussed.

Binding for action slips

Anna Foerster[1], Birte Moeller, Greg Huffman, Wilfried Kunde, Christian Frings & Roland Pfister
[1] *University of Würzburg, anna.foerster@uni-wuerzburg.de*

Humans rely on a powerful mechanism to control their actions – they bind features of their response to stimulus features, which allows for a seamless access of that response upon a future encounter of the same situation. An open question is how these bindings come about: Is the success of a response, the mere co-activation of a stimulus and a response, or the intended goal of the action the driving force of binding? We present an approach that disentangles these three accounts by examining binding effects for action slips, i.e., unintended, erroneous responses. Participants provided speeded responses to letters and we assessed binding of task-relevant stimulus features and response features through sequential analyses of performance as a function of the extent of feature overlap between trials and the success of responding. The results support the view that successful and unsuccessful episodes enter bindings and that these bindings pertain to the intended, correct response rather than to the executed, erroneous response. This finding qualifies binding as an immediate measure to learn from errors.

Utilization of emotional faces for anticipatory attentional orienting: The role of contingency awareness

Timea Folyi[1], Michaela Rohr & Dirk Wentura
[1] *Saarland University, t.folyi@mx.uni-saarland.de*

Increasing evidence suggests that emotional information can be utilized in an "automatic" way in processes that are inherently related to the emotional meaning: For example, seeing an angry face can trigger subtle facial responses, prepare avoidance reactions, and influence deployment of attention, judgments and decisions in line with or as a reaction to the emotional meaning (e.g., Hess & Fischer, 2013; Stins et al., 2011). In order to provide contextual flexibility in various critical situations, we proposed that emotional information can be utilized fast, efficiently, and based on limited perceptual input also for novel, goal-directed processes. To test this assumption, we used emotional faces as central cues in a series of endogenous cueing experiments, the facial expression signaled the location of targets. Endogenous cuing emerged fast, based on valence and specific negative emotions (e.g., sadness versus fear), and even based on masked emotional information (Folyi, Rohr, & Wentura, 2019). In a further study, we tested whether this cueing effect emerges based on explicit knowledge of cue-target contingencies in line with the prevailing view of endogenous cueing; or, at least partly, based on implicit learning of these contingencies. Cue emotion was again informative to the target location, but participants did not receive any information about this relationship. Overall, there was no indication of cueing without contingency information, and majority of the participants could not report these contingencies. Our results suggest that attentional processes based on implicit probability learning do not explain the efficacy of cueing by emotional faces.

Benefits and Drawbacks of Utilizing Multiple Process Tracing Methods

Mary Frame[1] & Joseph Johnson
[1] *Wright State University, mary.frame@wright.edu*

Process tracing methods are powerful, non-invasive tools for understanding the sub-processes and time course of cognitive activity. When utilized in conjunction with one another, these tools can provide insights far beyond what one could infer from typical summary variables, such as condition means and standard deviations. Furthermore, process tracing techniques can be utilized to construct or bolster computational and mathematical cognitive models. Despite these well-known advantages, however, there are also some limitations to incorporating process tracing data collection into certain research paradigms. These problems can be exacerbated when multiple process tracing methods are collected simultaneously without mitigation. Depending on the methods utilized, there can be highly variable startup and maintenance costs, difficulty of analysis, lack of compatibility between experimental software and process tracing hardware and software, difficulty with temporal alignment, and increased training time for lab personnel. This talk will provide a practical introduction to collecting data using multiple process tracing techniques for researchers interested in incorporating these methods into their experiments. It will include a discussion of the comparative costs and benefits associated with commonly utilized methods, so that researchers can anticipate and mitigate these drawbacks in advance and reap the benefits of process tracing techniques.

Development of software for indirect measurement of arousal and viewing direction in green anoles

Jannes Freiberg[1] & Christian Kaernbach
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, freiberg@psychologie.uni-kiel.de*

While being a large evolutionary group of species, reptiles are rarely seen in behavioral studies, and their cognitive abilities and emotional responses remain largely unknown. The reptilian brain is evolutionary earlier than the mammal brain, yet cognitive computations such as attention, memory formation, decision making or problem solving are already realized in reptiles with their comparatively simple cortical brain structures. To gain a deeper understanding of the underlying mechanisms, various behavioral experiments on the green anole (Anolis carolinensis) are conceived. To measure the physiological reactions of the animals without a need to cause arousal by interacting with them, a program was written in Python to analyze video feeds taken by two cameras. In multiple setups, the program was able to detect the lizard and record the breathing rate, pulse and the direction the head of the animal was facing for the duration of the experiment. Furthermore the program is able to detect a change in the color of the anoles skin, which in anoles is a typical sign of arousal. Further improvements to the program will be made to detect pupil dilation and blinking. This methodological advances provide the basis for experiments on anoles emotional respones to a variety of stimuli, allowing the experimental assessment of risk-awareness and decision-making in reptiles through various tasks.

Honesty Contracts: Validating a new method to control social desirability in self-reports

Madita Frickhoeffer[1] & Jochen Musch
[1] *Heinrich-Heine-Universitaet Duesseldorf, madita.frickhoeffer@hhu.de*

The validity of surveys asking for self-reports of sensitive attributes is threatened by socially desirable responding. To reduce social desirability bias we propose honesty contracts as a new method that can be added to any survey. Honesty contracts are based on placing an explicit contract with respondents who are asked, prior to the survey, whether they want to commit themselves to provide honest answers. Requiring a decision to conclude an honesty contract not only increases attention to honesty norms and helps to avoid the problem of participants skipping instructions, but also induces a voluntary self-commitment respondents subsequently try to honor. To investigate whether honesty contracts are indeed capable of reducing socially desirable responding, we conducted two experiments. In the first experiment we asked 215 participants to provide self-reports regarding nine socially undesirable behaviors, as for example driving a car after consuming alcohol, lying to other people, or shoplifting. As expected, respondents in the honesty contract condition were significantly more ready to admit socially undesirable behavior than respondents in the control condition. A second experiment (N = 210) replicated these findings and employed an additional control group, which received instructions stressing the importance of honest responses without requiring to conclude any contract. Results showed that honesty contracts controlled social desirability better than the mere reminder of honesty norms in the additional control group. Taken together, our results suggest that honesty contracts are a promising and easy-to-implement new approach to reduce response distortions due to social desirability.

No interaction of stimulus-response- and modality compatibility on task-switching

Erik Friedgen[1], Iring Koch & Denise Stephan
[1] *RWTH Aachen University, Erik.Friedgen@psych.rwth-aachen.de*

In task-switching, modality compatibility refers to the degree of overlap between the modality of the stimulus and the modality of the anticipated response effect. Switching between two incompatible modality mappings typically leads to larger mixing- and switch costs than switching between two compatible modality mappings. This has been attributed to the anticipation of response effects in the opposite modality than the stimulus modality, which is theorised to create crosstalk between the tasks. However, it is unclear at which stage of processing these modality-compatibility effects occur: The between-task crosstalk with incompatible modality mappings could arise either before or after response selection, or affect both stages to some extent. We investigated this by introducing a factor known to influence response selection – stimulus-response compatibility – and examined its possible interactions with modality compatibility: In Experiment 1, stimulus location was task-irrelevant, with participants responding to colour (a Simon task); in Experiment 2, stimulus location was task-relevant (a spatial-discrimination task with variation of element-level stimulus-response compatibility). Participants responded manually or vocally with the responses "left" and "right" to visual or auditory stimuli. With an overall sample size of 80 participants (N = 40 per experiment), results revealed no interaction between stimulus-response- and modality compatibility, neither in the Simon nor the spatial-discrimination task. This suggests that modality-compatibility effects occur either before or after response selection; we propose that the latter is more likely, due to effect anticipation during response initiation.

Electrify your Game! Anodal tDCS Increases the Resistance to Head Fakes in Basketball

Maximilian A. Friehs[1], Iris Güldenpenning, Christian Frings & Matthias Weigelt
[1] *Trier University, friehs@uni-trier.de*

The head fake in basketball describes an action during which players gaze in one direction, but pass the ball to the opposite direction. This deception can be modeled in the lab as a kind of interference resolution task. In such tasks, the left dorsolateral prefrontal cortex (lDLPFC) has been shown to play a critical role. In the present study, transcranial direct current stimulation (tDCS) was used as a form of non-invasive brain stimulation to modify activity in the lDLPFC. In a pre–post design, anodal and cathodal tDCS were contrasted. A 9 cm2 electrode was positioned over the lDLPFC, while a 35 cm2 reference electrode was positioned over the left deltoid. In a sample of N = 50 healthy, young adults, we observed a trend towards a significant singlesession tDCS effect on the head-fake effect. Specifically, it can be argued that anodal tDCS led to enhanced performance by reducing the interference effect produced by head fakes, when compared with cathodal tDCS. This result conforms to previous studies suggesting that neuromodulation of the lDLPFC impacts interference processing. Furthermore, these results bear important implications for the real-life application of tDCS as a tool for cognitive enhancement.

Speech but not speaker perception is impaired in unilateral tinnitus

Nils Frisius[1], Daniela Ivansic, Stefan R. Schweinberger, Orlando Guntinas-Lichius, Christian Dobel & Romi Zäske
[1] *Universitätsklinikum Jena, nils.frisius@uni-jena.de*

While chronic tinnitus is known to compromise the perception of speech, it is unclear if the same holds for non-linguistic speaker information. Furthermore, research with simple tone stimuli showed that unilateral tinnitus binds spatial attention, thereby impeding the detection of auditory changes in the non-affected ear. Using dichotic listening tasks, we tested 16 chronic left-sided tinnitus patients and control patients respectively, for their ability to ignore speech and speaker information in the task-irrelevant ear. To this end patients heard vowel-consonant-vowel (VCV) syllables, simultaneously spoken by gender-ambiguous voices in one ear and male or female voices in the contralateral ear. They selectively attended to speech (Exp. 1) or speaker (Exp. 2) information in a designated target ear, by classifying either the consonant (/b/ or /g/) of VCV syllables or voice gender (male or female) while ignoring distractor voices in the other ear. While performance was comparable across groups in the gender task (Exp. 2), tinnitus patients responded slower than controls in the consonant task (Exp. 1), with no effect of target ear. This suggests that chronic tinnitus hampers the processing of linguistic information in speech, while preserving the processing of non-linguistic speaker information. These findings support the growing evidence for speech comprehension impairments in chronic tinnitus.

Test effect on learning complex grammatical structures of artificial language Brocanto

Christopher Fust[1], Veit Kubik, Bertram Opitz & Torsten Schubert
[1] *Martin-Luther-Universität Halle-Wittenberg, christopher.fust@llz.uni-halle.de*

Testing effect refers to the finding of facilitated learning in conditions in which participants study and receive practice tests with conditions in which they receive an equivalent amount of further studying in lieu of practice tests. In more educational terms the testing effect can be compared with formative assessment which is used to monitor student learning to provide ongoing feedback. In the present study, we have investigated whether the testing effect can also be found when learning complicated grammatical structures. We used the artificial language Brocanto for this purpose. 26 participants studied 96 grammatically sentences during four learning phases of the artificial language BROCANTO to learn the underlying grammatical rules. There were two groups. During each learning phase, the study group received half of the items again for learning; the testing group had a test instead of the learning phase of group one. At the end of the experiment there was a final test, which the subjects repeated 48 hours later. Results replicated the typical testing effect demonstrating an advantage of restudying over testing on a final test immediately after the initial learning but the opposite effect at a retention interval of 48h. These results indicate that testing also has a positive effect on long-term-retention when learning complex materials.

You did great! – on the influence of habitual inner speech on the Simon and the arrow flanker task with larger stimulus sets

Miriam Gade[1] & Marko Paelecke
[1] *Medical School Berlin, miriam.gade@medicalschool-berlin.de*

Ever since Vygotskij, the role of talking to oneself to keep track of plans and achieve goals has been identified to play an important role in the socio-cultural development of children. In our project we investigate whether these inter-individual differences in evaluative and motivational inner speech are also indicative of successful goal-directed behaviour in young adults. We gave our participants a Simon task and manipulated stimulus orientation (i.e., vertical vs. horizontal arrangement) as well as stimulus material (i.e., words vs. gratings). To assess inter-individual differences in inner speech, we asked them to complete three questionnaires. We found inverted Simon effects for word stimuli presented in vertical arrangement, and the habitual use of inner speech predicted the size of the inverted Simon effect. We replicated this finding in a larger individual difference study and found the same pattern of results for an arrow flanker task. In the present study, we aim at investigating the impact of the number of stimulus-response episodes for this predictive effect of inner speech use in both paradigms, the Simon as well as the arrow flanker. To this end, for both paradigms we increased the stimulus-set size to four. For the Simon task, we again manipulated stimulus orientation. For the arrow flanker task we ran an online experiment. As before, participants completed the Varieties of Inner Speech Questionnaire and we predict congruency effects to depend on the habitual use of motivational and evaluative inner speech.

Zur Rolle musikalischer Expertise für die Handlungsplanung

Miriam Gade[1], Verena Brunner & Kathrin Schlemmer
[1] *Medical School Berlin, miriam.gade@medicalschool-berlin.de*

Zielgerichtetes Handeln wird zum einen durch die Aktivierung handlungsleitender Repräsentationen, zum anderen durch die Hemmung irrelevanter Repräsentationen sichergestellt. Aktivierung und Hemmung stehen dabei in einem, an die aktuelle Situation angepassten Verhältnis. Neben situationalen Faktoren zeigt sich, dass Menschen Vorabinformationen über zu absolvierende Handlungen effektiv nutzen können, um die Balance zwischen Aktivierung und Hemmung zu optimieren. Gemeinhin werden diese Prozesse und ihr Zusammenspiel im Aufgabenwechselparadigma untersucht. In diesem Paradigma wechseln Teilnehmende zwischen zwei oder mehr einfachen Entscheidungsaufgaben basierend auf einem validen Hinweisreiz oder einer vorab instruierten Aufgabensequenz. Als Evidenz für Aktivierungs- und Hemmprozesse werden Differenzen in Reaktionszeiten und Fehlerraten analysiert. In unserer Studie gingen wir der Frage nach, wie sich musikalische Expertise bei den gleichen situationalen Charakteristiken (z.B. Aufgabenwiederholungshäufigkeit) auf die Leistung bei einfachen Klassifikationsaufgaben auswirkt. Die zu bearbeitende Aufgabensequenz musste vorab gelernt und dann aus dem Gedächtnis abgerufen werden. Musikalische Expertise wurde mit der Skala „Musikalische Ausbildung“ des Goldsmiths Musical Sophistication Index (Müllensiefen, Gingras, Musil, & Stewart, 2014) erhoben. Aktuelle Forschung (Slama, Rebillon, & Kolinsky, 2017) konnte zeigen, dass musikalische Expertise einen positiven Einfluss auf kognitive Flexibilität, gemessen in einem Paradigma, bei dem Teilnehmende zwischen Notierungen (Violin- und Bassschlüssel) wechseln mussten, hat. Allerdings ist offen, ob dieser Effekt auch über musikspezifisches Material hinaus Bestand hat. Unsere Ergebnisse zeigen keinen Vorteil musikalischer Expertise in Maßen der kognitiven Flexibilität.

Evaluating neurocognitive visual word recognition models in the wild: Visual-orthographic information optimization and lexical categorization in natural reading

Benjamin Gagl[1] & Christian Fiebach
[1] *Goethe University Frankfurt, gagl@psych.uni-frankfurt.de*

How do we process visual information during natural reading? In a computational framework (evaluated based on single-word behavioral and brain data), we could previously show that redundant visual information of a script is "explained away" to optimize the amount of visual information to be processed. As a result, this model proposes that visual word recognition relies on an orthographic prediction error (oPE), which in turn depends on our orthographical knowledge. Here we investigate to which degree oPE representations are also involved in natural reading. In addition, we explore if high-level semantic prediction (sentence context), interacts with the 'lower-level' oPE. We measured eye movements during sentence reading from N=82 German native speakers and found that first fixation durations showed a significant oPE by predictability interaction. This interaction resulted from the presence of an oPE effect for non-predictable words while there was no identifiable effect of oPE for predictable words. This pattern indicates that the proposed oPE representations are only relevant when sentence-level semantic information cannot predict the upcoming word. In contrast, when words can be predicted at the sentence level, these higher-level and more specific predictions override the lower-level, context-free, and thus less specific predictions during visual-orthographic processing. We conclude that informationally optimized predictive processing based on orthographic knowledge is operative also in natural reading contexts, but only in the absence of more specific, higher-level (e.g., context-dependent) predictions.

Striking the chord vs. playing the melody: Transfer between sequential and parallel execution of associated responses

Robert Gaschler[1], Eliot Hazeltine & Hilde Haider
[1] *FernUniversität in Hagen, Faculty of Psychology, Hagen, Germany, robert.gaschler@fernuni-hagen.de*

Research on typos shows that elements of sequences (i.e. in typing the word "word") are activated in parallel, but are executed in sequence. Theories of representation of serial order recur on associations between elements (it is "o" because n-1 was "w") as well as on associations between elements and counters (it is "o" because it is the second element) and postulate mechanisms such as competitive cueing to resolve conflict originating from parallel activation. The characteristics of the associations and conflict resolving mechanisms involved might be further constrained by studying transfer between parallel and sequential execution of responses. In Experiment 1 (N=44) participants trained a first-order sequence executing one response per trial and were transferred to a setup, where two stimulus positions per trial had to be responded to by pressing the spatially corresponding keys. In Experiment 2 (N=62) participants were trained on executing a subset of the possible combinations of six responses simultaneously before being transferred to a one-response-per-trial setup. In either variant of transfer we observed RT costs of material that had been presented in the training phase and discuss the implications.

Memory Activation in Attitude Formation

Anne Gast[1], Jasmin Richter & Taylor Benedict
[1] *University of Cologne, anne.gast@uni-koeln.de*

If persons, objects, or other stimuli are presented together with evaluative information observers often acquire new attitudes about them. This is for example the case in evaluative conditioning where simple pairings between neutral and valent stimuli are presented together or in attitude formation paradigms where valent behavioral information is provided about a person. Based on declarative memory models of evaluative learning, we predicted that for these attitude learning effects to occur it is important that episodic evaluative information from the acquisition phase is retrieved when the attitude is measured. In two evaluative conditioning experiments (N = 93; 87) and in one experiment where attitudes where established with valent behavioral information (N = 93), we tested whether the reactivation of the paired evaluative information (vs. equally valent but non-paired information) during the measurement phase increased the attitude acquisition effects. This was the case across experimental procedures. In addition, we conducted two studies on autobiographical memories about everyday objects (N = 64; 80). We found that object evaluations were more influenced by the valence of an autobiographical memory episode when the episode was recently retrieved than when it was not recently retrieved. We discuss these findings in the context of models of evaluative conditioning and the debate of attitudes as constructions vs. enduring entities.

Following the doctor's order: Persuading hospital visitors' to clean their hands

Susanne Gaube[1], Peter Fischer, Verena Windl & Eva Lermer
[1] *Universität Regensburg, susanne.gaube@ur.de*

Hospital visitors pose a risk of transmitting pathogens that can result in nosocomial infections. Using alcohol-based hand-rub is the single most effective method to reduce the transmission risk. However, a majority of visitors do not clean their hands during their stay at a hospital. The present study aimed to evaluate an evidence-based intervention to improve visitors' hand hygiene behavior through persuasive signs. For the field experiment, seven signs were designed according to Cialdini's principles of persuasion: reciprocity, consistency, social-proof, unity, liking, authority, and scarcity. These principles have been successfully applied to change human behavior in many different settings. Each sign was displayed on a TV-screen for one week directly above the hand-rub dispenser in a hospital lobby. Between each posting, the screen was blank for one week (control). Visitor traffic and dispenser usage in the lobby was recorded via an electronic monitoring system. Overall, 246,102 entries and exits and 16,954 dispenser usages were recorded. During the blank control weeks, the dispenser usage did not vary significantly. The signs based on the authority and the social-proof principles significantly increased the hand-rub dispenser usage rate in comparison to the average baseline usage rate. These findings indicate that the principles of persuasion can be easily and cost-efficiently translated and implemented to initiate behavior change in health-care settings. Theoretical and practical implications of these findings are discussed.

A social comparison perspective on imitation - Focusing on dissimilarities as compared to similarities decreases automatic imitation

Oliver Genschow[1], Emiel Cracco, Pieter Verbeke, Mareike Westfal & Jan Crusius
[1] *Universität zu Köln, oliver.genschow@uni-koeln.de*

As the saying goes "monkey see, monkey do" it is widely agreed that individuals automatically imitate their interaction partners. However, current research shifts away from the picture of the human being that automatically imitates whatever it observes. For example, research has shown that individuals less strongly imitate others when they are faced with out-group members, non-human agents, or when they are in a competition mode. Despite evidence of these—and other—inhibitors, past research has not yet offered a comprehensive model that allows integrating them. Here, we suggest that taking into consideration Mussweiler's (2003) selective accessibility model may allow offering a new perspective on the integration of different moderating variables in automatic imitation. That is, all the inhibitors may elicit a focus on dissimilarities, as compared to similarities, and thus affect automatic imitation. In order to test whether a dissimilarity focus, as compared to a similarity focus, decreases automatic imitation we conducted three experiments in which we manipulated participants' focus. Experiment 1 finds decreased automatic imitation when individuals focus on dissimilarities between themselves and their interaction partner, as compared to when they focus on similarities. By including a neutral condition in Experiment 2 and 3, we replicate this finding. Moreover, further analyses show that a focus on dissimilarities decreases automatic imitation, but a focus on similarities does not increase automatic imitation. In sum, by taking into account comparison processes between interaction partners, the results help understanding why individuals do not always imitate each other.

Background speech interferes with verbal short-term memory: On the differential influence of speech-like quality (Sinewave Speech) and phonological content

Markus Georgi[1], Larissa Leist, Maria Klatte & Sabine Schlittmeier
[1] *RWTH Aachen University, Markus.Georgi@psych.rwth-aachen.de*

Only certain sounds disturb certain cognitive functions. Verbal serial recall of unrelated verbal items (e.g. numbers, consonants, or words) has been proven to be significantly reduced by certain task-irrelevant background sounds (Irrelevant Sound Effect), e.g. speech. So-called changing-state sounds, characterized by successively differing auditory-perceptual tokens (e.g. "beh, tie, peh, buh, ..."), disturb verbal short-term memory significantly more than so-called steady-state sounds, which are constituted by a repeating auditory-perceptual token (e.g. "bah, bah, bah, ..."). It is still subject of debate, whether phonological interferences between automatic processing of the background speech signal and volitional processing of the verbal memory material are decisive for the disruptive effect to occur. Thus, reducing the phonological content of background speech should diminish its disturbance impact on verbal serial recall. In one experiment (n=30), we compared the effects of changing-state and steady-state syllable sequences on verbal serial recall. These background sounds were either presented as the original speech signal, or as its modified version through sinewave synthesis (sinewave speech). Sinewave synthesis largely preserves the temporal-spectral complexity of the speech sound (and thus the changing-state content), while the phonological content is greatly reduced. As expected, changing-state sounds were more disturbing than steady-state sounds in both sinusoidal and natural speech. However, the changing- and steady-state sinewave speech sequences reduced performance less than the corresponding original speech sounds. We conclude that despite comparable temporal-spectral complexity, the original speech reduced verbal short-term memory to a greater extent than the phonologically degraded sinewave speech due to its higher phonological content.

Psycholinguistic Approaches to Rapid Automatized Naming

Lisa Gerhards[1], Barbara Schmidt, Alfred Schabmann, Prisca Stenneken & Anna Rosenkranz
[1] *University of Cologne, lisa.gerhards@uni-koeln.de*

Rapid Automatized Naming (RAN) is defined as the ability to name stimuli as fast as possible and they are used internationally for the early diagnosis of risk children with reading deficits. However, the relationship between RAN and reading is still a topic of critical debate and studies use RAN very differently regarding the condition (serial vs. discrete) and the stimuli (digits, letters, colours, objects). In this research, we implement both RAN conditions with stimuli controlled for (psycho)linguistic variables to explore the lexical-semantic processes in RAN. We tested 66 university students aged between 19 and 38 with both the serial and discrete RAN condition and controlled the stimuli for semantic category, word frequency, word length and name agreement. In addition, participants were tested on reading, executive functions (inhibition and shifting) and working memory. Results showed no frequency effect but a word length effect in both RAN conditions. No relationship between working memory performance and RAN was discovered, but we found a strong relationship between RAN and processing speed in the shifting task. Performance in word reading was correlated differently depending on lexical status and RAN condition. We discuss our findings in light of common and different lexical-semantic processes in RAN and reading, using the logogen model.

The price of predictability – Estimating inconsistency premiums in social interactions

Judith Gerten[1], Michael Zürn & Sascha Topolinski
[1] *Universität zu Köln, judith.gerten@uni-koeln.de*

When making financial decisions, people trade off the expected value and the variance of an investment option, generally preferring higher expected values to lower ones and lower variances to higher ones. To compensate a decision-maker for higher variances, the returns must include an additional risk premium, defined as the amount by which the expected value of the risky option exceeds the value of the risk-free option while the decision maker is indifferent between both options. Previous psychological research suggests that similar to the classical risk aversion, people might also exhibit inconsistency aversion and dislike unpredictable interaction partners. In a set of seven experiments (total N = 2,261), we pitted consistent against inconsistent interaction behaviors while varying the expected returns of the interaction. We identified the additional expected return of the interaction with an inconsistent partner that must be granted to make decision-makers prefer a more profitable, but inconsistent interaction partner to a consistent, but less profitable one. Across all experiments, we locate this inconsistency premium at around one third of the expected value of the risk-free option. These preference patterns emerged under both hypothetical and incentivized conditions in both an organizational workplace collaboration setting and in an economic game.

Effects of visual attention and working memory span on the eccentricity bias

Celine Gillebert[1], Lena Hofbauer & Tianlu Wang
[1] *KU Leuven, celine.gillebert@kuleuven.be*

When attention is unguided, perceptual performance is generally better for stimuli appearing in the central as compared to the peripheral region. To what extent the eccentricity effect depends on task demands and individual factors, is still a matter of debate. In the current study, we investigated the effect of top-down allocation of attention and working memory span on the eccentricity bias in two experiments. In the first experiment, participants (N=24) performed a probed change detection task in which we simultaneously presented two target letters in central vision (at 5° eccentricity) and two target letters in peripheral vision (at 10° eccentricity). In line with previous findings, we observed a significant eccentricity effect when participants were asked to distribute their attention across the visual field. This effect diminished when cued to one level of eccentricity in the left and/or right visual field, both when the probe letter appeared at the validly and when it appeared at the invalidly cued location. In the second experiment, participants (N=56) performed an unguided whole/partial report task where 4 or 8 target letters appeared at three different eccentricity levels (4°, 7°, 10° of visual angle). Working memory span was measured by a digital Corsi Block Tapping Task and ranged between 3.40 and 7.60. We observed a significant effect of eccentricity, which was not modulated by working memory span. In summary, our findings demonstrated that the ability to process information in the peripheral visual field can be flexibly modulated by top-down allocation of attention.

Effects of acute stress on attentional adjustment and distractor-elicited response activation

Imke Gillich[1], Mike Wendt, Andreas Löw, Susanne Vogel & Thomas Jacobsen
[1] *Helmut-Schmidt-University/University of the Federal Armed Forces Hamburg, gillichi@hsu-hh.de*

Acute stress is assumed to affect attentional and executive processing of stimulus information by narrowing the attentional focus and impairing attentional flexibility. The temporal flanker task, in which a target stimulus is preceded by congruent or incongruent distractors, allows investigating the deployment of attention to target and distractor stimulus information under conditions of varying utility of the distractor for response selection. Presenting a higher proportion of congruent trials usually results in a larger congruency effect (Proportion Congruent Effect, PCE). This effect is considered evidence for attentional adjustment to changing distractor-related contingencies. Consistent with this interpretation, previous studies observed enhanced distractor-evoked sensory potentials (i.e., posterior P1 and N1) in the EEG under conditions of a larger proportion of congruent trials. To investigate the effect of acute stress on such adjustment, we compared the PCE and related EEG measures after participation in the Trier Social Stress Test with a group of control participants with no stress induction (N = 34 for each group). Although behaviorally the PCE was not affected by the stress manipulation, electrophysiological measures suggested that stressed participants were impaired regarding the usage of distractor information for response preparation and the regulation of premature response activation. Moreover, stressed participants' responses tended to be less accurate when the distractor-target stimulus-onset asynchrony (SOA) was long. Taken together our results do not support the notion of a stress-related deficit in attentional flexibility but hint at reduced action preparation and regulation under stress.

Effects of an instructor's eye gaze on cognitive performance in a question-answer interaction

Maria Glaser[1], Hannah-Sophia Boltz, Helene Kreysa & Stefan R. Schweinberger
[1] *Humboldt-Universität zu Berlin, Berlin, GERMANY, maria.glaser@hu-berlin.de*

Humans are very sensitive to another person's eye gaze. We investigated the role of eye gaze during a question-answer interaction and its effect on cognitive performance (cf. Falck-Ytter et al., 2015). Using a video-mediated approach, participants were presented with videos of a speaker either looking at the camera (direct gaze) or not (averted) while phrasing the task. They then had to solve and respond to the respective problems verbally. In our first experiment, we used three different cognitive tasks: a digit span task, adapted for each individual participant, an arithmetic task and a verbal task (because a greater effect of eye gaze on cognitive performance in verbal communication compared to numeric domains seemed feasible). The analysis of the accuracy and response time data of 36 participants did not reveal significant effects of speaker eye gaze in any of the three tasks. One reason for this lack of effects could be that we deliberately piloted the tasks to be relatively difficult for our student participants. Arguably, the resulting high level of cognitive load might mean that participants devoted all available resources to solving the tasks, and effectively ignored the speaker's eye gaze behaviour. In a follow-up experiment (N = 35 to date), we are therefore using the digit span (DS) task only and manipulating difficulty within participants by presenting a mixed set of easy (DS = 5), moderate (DS = 6), and difficult (DS = 7) problems via videos of a speaker with direct and averted gaze.

A new experimental paradigm for evaluating maladaptive habitual avoidance

Valentina Glück[1] & Andre Pittig
[1] *University of Würzburg, valentina.glueck@uni-wuerzburg.de*

A habitual, outcome-insensitive component has been proposed to underlie persistent anxiety-related avoidance behaviors. Validated experimental paradigms for the assessment of the strength of maladaptive habitual avoidance behavior are, however, not available yet. We used an outcome devaluation paradigm with habit-incompatible goal-directed approach responses in test to assess the strength of maladaptive (costly) avoidance behavior. 55 healthy participants (Experiment 1) and 72 healthy participants (Experiment 2) were extensively trained with two simple avoidance responses (pressing left/right button) to prevent an aversive unconditioned electrical stimulus (US) to two full-screen color stimuli. Subsequent US devaluation consisted of the removal of the US electrodes. In the second experimental phase, neutral object stimuli were presented on top of the same background colors. Participants could obtain monetary rewards when responding correctly to these compound stimuli. Background colors were irrelevant for these approach responses. Approach responses were either compatible with overlearned avoidance in habit-compatible trials or incompatible in habit-incompatible trials. In experiment 1, participants needed to infer the contingencies between neutral object stimuli and rewards by trial and error learning. In experiment 2, these contingencies were instructed after US devaluation to preclude effects of trial and error learning. We observed higher accuracies in habit-compatible vs. habit-incompatible trials in experiment 1. This finding indicates that outcome-insensitive habitual avoidance responses, which affected subsequent goal-directed approach, were acquired. Data analysis for study 2 is currently ongoing. A summary of the results from both studies will be presented.

Is Long-Term Memory Used in a Visuo-Spatial Change-Detection Paradigm?

Benjamin Goecke[1], Oliver Wilhelm & Klaus Oberauer
[1] *Ulm University, Benjamin.Goecke@uni-ulm.de*

In tests of working memory with verbal or spatial materials repeating the same memory sets across trials leads to improved memory performances. This well-established "Hebb repetition effect" could not be shown for visual materials. This absence of the Hebb effect can be explained in two ways: either, persons fail to acquire a long-term memory representation of the repeated memory sets over the course of repetitions, or they acquire such long-term memory representations, but fail to use them during the to be processed working memory task. With the present study (N = 30), we aimed to decide between these two possibilities by manipulating the long-term memory knowledge of some of the memory sets used in a change-detection task. Before the change-detection test, the participants had to complete an explicit learning phase where they had to memorize three arrays of colors until a satisfying memory performance was reached. Subsequently, the participants were tested with the change-detection paradigm, which contained both previously learned and new color arrays. The previously learned arrays were continuously repeated across trials, whereas the new arrays were randomly generated. Change detection performance was better on previously learned compared to new arrays, showing that long-term memory is used in change detection. Memory for the previously learned arrays did not improve further during change detection, showing no evidence for further learning through repetition.

The effect of tDCS over the left PMC on the consolidation of a newly learned motor sequence

Stephanie Bettina Göller[1] & Bettina Pollok
[1] *Heinrich-Heine-Universität Düsseldorf, stephanie.goeller@hhu.de*

The premotor cortex (PMC) is known to be part of a brain network subserving motor control, raising the question for its significance in motor learning. While the primary motor cortex (M1) plays a crucial role in the acquisition of a newly learned motor sequence, the precise impact of the PMC on subsequent consolidation remains less clear. The present study aims at investigating the role of the left PMC for early consolidation of a motor sequence after training on serial reaction time task (SRTT). Anodal, cathodal tDCS and sham-stimulation were applied to the left PMC in 18 healthy non-musicians 30 minutes after SRTT training with the right hand. Reaction times were measured prior to SRTT training (t1), at the end of training (t2), directly after tDCS (t3) and after overnight sleep (t4). The analysis revealed a significant facilitation of reaction times in sequential trials after anodal tDCS at t3, whereas no further significant improvement was evident at t4 (after overnight sleep). In contrast to this, cathodal stimulation yielded a significant reduction of reaction times after overnight sleep (t4). Reaction times at t4 did not differ between cathodal and anodal stimulation. No significant effects were found following sham-stimulation. The results support the hypothesis of a causal involvement of the PMC in early consolidation. In particular, the data imply that anodal tDCS can facilitate early motor sequence consolidation. Noteworthy, the impact of a single tDCS application is of short duration and remediated by progression of time and / or sleep.

Motor Coordination Induces Social Identification: An Exploration into the link between Joint Action and Group Perception

Felix Johannes Götz[1] & Anand Krishna
[1] *Universität Regensburg, felix-johannes.goetz@ur.de*

In social identity theorizing, categorizing oneself and others as one we rather than separate Is is understood as the result of similarity perceptions. In joint action theorizing, we- rather than I-mode processing of a joint endeavor is understood as the result of representing both one's own and one's coactor's action contributions. However, no research known to us has yet examined a possible effect of joint action on social identification. In Experiment 1, participants performed a joystick task with a shared performance goal with three different partners. The task varied between partners in motor coordination requirements, thereby varying co-representation. When task segments were discrete between partners, they identified less as a group than when they had to coordinate their behavior. Surprisingly, constant motor coordination did not lead to higher identification than intermittent coordination, even though it increased co-representation. Experiment 2 (registered report pending) will investigate whether joint action increases self-categorization, addressing a possible intervening process from Experiment 1. Participants will again perform a joystick task with a shared performance goal with three different partners. This time, however, the tasks will vary between partners both in action similarity and motor coordination requirements, allowing conclusions about the relative contributions of objective similarity vs. joint action to self-categorization. In general, examining the perceptual and motor aspects of collective behavior may offer a new perspective to extend the basic tenets of social identity theorizing.

Learning to Expect the Future: How fast do anticipatory saccades towards future action consequences emerge?

Florian Gouret[1] & Christina Pfeuffer
[1] *University of Freiburg, florian.gouret@psychologie.uni-freiburg.de*

When our actions consistently yield the same consequences, we form action-effect associations that allow us to anticipate the effects of our actions. Interestingly, our eyes already move towards the predictable future location of our action´s effect in anticipation of it (anticipatory saccade). Yet, the number of learning instances required to observe such anticipatory saccades emerge is unknown. In two experiments, participants responded to forced-choice targets with left/right key presses. Correct answers were followed by a visual effect either on the same side (action-effect compatible) or on the opposite side (action-effect incompatible). In a first experiment, action-effect compatibility switched after sequences of 4, 8, or 12 trials (randomly allocated to prevent predictions). As a result, participants started to perform anticipatory saccades in the direction of future effect locations within the first four trials and successfully adapted when action-effect compatibility changed. In a second experiment, we investigated if this finding remains in a less predictable environment, where random trials (2 to 7) separated sequences of 3, 5, or 7 trials of one action-effect compatibility (randomly allocated). We replicated our findings. In sum, these findings illustrate that only a few action-effect learning instances are sufficient to develop action-effect associations that trigger attentional shifts towards the anticipated future consequences of our actions.

The influence of rater training and personal relevance on halo effects

Michael Gräf[1]
[1] *FOM University of Applied Sciences, michael.graef@fom.de*

Halo effects are one of the most well-known types of judgment biases. Although they have been intensely researched, it is still unclear how knowledge and motivation influence halo effects. Based on recent findings, positive halo effects are proven to be stronger and less affected by external factors than negative halo effects. Hence, it is plausible that the same is true regarding internal factors. That is, a higher knowledge and a higher motivation should be more effective in reducing negative halo effects than in reducing positive halo effects. In three experiments, participants judged fictitious target persons. Knowledge was manipulated by different forms of prior rater rating. Motivation was manipulated by personal relevance regarding group memberships. As expected, personal relevance had a stronger impact on negative halo effects compared to positive halo effects. In contrast, training, especially the advanced training, reduced halo effects regardless of valence. These results present an important starting point for investigating the question, whether halo effects are judgment biases or ontogenetic learning and thus simply reflect the true state of the world. Further, the studies successfully implemented an effective advanced training procedure which may explain the conflicting results of previous research regarding the effectiveness of rater trainings.

Temporal dynamics of attentional shifting in frequency tagged random dot kinematograms

Tobias Grage[1], Simon Frisch & Stefan Scherbaum
[1] *TU Dresden, tobias.grage@tu-dresden.de*

In adaptive behavior, flexibly shifting one's attention between different objects or features is often required in order to navigate complex environments. Likewise, the inhibition of no longer relevant objects or features is crucial as well (see Gruber & Goschke, 2004). A powerful method to investigate how these control demands are conveyed in selective attention is frequency tagged EEG: With this technique, different stimuli are turned on and off at different frequencies to elicit steady state visually evoked potentials (SSVEPs) in the EEG signal. The amplitude of these potentials indicates the degree to which a specific stimulus was attended by the participant (e.g., Scherbaum, Fischer, Dshemuchadse, & Goschke, 2011). To investigate the shifting of attention, the task switching paradigm is used by many studies. However, this paradigm suffers from a high number of repetition trials that are irrelevant for the phenomenon of interest, the shifting of attention. Here, we introduce a random dot kinematogram (RDK) task with attentional shifts between colors in each trial. This task, which is adapted from Müller, Trautmann, & Keitel, 2016, is comprised of three differently colored RDKs, each tagged with a specific frequency, in which coherent movement events have to be detected in the cued color. Importantly, during each five second trial the cued color switches halfway through. Coherent movement events can occur before and/or after the color switch. This offers us the opportunity to investigate attentional shifts and their effects (e.g. perseveration of the pre-switch color) in every trial.

Mobile Brain Body Imaging and Mobile EEG to investigate embodied and real-world brain dynamics

Klaus Gramann[1]
[1] *TU Berlin, klaus.gramann@tu-berlin.de*

Research using electroencephalography (EEG) in humans approaches a 100-year anniversary with the first publications by Berger in 1929. Since then, remarkable progress has been made identifying neural features underlying human cognition and behavior. Most of the recordings over the last 100 years, however, required participants to remain seated and to avoid movement to prohibit movement-related artifacts from distorting the signal of interest. The drive to better understand human brain function in more ecological valid scenarios has driven EEG research outside the lab and recent years have shown a remarkable shift towards recording brain dynamics in actively behaving participants in complex technical setups or in the real world. This introduction to the symposium "Mobile EEG and Mobile Brain/Body Imaging – New methods, new results?" will give an overview of new technological developments and a definition of mobile EEG and Mobile Brain/Body Imaging (MoBI). This will be followed by theoretical considerations of why MoBI is important to better understand human brain function. The requirements and pros and cons of different approaches will be discussed and examples for recent interactive VR experiments are shown to open the podium for five talks on mobile EEG and MoBI providing new insights into the question whether the results from MoBI experiments replicate what we know from 100 years of laboratory research.

Evaluating neuro-cognitive inspired reading models based on behavioral training data

Klara Gregorova[1] & Benjamin Gagl
[1] *Department of Psychology, Goethe University Frankfurt, Frankfurt/Main, Germany, klaragregorova@stud.uni-frankfurt.de*

Efficient neuronal processing is essential. Thus, the Lexical Categorization Model (LCM) assumes, for the reading brain, it is beneficial to prevent semantic processing for non-words. The successful evaluations of the LCM with typical readers motivated us to implement a training study consisting of multiple sessions. The core of the LCM training is an explicit lexical decision task, i.e., is the string presented a word or not, that includes feedback on whether the response was correct. Executing lexical decisions is assumed to train the categorization process that was described by the LCM. We conducted three experiments with a three-session training for adult German language learners suffering from slow reading (N=81). Experiment 1 was the first LCM training pilot. Experiment 2 compared the training with phonics training in a randomized controlled fashion. In Experiment 3, we implemented a comparison with a variant of the LCM training (i.e., with changing fonts). We found, in general, after the LCM training, an improvement in the overall reading speed in all experiments. Also, we found an effect of word-likeness, and categorization difficulty derived from the LCM implementation. Interestingly, both effects interacted with training, e.g., the categorization effect increased with training. Finally, we found that the individual estimates of the categorization difficulty by training interaction correlated with the increase in general reading speed. This strongly suggests that we found causal evidence for the implementation of an LCM based categorization process in reading. Thus, one of the underlying processes of efficient reading is lexical categorizations.

Does switching matter? Investigating the influence of increased dual-task coordination load on the indirect representation of sexual interest within a sexual distractor task

Teresa Greiwe[1], Kirsten Jordan, Klaus Rothermund & Jürgen L. Müller
[1] *Friedrich-Schiller-Universität Jena, Germany, teresa.greiwe@uni-jena.de*

The sexual distractor task is designed to measure sexual interest indirectly based on performance and eye-movements recorded during a mental rotation task and the simultaneous presentation of neutral and sexually (non-)preferred distractors. However, current empirical evidence suggests low distractor processing and small interference effects of sexually preferred distractors used as an indicator of sexual interest. The aim of the present study was to investigate whether the level of distractor processing and hence interference effects elicited by sexually preferred distractors increase systematically due to an increased load of higher cognitive functions (dual-task coordination). Therefore, the original version of the sexual distractor task was modified by implementing a randomized trial-by-trial change between the mental rotation task and an additional evaluation task leading to an increased dual-task coordination load. The level of distractor processing and interference effects of sexually preferred distractors were compared between the original (single-task) and the modified version (dual-task) among N = 53 healthy male participants. In the modified version, the level of distractor processing was significantly higher compared to the original version. Nevertheless, there was no difference regarding interference effects of sexually preferred distractors indicating sexual interest. Exploratory analysis suggests a further investigation of trials immediately preceded by a task switch.

Motor-cognitive crosstalk in a nested task – Decision making is modulated by concurrent motor processes

Eric Grießbach[1], Francesca Incagli, Oliver Herbort & Rouwen Cañal-Bruland
[1] *Friedrich-Schiller-Universität Jena, Germany, eric.griessbach@uni-jena.de*

Everyday behavior often requires doing multiple aspects of a task at once: When crossing a street, the decision of how to avoid cars is implemented while controlling locomotor behavior (i.e. gait). Such behavior is typically thought to be organized hierarchically, that is, "higher-level" cognitive processes are assumed to govern the execution of "lower-level" motor processes. Yet, research on multitasking, embodiment, and ideomotor theory questions this unidirectional impact and advocate that lower-level motor processes could also affect higher-level decision making. Therefore, we examined to what degree lower-level motor processes influence higher-level cognitive processes in nested tasks. To this end, participants first walked towards a central obstacle and then bypassed it to collect rewards displayed on a left or right positioned target table (Y-configuration). To manipulate "lower-level" stepping behavior the starting position was predetermined, which resulted in varying body states before passing the obstacle (left or right foot in front). Results showed that a left-footed last step before the obstacle increased the odds of going to the right side and vice versa. This effect was robustly observed in a neutral reward condition. When the reward was biased towards one side, only a small subsample was affected by the body state. As such lower-level stepping behavior seemed to influence the higher-level decision. It follows that hierarchical models of nested tasks would be well advised to integrate crosstalk from motor to cognitive processes.

Consequences of cognitive offloading: Boosting performance but diminishing memory

Sandra Grinschgl[1], Frank Papenmeier & Hauke S. Meyerhoff
[1] *University of Tübingen, sandra.grinschgl@uni-tuebingen.de*

The ubiquitous access to modern technological tools such as tablets allows the temporal externalization of working memory processes (i.e. cognitive offloading). Whereas using technological tools to offload cognitive processes improves immediate performance on different tasks, little is known about potential long-term consequences of offloading behavior. In the current set of experiments, we asked our participants to first solve a pattern copy task that allows for cognitive offloading and then to complete a subsequent memory test. In Experiment 1 (N=172), we observed a trade-off between immediate and subsequent consequences of offloading behavior. Decreasing costs for cognitive offloading resulted in more offloading and more efficient immediate task performance; however, this came along with less accurate performance in the (unexpected) memory test. In Experiment 2 (N=172), we observed less offloading accompanied by more accurate subsequent memory performance when the participants were aware of the upcoming memory test than when they were not aware of the memory test. In Experiment 3 (N=172), we replicated the detrimental effect of cognitive offloading on subsequent memory performance. Participants who were forced to maximally offload showed a reduced memory accuracy when they were not aware of the memory test. Interestingly, however, the participants were (at least partially) able to compensate the detrimental effects of offloading when they were aware of the memory test. Summarized, our experiments therefore suggest that offloading without the explicit intention to form memory representations diminishes memory performance. Nonetheless, such explicit memory intentions can help to evade the negative consequences of cognitive offloading.

Hindsight bias is not a by-product of knowledge updating

Julia Groß[1], Hartmut Blank & Thorsten Pachur
[1] *University of Mannheim, julia.gross@psychologie.uni-mannheim.de*

After having learned a fact or the outcome of an event, people often overestimate what they had known beforehand. According to a prominent account, this hindsight bias is a by-product of adaptive knowledge updating (Hoffrage et al., 2000). This proposal, however, has not been submitted to a rigorous empirical test. We conducted such a test in the context of numerical estimation. Participants (N = 146) provided estimates of country populations, received feedback about the correct answers, were asked to report their initial estimates (hindsight task), and provided new estimates. To index the amount of knowledge updating, we quantified individual seeding effects (Brown & Siegler, 1993)—improvements in accuracy on new estimates due to feedback on old estimates. If hindsight bias reflects knowledge updating, the strength of seeding effects should be related to the strength of hindsight bias. Further, the magnitude of this relationship might depend on the time available to integrate the feedback with existing knowledge. Participants were randomly assigned to a control group, in which no information about correct responses was provided (n = 51), or to one of two experimental groups with correct responses shown either during ("intermixed", n = 47) or prior to the hindsight task ("delayed", n = 48). Providing correct responses elicited a seeding effect and hindsight bias. However, the strength of seeding effects were unrelated to the strength of hindsight bias. The results suggest that hindsight bias is not a by-product of knowledge updating, but might rather reflect the operation of anchoring processes.

Radfahrstreifen schützen? Einfluss des geschützten Radfahrstreifens auf das Fahrgefühl

Susanne Gruener[1] & Mark Vollrath
[1] *Technische Universität Braunschweig, susanne.gruener@tu-braunschweig.de*

Die Stärkung des Radverkehrs ist gut für Umwelt, Gesundheit und Verkehrsfluss, letzteres vor allem in Städten. Ein gutes Gefühl beim Fahren (empfundene Effizienz, Komfort und Sicherheit beim Radfahren) kann dazu beitragen, die Bereitschaft zum Radfahren zu erhöhen. Häufig genannte Hinderungsgründe gegen die Nutzung des Fahrrads sind eine als unsicher empfundene Radinfrastruktur und hohe Verkehrsdichten des motorisierten Verkehrs. Darauf reagierend wurde der geschützte Radfahrsteifen (weitere Breite, grüne Oberflächenkennzeichnung, bauliche Trennung zur Straße) an einigen Stellen in Deutschland eingeführt. Bislang ist allerdings unklar, ob dieser tatsächlich zu einer entsprechenden Verbesserung des Gefühls beim Radfahren führt und den Investitionsbedarf rechtfertigt. Daher wurde eine Studie im Fahrradsimulator mit 48 Probanden (Ø Alter 30; 23 Frauen) durchgeführt. In einem 2x2 Versuchsplan mit Messwiederholung fuhren diese die gleichen Stadtstrecken auf einem regulären Radfahrstreifen und einem geschützten Radfahrstreifen jeweils mit einer niedrigen und einer hohen Verkehrsdichte des überholenden Autoverkehrs. Die Ergebnisse zeigen, dass Fahrten auf dem geschützten Radfahrstreifen als sicherer, komfortabler und effizienter bewertet werden als Fahrten auf einem regulären Radfahrstreifen. Der motorisierte Verkehrt stört zudem weniger, da Nähe und Gefahr geringer eingeschätzt werden. Auch die Querung von Kreuzungen und das eigene Überholen anderer Radfahrender wurden als sicherer und komfortabler bewertet. Unabhängig davon führt eine niedrigere Verkehrsdichte zu einem höheren Sicherheitsgefühl. Der geschützte Radfahrstreifen kann damit das Fahrgefühl deutlich verbessern und deshalb empfohlen werden. Die Ergebnisse sollten allerdings im realen Verkehr validiert werden.

The Effect of Social Influence on Relief Learning

Marthe Gründahl[1], Leonie Retzlaff, Marta Andreatta & Grit Hein
[1] *Universitätsklinikum Würzburg, Gruendah_M@ukw.de*

Anticipation of pain triggers defensive responses such as startle potentiation, while its avoidance and termination result in positive sensations such as startle attenuation, called relief. These responses can become associated with and later elicited by other stimuli concurrently present. Importantly, social support reduces aversiveness of pain. We investigated the effect of social influence on relief responses and whether active relief (avoidance) differs from passive relief (pain termination) in 102 healthy females. During acquisition, the active group (N=33) learned to actively oppress a painful stimulation (unconditioned stimulus, US), the social group (N=35) believed that another participant oppressed the US, and the passive group (N=34) had no influence. A visual stimulus (conditioned stimulus, CS+) followed US' termination. Subsequently (test phase), participants heard aversive startle probes presented with the CS+ or a novel visual stimulus (Control). Startle responses and fear ratings were collected as learning indices. After acquisition, all participants rated CS+ as more frightening than Control, suggesting that on the verbal level, the relief-associated stimulus elicited fear in all groups. After test, fear ratings of CS+ further increased but did not differ from Control. The same was evident for startle responses to CS+ and Control in both passive and active group. Thus, relief-physiological responses indicate equal implicit valence for passive and active relief. In comparison, the social group showed overall lower startle responses. However, responses were higher to CS+ than New. In sum, we confirmed that social influence reduces physiological fear response in general, but inhibits implicit relief-learning.

Only learned target features guide visual attention

Markus Grüner[1], Florian Goller & Ulrich Ansorge
[1] *Universität Wien, Institut für Psychologische Grundlagenforschung und Forschungsmethoden, markus.gruener@univie.ac.at*

The contingent-capture hypothesis claims that stimuli sharing a feature with a searched-for target involuntarily capture visual attention, while non-matching stimuli do not. Per each target display, we presented four lines of different colors and orientations, each surrounded by a circle with a gap either at the top, bottom, left, or right. Participants reported the gap position via pressing the corresponding arrow key on a keyboard. The target was always the same color and orientation, and could be searched for by its color, its orientation, or both. We let participants learn to search for the target via trial and error. Therefore they received feedback (wrong or correct) after each response. We tested the used search criterion by pre-target cues. Pre-target cues appeared either at the same position as the target (valid) or at a different position (invalid), and either 1) matched the target color and orientation, 2) matched the target color only, 3) matched the target orientation only, or 4) did neither match target color nor orientation. All participants learned and used only the color to search for the target. In line with the contingent-capture hypothesis, both cues matching the target color elicited significant cueing effects (i.e., faster search times in valid than invalid trials) of similar magnitude (no significant difference). However, the cue matching the target orientation only did not elicit a cueing effect, just like the non-matching cue. Results indicate that not all target features were learned during search for targets.

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

Iris Güldenpenning[1], Matthias Weigelt & Wilfried Kunde
[1] *University of Paderborn, iris.gueldenpenning@upb.de*

Typically, head fakes in basketball are generated to deteriorate performance on the side of the observer. However, little is known about the potential costs at the side of the producer of a fake action. Here, we studied such head-fake production costs. Participants were asked to either generate direct passes or head fakes. The required actions were cued by an auditory stimulus with an interstimulus interval (ISI) of either 0 ms, 800 ms, or 1500 ms in advance of the request to actually carry them out. We observed higher reaction times (RTs) for head fakes as compared to direct passes for no and an intermediate preparation interval (ISI: 0 ms and 800 ms). For a long preparation interval (ISI: 1500 ms), these fake-production costs, at least at a descriptive level turned into a benefit, when the passing movements could be prepared in advance. The reversal of the fake-production costs into a benefit (although, not significant) came as a surprise. We speculate that regular passes with an ISI of 1500 ms might have been "overprepared" and had to be inhibited until the presentation of the GO-Signal. This inhibition had to be overcome and might have created a delay in initiating and executing these direct passes. Results of the present study suggest that generating fake actions produces performance costs, however, these costs can be overcome by mental preparation.

A Strong Test of Empirical Validity for Cognitive Process Models

Julia Haaf[1], Nathan Evans & Frederik Aust
[1] *University of Amsterdam, j.m.haaf@uva.nl*

Cognitive process models are a popular tool to examine the underlying processing structure of cognitive phenomena. When interpreting these parameters it is useful to consider individual differences. Previously, these models were either applied on the individual level, and individual differences were assessed via classification of parameter values, or they were applied on the aggregate level, and individual differences were ignored. With the introduction of Bayesian statistics in the field, hierarchical process models are developed as a tool to draw inference on the aggregate level while still accounting for individual variability. Usually, individual parameter estimates are ignored and only distribution parameters are interpreted. Yet, this practice does not account for severe, qualitative individual differences. For example, an experimental manipulation may affect all individuals' guessing parameter in the same direction, or it may affect guessing differently for different participants. This assessment is crucial when assessing empirical validity of process models. In this talk, we show how a strict test of selective influence can be performed using ordinal constraints on individuals' parameters. This assessment is a general tool for a wide range of cognitive process models.

Effects of score-sheet-based vs. standardized written feedback on student learning growth and change in reported self-efficacy

Astrid Haase[1] & Christine Johannes
[1] *University of Erfurt, astrid.haase@uni-erfurt.de*

The usefulness of feedback plays an important role for effective learning. It is a challenge in academic contexts to find a balance between time constraints, feedback quality and immediacy of feedback. Because of the parsimony of score sheets, we want to explicitly test whether its effect on self-efficacy and learning gain is equivalent to textual feedback. We investigate the effects of the feedback type in a quasi-experimental pre-post design with 80 freshmen (M = 20.56 years SD = 2.79, 14 men), who attend one of four parallel introductory university seminars. Students work on home assignments on four occasions during the seminar. For the assignments, half of the participants receive a score sheet feedback, the other half receive textual feedback with standardized text modules. We test for differential effects on learning gain (pre-post knowledge gain; 20 items on topics covered in the four assignments) and self-efficacy (adaptation of the self-efficacy scale by Schwarzer and Jerusalem, 1999). Openness to feedback (AILI subscore on receptiveness to external feedback; translated by Meijer, 2004) and achievement motivation (German version of the AGI by Sudmann et al., 2014) are considered as potential moderators. Both variables were measured in a pretest at the beginning of the semester. This study is currently ongoing. Data will be analysed using repeated measurement ANOVAS. Openness to feedback and achievement motivation will be included as moderator variables, if there are substantial correlations with an outcome. Results will yield implications for the design of blended learning environments.

Olfactory context dependent memory: What makes odors effective mnemonic cues?

Ryan P. M. Hackländer[1], Helge Schlüter & Christina Bermeitinger
[1] *University of Hildesheim, hacklaen@uni-hildesheim.de*

Retrieval is enhanced when it takes place in the same context as that in which the material was first learned. This is referred to as context dependent memory. Many different types of stimuli have been found to be effective contextual mnemonic cues. One potentially powerful type of mnemonic cue is odor. Indeed, when odors are used as contexts in context dependent memory studies, the effect sizes are generally larger than most other types of cues, including places. While it is clear that odors can act as effective mnemonic cues, it is not clear what about an odor is stored in the episodic memory that makes it an effective cue. In the experiment presented here, which is still be completed, we aimed to determine whether odors present during learning lead to the activation of a semantic concept or whether the odor presented during learning is stored as a unique odor object. We had subjects intentionally learn a list of words in the presence of an odor. During retrieval subjects were either exposed to the same or a different odor, or to visual representations of the source of the same or a different odor. If odors are stored as semantic concepts, then we could expect CDM effects with the reinstatement of the same odor or its visual representation. However, if odors are stored as unique objects, then only reinstating the same odor should lead to CDM.

Walking influences basic processing strategies of visual information

Barbara Haendel[1] & Liyu Cao
[1] *University of Würzburg, barbara.haendel@uni-wuerzburg.de*

We meet most of our perceptual challenges while moving, however, our knowledge about human perception, largely derives from laboratory research where participants are required to sit still, keep fixation and avoid blinking. We assessed two open question: i) does walking influence human perceptual performance and can we find corresponding changes in brain activity ii) what role plays the interactions between walking and concurrently executed eye movements. We investigated the effect of free walking on visual perception by analysing mobile electrophysiological (EEG) and behavioural responses (step rate, reaction time, detection rate, eye movement) in humans during different movement states. With converging evidence from neurophysiological and behavioral measurements, we find that walking influences brain activity from visual areas independent of visual input and enhances input processing from the peripheral compared to the central visual field. The concurrent modulation of alpha oscillatory activity indicates the involvement of inhibitory processes. Importantly, eye movements do not explain the effects. Nevertheless, we find that walking and eye related movements are linked. Blink rate, saccade rate and pupil size are modulated by walking speed, however, the different eye movements are affected differently in light or darkness. Additionally, blinks and saccades preferentially occur during the stance phase of walking. Our work indicates that low-level processing of sensory information is influenced by the current movement state of the body. This influence affects eye movement pattern, perception and neuronal activity in sensory areas and might form part of an implicit strategy to optimally extract sensory information during locomotion.

The Influence of an App's Risk on Trust, Distrust and Intention to Use

Josephine Halama[1], Susen Döbelt & Franziska Bocklisch
[1] *TU Chemnitz, Professorship of Cognitive and Engineering Psychology, josephine.halama@psychologie.tu-chemnitz.de*

Besides of many advantages, the usage of smartphone apps can provoke privacy risks, as they may use more personal data as needed. Nevertheless, it is difficult for users to assess an app's risk and the trust in an app to make informed usage decisions. Furthermore, an accessible risk should effect distrust, a related but distinct construct from trust. A brief study within a privacy workshop was conducted to investigate the impact of an accessible app's risk on distrust, trust and intention to use. Furthermore, the distinctiveness of distrust and trust was examined. Thereby, participants (N = 16) got information about a risky shopping app and assessed this app before and after. Results indicated that trust and distrust should be considered as different constructs. Moreover, trust and intention to use decreased and distrust increased. In summary, transparency about the risk can lead to a more appropriate assessment of an app and an informed decision about the usage.

Predictors of cognitive performance in software reverse engineering and code obfuscation

Salsabil Hamadache[1]
[1] *Ruhr University Bochum, salsabil.hamadache@rub.de*

In software development, obfuscation techniques are used to deliberately create code that is difficult for humans to comprehend. Their goal is to hamper reverse engineering, the process of identifying a system's components, interrelationships, and functionality, which may be attempted for both legitimate and illegitimate reasons. Technical obfuscation and reverse engineering procedures in IT security are fairly understood, but little is known about the human sense-making necessarily involved or the role of adversarial reasoning in IT security. Both obfuscation and reverse engineering can be conceptualized as psychological problem solving processes. This study will be conducted to receive insights into strategies and challenges when obfuscating and reverse engineering code. Further, we derived potential predictors of performance from the problem solving literature (convergent/divergent thinking, ambiguity tolerance, adversarial reasoning) and will empirically assess their relevance in this particular domain. In a between-subjects experimental design, participants are randomly assigned to receive a course on adversarial reasoning (or no course), then either are given clear code that they are asked to obfuscate, or to reverse engineer clear software code and code that has been obfuscated by another participant. Further, individual difference variables (see above) are assessed. The goals of this research are twofold: gaining insight into fundamental adversarial problem solving processes, and improving our understanding of what makes reverse engineering of software code particularly hard (or easy) as a means to inform cybersecurity measures. We are currently running the study and will present results, the discussion, and our approach and methods at TEAP.

Confidence-accuracy relationships in forced-choice recognition

Maciej Hanczakowski[1], Ewa Butowska & Katarzyna Zawadzka
[1] *SWPS University, maciej.hanczakowski@gmail.com*

In memory tasks, confidence is likely to track accuracy if those factors shaping accuracy also serve as cues for confidence judgments. A primary factor determining forced-choice recognition accuracy is the difference between the evidence supporting the target and that supporting the lures within a given recognition judgment. A large difference between the two in favor of the targets increases the likelihood of correct responding. In this study we show that confidence does not depend on this difference of evidence between target and lures, but on the absolute evidence supporting the chosen alternative. In four experiments we show that manipulating the strength of evidence supporting targets affects confidence judgments but, across different types of forced-choice recognition tests, varying the strength of evidence supporting lures creates robust confidence-accuracy dissociations by changing accuracy while not affecting confidence. Together, these data support an absolute account of confidence in forced-choice recognition and demonstrate that confidence-accuracy dissociations across recognition conditions are likely to be ubiquitous.

Neural Correlates of Conflict Adaptation in Working Memory

Eva-Maria Hartmann[1], Miriam Gade & Marco Steinhauser
[1] *Katholische Universität Eichstätt-Ingolstadt, eva-maria.hartmann@ku.de*

The present study investigates mechanisms and neural correlates of adaptive cognitive control in working memory (WM). WM is conceived as a system for short-term maintenance, updating and manipulation of representations required for goal-directed action. Adaptive control refers to the finding of flexible adjustments of control processes in face of conflict. For instance, the conflict adaptation effect denotes that conflict on the previous trial leads to a higher level of cognitive control on the current trial. To investigate adaptive control in WM, we measured event-related potentials (ERPs) in a modified Sternberg paradigm. Participants memorized two differently colored lists of four number items (i.e., 2 5 7 1), in which corresponding positions in both lists contained the same digits (congruent items) or different digits (incongruent items). Participants were required to validate whether a given probe matched a particular digit at its corresponding position in the correct list of the memory set. Behavioral data indicated a conflict adaptation effect, that is, responses to incongruent probe items were slower and this congruency effect was reduced following trials with incongruent probe items. In ERPs, we could differentiate dynamic adaptations of match decisions from mismatch decisions: a conflict adaptation effect for match but not for mismatch decisions was found at frontal electrode sites whereas a conflict adaptation effect for mismatch but not for match decisions was found at posterior electrode sites. These results demonstrate adaptive control in WM and link the respective mechanisms to WM-related neural activity.

Validation of the Bayesian algorithm behind response-time extended multinomial processing tree (RT-MPT) models

Raphael Hartmann[1], Lea Johannsen & Karl Christoph Klauer
[1] *University of Freiburg, raphael.hartmann@psychologie.uni-freiburg.de*

Response-time extended multinomial processing tree (RT-MPT; Klauer and Kellen, 2018) models constitute a relatively new model class to model response latencies alongside the response frequencies of traditional multinomial processing tree (MPT) models. It enables the estimation of process-completion times and encoding plus motor-execution times (a.k.a. non-decision time), next to the typical process probabilities of traditional MPT models. Process-completion time refers to the time a process needs to finish with one of two outcomes (e.g. how long does it take to detect a word successfully, where detection is the process and the success its outcome). We developed an R-package, called "rtmpt" (Hartmann, Johannsen, & Klauer, in press), to fit models of the RT-MPT model class and show that the Bayesian algorithm underlying "rtmpt" is valid.

Reducing Discomfort in Automated Driving by Increasing System Transparency via HMI

Franziska Hartwich[1], Matthias Beggiato & Josef Krems
[1] *Chemnitz University of Technology, franziska.hartwich@psychologie.tu-chemnitz.de*

The development of automated vehicles promises numerous benefits for future mobility. However, the acceptance and therefore usage of this technology will be determined by the degree of comfort and safety users perceive when transferring vehicle control to an automated system. It is assumed that these aspects of the driving experience can be improved via Human Machine Interfaces (HMI) helping passengers to understand and predict the behavior of the automated vehicle. This approach was evaluated in a driving simulator study with 41 participants aging from 24 to 77 years. Each participant experienced two highly automated trips along a 9 km long test track including six complex and therefore potentially uncomfortable driving situations such as intersection and obstacles on the road. In one of both trips, an HMI was activated in the instrument cluster when approaching each of the six driving situation to inform the passenger about the traffic elements detected by the vehicle, the planned maneuver for this situation, and the time to the start of the maneuver. Compared to the trip without HMI, participants experienced significantly decreased discomfort with the HMI, as indicated continuously during driving via handset control. Using standardized questionnaires after each trip, participants also reported significantly increased perceived safety, trust in automation and system acceptance after driving with the HMI. To conclude, an HMI-based increase of system transparency has the potential to improve users' automated driving experience and hence their evaluation of automated vehicles.

Cumulative Semantic Interference during Language Production in a Joint Task Setting – an EEG Study

Roger Hauber[1], Anna Katharina Kuhlen & Rasha Abdel Rahman
[1] *Humboldt Universitaet zu Berlin, roger.hauber@hu-berlin.de*

Cumulative semantic interference (CSI) refers to a linear increase of naming latencies for pictures from the same semantic category (Howard et al., 2006). When naming pictures with a task partner, CSI can also be elicited by the partner's naming (Kuhlen & Abdel Rahman, 2017; Hoedemaker et al., 2017). To what extent partner-elicited CSI is driven by lexical access on behalf of the partner (i.e. simulation) or by processing the partner's naming response remains unclear. In the present study, we assess event-related brain potentials (ERPs) in a joint picture naming setting. Participants name five members of different semantic categories, with an additional five members being named by either the partner (Joint Naming condition) or nobody (Single Naming condition). Electrophysiological correlates of CSI and lexical access that have been identified in single-speaker settings (e.g. Costa et al., 2009; Rose & Abdel Rahman, 2017) are taken in the present study as indexes of partner-elicited CSI that are employed to assess the relative contributions of simulation and processing of the partner's response. Naming latencies and ERPs should reveal stronger CSI effects in the Joint compared to the Single Naming condition, reflecting partner-elicited interference. Additionally, participant's ERPs when their partners are naming pictures should reveal evidence of lexical access before the partner's speech onset, indicating simulated lexical access. We also perform exploratory analyses on the ERPs time-locked to the partner's speech onset to investigate the potential influences of processing the partner's naming response.

Intrinsic brain network correlates of phasic alertness in healthy aging

Marleen Haupt[1], Adriana L. Ruiz-Rizzo, Christian Sorg & Kathrin Finke
[1] *Ludwig-Maximilians-Universität München, marleen.haupt@psy.lmu.de*

Phasic alerting cues temporarily increase the brain's arousal state. In younger and older participants, visual processing speed in a whole report task, estimated based on the theory of visual attention, is increased in cue compared to no-cue conditions. In younger participants, phasic alerting effects on visual processing speed have been linked to intrinsic functional connectivity (iFC) within the cingulo-opercular network. Robertson (2014) suggested that the connectivity of the right fronto-parietal network is essential for maintaining alertness capabilities in aging. The present study assessed whether older participants' ability to profit from warning cues is related to iFC in the cingulo-opercular or right fronto-parietal network. We obtained resting-state functional magnetic resonance imaging data from 31 older participants. By combining an independent component analysis and dual regression, we investigated iFC in both networks. A voxel-wise multiple regression in older participants revealed that higher phasic alerting effects on visual processing speed were significantly associated with lower right fronto-parietal network iFC. We then compared healthy older participants to a previously reported sample of younger participants to assess whether behaviour-iFC relationships are age group specific. The comparison revealed that the association between phasic alerting and cingulo-opercular network iFC is significantly lower in older than in younger adults. Additionally, it yielded a stronger association between phasic alerting and right fronto-parietal network iFC in older versus younger participants. The results support a particular role of the right fronto-parietal network in maintaining phasic alerting capabilities in aging.

Expertise and the beauty of mathematical equations

Gregor Hayn-Leichsenring[1], Oshin Vartanian & Anjan Chatterjee
[1] *Universitätsklinikum Jena, gregor.hayn-leichsenring@med.uni-jena.de*

In most cases, judgments of beauty are triggered by visual perception (e.g., for faces, landscapes, artworks, etc.). However, concepts like mathematical equations can also be considered beautiful. We hypothesize that these kinds of beauty judgments are mainly based on cognitive processes and are influenced by semantics and knowledge. Therefore, expertise should have an important effect on beauty judgments of equations. To test our prediction, we asked 20 students of mathematics and 20 laypeople to sort equations according to their beauty using the Q-sort method. Afterwards, we asked all participants to complete a questionnaire to probe the bases for their judgments. We found that mathematics students are (A) more consistent in their ratings, and (B) prefer shorter and less complicated equations. Additionally, (C) in contrast to laypeople, students of mathematics are able to explain why they prefer some equations over others. The results confirm our prediction and we conclude that expertise alters (and sharpens) aesthetic judgments of mathematical equations.

Self-involvement biases learning of ingroup and outgroup information, but not retrieval

Stefanie Hechler[1], David Urschler & Thomas Kessler
[1] *Friedrich-Schiller-Universität Jena, Germany, stefanie.hechler@uni-jena.de*

When learning about two categories, people accentuate the distinct features of these categories. Categories are even differentiated, if there are no factual differences between them (e.g., illusory correlations). However, when the self is a member of one of these categories, the ingroup bias additionally affects the category differentiation. Such ingroup biases evolve despite equal distribution of the information about the groups (Howard & Rothbart, 1980). In the current study (N= 116), we examined whether an ingroup bias emerges during learning or retrieval of group information. There were three between-participant conditions: 1) No categorization. 2) Categorization in ingroup and outgroup before learning 3) Categorization after learning. The categorization procedure followed a minimal group paradigm. In the study, participants learned the same amount of positive and negative information about both groups. In a test phase, the same information and new distractors were re-presented. Participants indicated whether they have seen the information before, and if yes, which group it belonged to. We applied multinomial modelling to distinguish between memory and guessing behaviour. Results only reveal a guessing bias for the non-categorized participants. In contrast, participants who were categorized before learning, remembered positive information of their ingroup better than negative information. There was no biased memory, when participants were not categorized or categorized after learning about the groups. Nevertheless, participants who were categorized before or after learning, preferred their ingroup over the outgroup. This indicates that biased group impressions emerge during learning about two groups, and manifest in memory biases.

Using probabilistic classifications on the individual level to test hypotheses on the group level

Daniel W. Heck[1], Clintin P. Davis-Stober & Daniel R. Cavagnaro
[1] *Philipps-Universität Marburg, dheck@uni-marburg.de*

By operationalizing competing theories as statistical models for behavioral outcomes (e.g., choice probabilities or response times), model-selection techniques such as the Bayes factor allow researchers to test competing strategies on the individual level. For each participant, this method provides posterior model probabilities defined as the probabilities that each of the competing models generated the behavioral outcomes. Recently, the theoretical and statistical sophistication of model-selection methods and models has steadily increased. However, given model-selection results on the individual level, it is not clear how to draw inferences on the group level (e.g., "do all or does a majority of participants adhere to a specific theory?"). As a remedy, we extend a recent model-based test for probabilistic classification by Cavagnaro and Davis-Stober (2019) to estimate the relative group sizes of the different theories. This method accounts for classification uncertainty and allows to test informative hypotheses on the group level (e.g., "most participants are best described by theory X or Y"). The method requires only posterior model probabilities (or information-theoretic weights) per individual as input and can easily be applied using the R package "multinomineq" for multinomial models with inequality constraints. Besides a reanalysis of empirical data, we present Monte Carlo simulations to assess the effect of ignoring classification uncertainty when drawing inferences on the group level.

A Causal Judgment Paradigm for Discrimination Perception

Paul Heineck[1] & Roland Deutsch
[1] *University of Würzburg, paul.heineck@uni-wuerzburg.de*

Every day millions of people perceive discrimination, yet discrimination is also overlooked or wrongly accused. In our line of research, we are interested in socio-cognitive processes underlying discrimination perception. Since discrimination is defined as the process by which people are treated differently (especially unfair) because of their group membership (e.g. Jary & Jary, 1995), the main question to be answered in discrimination perception is whether the difference in treatment is attributable to differences in group membership rather than a socially accepted feature (SAF; e.g. performance). Hence, to perceive discrimination, people must infer causal priority of the group membership over SAFs. As such, the question of discrimination perception would essentially concern the perception of covariation of group and treatment mediated by the SAF. By measuring the perception of this partialized covariation, one would be able to access participants' discrimination perception with reduced biases. In our experiment, we investigated participants' (N=86) sensitivity to covariations between two variables in the presence of a potential mediator or suppressor in dependence of different question formats. The results revealed significant differences between the three formats and indicate that people may be sensitive to trivariat covariations if the right question format is used. With this new perspective, we attempt to shed light on processes underlying discrimination perception through a new paradigm to represent discrimination in a laboratory setting. We designed a new sampling task to demonstrate the precision of the new measurement under various variables with previously observed effects on discrimination perception. Results are still pending.

Subitizing and Visual Working Memory: A Common Capacity Limit?

Sophia Heinlein[1] & Kerstin Jost
[1] *Medizinische Hochschule Brandenburg, sophia.heinlein@mhb-fontane.de*

In enumeration tasks, responses are typically fast and accurate with a shallow slope up to about three to four elements, a phenomenon known as subitizing. Beyond this point, response times and error rates increase more steeply for each added item, resulting in an elbow-like function. Like subitizing, visual working memory also shows a capacity limit at around three to four items. This observation of numerically similar capacity limits in a variety of multiple object tasks has invited the suggestion that a common resource is responsible for the performance limits. Item individuation might be such a limiting factor. In accordance with this claim, subitizing has been shown to be strongly related to visual working memory capacity. However, evidence is scarce because in these studies enumeration/ subitizing is often measured with brief object presentation times going along with relatively high working memory demands, which in turn, might be responsible for performance variations in both tasks. We here tested whether the correlation between individual working memory capacity and individual subitizing range still holds when viewing time in the enumeration task is unlimited. In 60 participants, we measured individual working memory capacity in a change-detection paradigm. Individual subitizing ranges were estimated with a novel, recently published method. Our results revealed only a low correlation between the two measures indicating that a common limited resource cannot be entirely responsible for individual differences in enumeration and visual WM, but that more specific capacity-limiting factors and mechanisms do contribute as well.

Consequences, Norms, or Willingness to Interfere – What drives the Foreign Language Effect in Moral Dilemma Judgment

Max Hennig[1] & Mandy Hütter
[1] *Eberhard Karls Universität Tübingen, Maximilian.Hennig@uni-tuebingen.de*

Moral judgment research frequently uses sacrificial dilemmas, in which one has to decide whether to kill one person in order to save several others. In this paradigm, not killing is usually assumed to suggest adherence to absolute norms, while killing is taken to indicate sensitivity to consequences of an action. Research employing this approach indicates the existence of a foreign language effect (FLE), such that willingness to engage in sacrificial killing is higher when scenarios are considered in a foreign compared to one's native language. However, methodological limitations prevent much of past research from speaking clearly about its underlying mechanisms. Moreover, as some evidence suggests the FLE may be restricted to scenarios enforcing high levels of personal involvement, the boundary conditions of this effect are somewhat unclear. Avoiding these limitations we applied multinomial processing tree modeling to estimate sensitivity to aggregate consequences, norm-sensitivity, and preference for inertia over interference as independent determinants of dilemma responses. Results of two experiments (N1 = 247, N2 = 574) suggest that the FLE may be restricted to high-involvement dilemmas, in which foreign language reduces norm-sensitivity and inertia alike. In response to low-involvement dilemmas no consistent effects were observed. These findings thus help to clarify how several cognitive mechanisms jointly contribute to the FLE in dilemma-judgment. While partly compatible with previous research, our findings also suggest the FLE to be in part an artefact resulting from uncontrolled response tendencies, specifically inertia, which systematically bias responses in other dilemma paradigms.

Process tracing in the browser with lab.js, mousetrap-web, and beyond

Felix Henninger[1] & Pascal J. Kieslich
[1] *University of Mannheim / University of Landau, mailbox@felixhenninger.com*

Process tracing extends the cognitive psychologists' toolbox by providing further insights into the mechanisms underlying any given phenomenon. Among the available process tracing methods, mouse-tracking is a versatile method for monitoring the development of cognitive processes over time, particularly the commitment to and the degree of conflict between response options in forced choice tasks. So far, this method has been limited to laboratory-based software, and not easily been available to researchers looking to conduct studies online. Thus, researchers interested in mouse-tracking have had to forgo the advantages that internet-based research offers, such as the quick and efficient collection of larger and more diverse samples. As a solution, we introduce the mousetrap plugin for lab.js, a free and open-source, online study builder. It provides a graphical interface for constructing experiments without requiring programming skills, and allows for the easy implementation of browser-based mouse-tracking studies. Mousetrap-web integrates with the mousetrap R package for processing, analysis and visualization of the collected data. We also address several methodological challenges of moving beyond the laboratory and collecting mouse-tracking data in self-administered online studies, where the individual participants' hardware and environment are not as easily controlled. Finally, we show through technical validation that our software reliably records mouse movements in different browsers. Mousetrap-web is available free of charge, with source code openly available from https://github.com/felixhenninger/mousetrap-web. Going beyond mouse-tracking, we discuss general approaches for integrating additional process tracing techniques in the browser.

lab.js: A free, open, online experiment builder

Felix Henninger[1], Yury Shevchenko, Ulf K. Mertens, Pascal J. Kieslich & Benjamin E. Hilbig
[1] *University of Mannheim / University of Landau, mailbox@felixhenninger.com*

Web-based data collection is increasingly popular in both experimental and survey-based research because it is flexible, efficient and location-independent. While dedicated software for laboratory-based experimentation and online surveys is commonplace, researchers looking to implement experiments in the browser have, heretofore, often had to manually construct their studies' content and logic using code. We introduce lab.js, a free, open-source experiment builder that makes it easy to build studies for both online and in-laboratory data collection. Through its visual interface, stimuli can be designed and combined into a study without programming, though studies' appearance and behavior can be fully customized using HTML, CSS and JavaScript code if required. Presentation and response times are kept and measured with high accuracy and precision heretofore unmatched in browser-based studies. Experiments constructed with lab.js can be run directly on a local computer and published online with ease, with direct deployment to cloud hosting, export to web servers, and integration with popular data collection platforms. Studies can also be shared in an editable format, archived, re-used and adapted, enabling effortless, transparent replications, and thus facilitating open, cumulative science. The software is provided free of charge under an open-source license; further information, code and extensive documentation are available from https://lab.js.org/

Better safe than sorry – Gap Acceptance related to Participants' Age, Vehicle Types and Speed

Ann-Christin Hensch[1], Matthias Beggiato & Josef Krems
[1] *Chemnitz University of Technologie, ann-christin.hensch@psychologie.tu-chemnitz.de*

To support drivers' comfort and acceptance, automated vehicles (AVs) need to communicate with other traffic participants. For safe and comfortable interaction, AVs should operate consistently by using known manually driving behavior. Thus, parameters regarding informal communication and potential influencing factors need to be investigated for the implementation in AVs' (e.g., gap acceptance parameters). The present video simulation study investigated the effects of participants' age, vehicle type and vehicles' speed on participants' gap acceptance in a shared space setting. The pre-recorded real-world video material was presented to N = 42 participants (two age groups: < 30 years vs. > 45 years). The recordings displayed a left turn parking maneuver from the drivers' perspective including an overlap of the ego-vehicles' and the oncoming vehicles' trajectory. The material contained three vehicle types (scooter, passenger car, truck) approaching with different speeds (10 - 35 km/h). A mixed ANOVA showed main effects for participants' age, vehicle types and vehicles' speed. Time gaps increased by vehicles' size, with smallest gaps for the scooter and largest for the truck. Moreover, lower (i.e., riskier) time gaps were selected for higher speeds. Older participants preferred more conservative gaps compared to younger participants. The results are in line with previous studies on size-arrival effects and pedestrian-to-vehicle interaction. To meet human expectations and enhance comfort and acceptance, AVs should particularly consider speed related time gaps. Age related time gaps could serve as basis for different automated driving style profiles, e.g. defensive vs. dynamic driving style.

The Impact of Visual and Proprioceptive Factors on Subjective Ratings of Different Rotated Seating Positions and its Relevance for Automated Driving

Sandra Hensen[1], Julia Pelzer, Viktoria Arling, Gudrun M. I. Voß & Stefan Ladwig
[1] *RWTH Aachen University, Institute for Automotive Engineering, sandra.hensen@ika.rwth-aachen.de*

Automated driving is one of the most important developments within the automotive industry which can lead to a lot of potential benefits like safer roads, more effective road use, and optimized energy usage. Another significant consequence with increasing level of automation is drivers, now (passive) passengers, can engage in non-driving activities. In this context, vehicle interiors and seating arrangements (e.g. rotated seating positions) can be designed according to the desired activities. To assess which rotated seating positions are generally accepted and perceived as most comfortable for users, an empirical test track study was conducted using a mixed design. It was investigated, whether the subjective evaluation of seat orientations is influenced by visual or proprioceptive factors and the phenomenon of motion sickness. Participants (N = 61) were asked to rate seven rotated seating positions with(out) view to the outside as a within subject factor. Further, driving direction was altered (counter) clockwise as a between subjects factor. The results show significant differences in the subjective evaluation of left- and right-wing rotations dependent on the driving direction, indicating that visual and proprioceptive factors play an important role. As backwards rotations were not part of the present study, these should be addressed in follow up studies.

Reducing the time loss bias: Two ways to improved driving safety and energy efficiency

Mario Herberz[1], Celina Kacpersky & Florian Kutzner
[1] *Geneva, mario.herberz@unige.ch*

Drivers systematically overestimate the time lost when decelerating from relatively high driving speeds, known as time loss bias. In the present study, we investigated the debiasing potential of two behavioral interventions: the Paceometer (Peer and Gamliel, 2013) and a newly designed Pop-up assistant, in a video-based highway driving scenario in the lab. The Paceometer provided participants with pace information (min/km) added to the common speedometer display (km/h). The Pop-up assistant provided situation-specific information about the time lost when decreasing speed. Analyses of our pre-treatment-post measures provided supporting evidence for the improvement of time loss estimations for both debiasing tools. Additionally, results yielded a temporal spillover effect for the Pop-up assistant, but not for the Paceometer. Differences in cognitive demand and the potential benefits of both interventions to reduce risky driving, fuel consumption, and fuel costs will be discussed.

Precise movements in awkward postures: Precision requirements determine grasp selections for object manipulations

Oliver Herbort[1] & Wilfried Kunde
[1] *Julius Maximilians University of Würzburg, oliver.herbort@uni-wuerzburg.de*

When people grasp to-be-manipulated objects, they typically select grasps that result in a medial, comfortable arm posture at the end of the object manipulation. (end-state comfort effect). It has been suggested that medial end-states are preferred because these arm postures provide the highest degree of control (i.e. movement speed and precision) over the wielded object. We directly tested the precision hypothesis by manipulating the arm postures that maximize control over an object using a virtual reality object manipulation task. In two experiments, participants predominantly selected grasps that maximized control over the object in the final phase of an object manipulation even when this implied adopting excursed, uncomfortable end-states. In a third experiment, we show that medial end-states allowed participant to exert a higher level of control than excursed end-states and that this benefit might suffice to elicit the end-state comfort effect. In summary, these findings directly support the hypothesis that the end-state comfort emerges because it maximizes the control over the manipulated object at the end of object manipulations.

Age differences in prospective memory: The role of strategic and associative demands

Alexandra Hering[1], Katharina Schnitzspahn, Yee Lee Shing & Matthias Kliegel
[1] *University of Geneva, alexandra.hering@unige.ch*

Prospective memory describes the ability to remember delayed intentions. It is a crucial skill for functional independence in everyday in older age. To realize intentions successfully, the appropriate moment (i.e., prospective memory cue) has to be detected in the environment and the intended action has to be retrieved from memory. In the present study, we were interested if (A) providing an encoding strategy and (B) manipulating the association between the prospective memory cue and the intended action influences prospective remembering across the adulthood. We assessed behavioral and neurophysiological measures (i.e., EEG) of prospective memory performance 40 younger and 40 older adults. Participants worked on a two-back picture task as ongoing activity with an embedded prospective memory instruction. At the beginning of each block, they had to encode two prospective memory cues and the respective actions. The cue-action pairs varied in their lexical association being highly associated or not. Furthermore, half of the sample received an imagery strategy to support encoding. Results show that prospective memory performance differs between the two age groups with older adults showing reduced performance rates. Moreover, both, cue-action association and strategy use seem to influence performance. Especially associative demands seem to be relevant for the decline of prospective memory performance in older adulthood. Strategies benefited both age groups. Neural correlates further foster the understanding of associative and strategic demands. The results will be discussed in light of models on episodic memory and prospective memory.

Why does it feel good to act extraverted? An experimental study of the mediators between extraverted behavior and positive affect

Wiebke Herrmann[1], Annabel Marschner & Jan Wacker
[1] *Universität Hamburg, wiebke.herrmann@uni-hamburg.de*

Both trait extraversion and extraverted behavior are associated with greater positive affect. A recent study found this association to be mediated by perceived social contribution, a dimension of the social well being scale. However, a more comprehensive investigation of potential underlying mechanisms of the extraversion-positive affect link is still lacking. In the present study, we investigated if additional dimensions of well-being mediate the relationship between enacted extraverted behaviors and positive affect. One-hundred and eight participants were instructed to enact either extraverted or introverted behaviors (versus no instruction) in a group discussion of three participants. Contrary to prior findings structural equation models demonstrated that state social contribution was not a significant mediator of the relationship between enacted extraverted behavior and positive affect. Instead, the well-being dimensions 'engagement' and 'relations' significantly mediated the relationship between enacted extraverted behavior and positive affect. This suggests that extraverted behavior may increase the experience of flow and the feeling of being appreciated during the task which may in turn lead to increases in positive affect. Limitations of the study and implications for the relationship between personality and well-being are discussed.

The cognitive deficit profile in survivors of severe sepsis – first results of the STARDUsT study

Elizabeth Hertel[1], Christian Geis, André Scherag, Jonathan Wickel & Kathrin Finke
[1] *Universitätsklinikum Jena, elizabeth.hertel@med.uni-jena.de*

Chronic cognitive dysfunctions are a major and debilitating problem in survivors of severe sepsis. While impairments in attention and executive functions have been reported repeatedly, a comprehensive deficit profile has not been established. Furthermore, the basic underlying mechanisms that are impaired in these patients and that lead to low performance in standard neuropsychological tasks are not identified. In the STARDUsT study patients of the Mid German Sepsis Cohort (MSC) are assessed with a normed neuropsychological standard battery, the Neuropsychological Assessment Battery (NAB), in order to retrieve a comprehensive cognitive deficit profile of sepsis survivors. Furthermore, the MSC patients are also assessed with experimental whole and partial report tasks based on the theory of visual attention (TVA), in order to quantify basic parameters of visual attention. The overall aim is to test whether changes in specific attentional parameters can explain the deficit profile shown by sepsis survivors in established clinical tasks. Relevant demographical and medical data, such as age, duration since sepsis, duration of delir and depression and anxiety scores will be taken into account in the analyses.

Incidental encoding of visual information in spatial and temporal reference frames in working memory

Anna Heuer[1] & Martin Rolfs
[1] *Humboldt-Universität zu Berlin, anna.heuer@hu-berlin.de*

Visual events are structured in space and time, yet models of visual working memory have largely relied on tasks emphasizing spatial aspects. Here, we show that temporal properties of visual events are incidentally encoded along with spatial properties. Across several experiments, participants performed a colour-change-detection task, in which each item had unique but task-irrelevant spatial and temporal coordinates at encoding. The key manipulation concerned the retrieval context: The test array was identical to the memory array in terms of either its entire spatiotemporal structure, or only its spatial or temporal structure. Removing spatial or temporal information at retrieval resulted in performance costs, indicating that memory relied to some degree on both spatial and temporal contexts in which items were initially perceived. No comparable costs were observed for a different task-irrelevant feature dimension (size). Encoding of the spatiotemporal structure occurred incidentally, not strategically, as it was robust even when the retrieval context was perfectly predictable. However, spatial and temporal inter-item spacings influenced the weighting of spatial and temporal information: It favoured the domain in which items were more widely spaced, likely facilitating their individuation and thereby access to memory representations. Across individuals, the weighting of spatial and temporal information varied substantially, but it remained consistent across days, suggesting stable preferences for coding in the spatial or temporal domain. We propose that time serves a similar function as space in the representational architecture of visual working memory, providing a reference frame in which objects are bound.

Persuasion as a Sequential Process

Jannis Hildebrandt[1], Roman Linne, Hans-Peter Erb & Gerd Bohner
[1] *Universität Bielefeld, j.hildebrandt@uni-bielefeld.de*

The authors tested a new theory of persuasion as a sequential process (PSP). Drawing on assumptions from both the Heuristic-Systematic-Model and the Parametric Unimodel of Persuasion, PSP predicts assimilation and contrast effects based solely on the sequence in which identical arguments are encountered. Specifically, if an initial argument is immediately followed by an argument of opposite valence (vs. a neutral argument), contrast effects are predicted to occur, despite the fact that the overall information is held constant. In a laboratory experiment, students (N = 216) read four arguments for or against the abolishment of cash. They were assigned randomly to the conditions of a 2 (initial argument: positive vs. negative) x 2 (subsequent three arguments: neutral, positive, very positive vs. neutral, negative, very negative) x 2 (order of subsequent arguments: neutral to extreme vs. extreme to neutral) between-subjects-design. After each argument, they listed one thought related to that argument; thoughts were subsequently rated as favorable versus unfavorable and aggregated into a thought valence index. Participants also reported their overall attitude toward the abolishment of cash. A-priori contrast analysis fully supported the predictions of PSP for the pattern of attitudes. In addition, the effects of experimental conditions on attitudes were fully mediated by thought valence. Theoretical and applied implications will be discussed.

Alpha Protocol - The Role of EEG Alpha Power in Differences in Visual Information Processing based on the Theory of Visual Attention (TVA) between Action Video Gamers and Control Participants

Yannik Hilla[1], Jörg Von Mankowski, Julia Föcker & Paul Sauseng
[1] *Ludwig-Maximilians-Universität München, y.hilla@psy.lmu.de*

Action video gaming has been shown to improve a range of cognitive functions. The basis for these improvements seems to be attentional control in conjunction with reward-related learning to amplify executing goal-relevant actions while suppressing goal-irrelevant actions. Given that EEG alpha power reflects inhibitory processing, a core component of attentional control, it might represent the electrophysiological substrate of cognitive improvement in action video gaming. Therefore, the aim of this study was to test whether non-video gamers (NVGs), non-action video gamers (NAVGs) and action video gamers (AVGs) exhibit differences in EEG alpha power, and whether this might account for differences in visual information processing as operationalised by the theory of visual attention (TVA). 15 NVGs, 15 NAVGs and 10 AVGs performed a visual short-term memory paradigm where they memorized shape stimuli depicted on circular stimulus displays at six different exposure durations while their EEGs were recorded. We applied a computational approach based on TVA-algorithms to analyze behavioural data. There was a positive correlation between the extent of EEG alpha amplitude suppression and the speed of information processing across all participants; AVGs exhibited the strongest EEG alpha amplitude suppression after processing stimulus displays; and video gamers exhibited faster information processing than NVGs after practice. Since group differences in EEG alpha power were associated with group differences in speed of information processing, we concluded that EEG alpha power might be a neural substrate of attentional control to explain why video gamers exhibit enhanced visual information processing.

The effect of interruption duration and position on post-interruption performance

Patricia Hirsch[1], Luca Moretti & Iring Koch
[1] *RWTH Aachen University, patricia.hirsch@psych.rwth-aachen.de*

Task interruptions are common in everyday life and have been shown to have a harmful effect on performance. In the present study, we examined the effects of interruption duration and position on post-interruption performance. Subjects carried out a predefined sequence of six sub-tasks, comprising two n-2 task switch trials (e.g., ABC ACB) or two n-2 task repetition trials (e.g., CBC ABA; n-2 backward inhibition paradigm). This primary task was interrupted by a categorization task before the second, third, or forth sub-task for 2 or 8 seconds; or there was no interruption. In line with the memory of goals model (Altmann & Trafton, 2002), we expected a higher resumption lag (i.e., time to resume the primary task) and more errors with long than with short interruption duration. Moreover, in accordance with previous studies indicating that a decline in post-interruption performance would be especially pronounced when mental workload was high, we predicted that resumption lag and error rates were highest when the primary task was interrupted before the third task (i.e., switch between trial n-1 and n) in n-2 task repetition trials. This is because it is assumed that when switching to a new task, the previous task set is inhibited. When switching from trial n-1 to trial n, this inhibition has to be overcome, and thus the mental workload is higher in this case in relation to the other interruption positions.

LATER Modelling of Emotional Antisaccades

Alexandra Hoffmann[1], Christian Büsel & Pierre Sachse
[1] *Universität Innsbruck, alexandra.hoffmann@uibk.ac.at*

In the present study, we are going to apply a traditional antisaccade paradigm, in which participants have to inhibit a saccade to a salient white circle stimulus, as well as an emotional antisaccade paradigm, in which a saccade to an emotional facial stimulus has to be avoided by the participants. A novelty of the present study is that – in contrast studies using emotional antisaccades to measure inhibition performance – this is the first time the paradigm is tested in healthy subjects only. Data from both paradigms is subsequently subjected to linear approach to threshold with ergodic rate modelling (LATER). Based on the LATER model by Noorani & Carpenter (2013), we aim to predict antisaccade performance from subjects' performance in prosaccade trials. Moreover, performance in the emotional antisaccade paradigm will be predicted by the performance in the standard antisaccade paradigm. In contrast to Noorani & Carpenter's approach, pro- and antisaccades are not going to be presented in a blocked, but in an interleaved design. The LATER model has, so far, only been fitted to the blocked design, which adds even more exploratory value to our new approach. We hypothesize that, as antisaccade performance can be predicted by prosaccade performance when subjects are presented with the blocked version of the task, the prediction should also work in an interleaved design as well as across paradigms using different kind of stimuli.

Modality matters, but why? Effects of response selection difficulty on effector system-based prioritization in multiple action control

Mareike A. Hoffmann[1] & Lynn Huestegge
[1] *University of Würzburg, mareike.hoffmann@uni-wuerzburg.de*

Executing two responses at once typically yields performance decrements. These costs are often distributed unevenly among the involved responses, especially when they are executed using different effector systems. In recent years, we provided cumulative evidence for a consistent prioritization pattern (ordinal structure of the extent of dual-response costs) based on the effector systems involved. However, the functional significance of (or the underlying mechanism to explain) this type of prioritization remained elusive. In the present study, we focused on the role of response selection difficulty as a potential explanatory factor. To do so, we compared pedal vs. manual dual-response (and dual-task) performance using one common stimulus (or two distinct stimuli) in the crossed-incompatibility paradigm (CIP). This paradigm requires participants to execute two responses, while either one or the other response is spatially (in)compatible with the relevant stimulus. The results reveal the extent to which spatial stimulus-response compatibility affects effector system-based task prioritization. Thereby, we provide first evidence for assessing the role of response selection difficulty on capacity allocation among output-related systems. The results represent a first step towards explaining effector system-based task prioritization.

Video-based P-CR eye-trackers are not suitable for the measurement of small saccades

Kenneth Holmqvist[1], Saga Öhrbom & Mark Shovman
[1] *Universität Regensburg, kenneth.holmqvist@ur.de*

Eye-tracking is widely used in psychological research, on topics such as reading, decision making, neuroscience, education, and in many applied areas. In recent years. several artefacts have been found in video-based pupil-corneal reflection (P-CR) eye-tracking. We show new data from the Dual-Purkinje Imaging (DPI) eye-tracker and many P-CR eye-trackers that eye rotations of amplitudes between 1 arcmin and around 2 degrees are frequently erroneously measured by the video-based eye-trackers, but not by the DPI. The corneal reflection (CR) feature of these P-CR eye-trackers is shown to be the major cause of the erroneous measurements. Other recent studies have shown that the pupil feature causes similar artefacts. Our data suggest that some results from research on reading, microsaccades, and vergence, where the amplitude of small eye movements have been measured with past or current video-based eye-trackers, may need to be reconsidered. Furthermore, we present a new analogue eye-tracker and bench-mark it against the DPI and the Tobii Spectrum in several tasks, including a simultaneous co-recording of the DPI with our new analogue eye-tracker. Our data provide evidence that for the measurement of saccade rotations of amplitudes up to around 2 degrees, analogue eye-trackers generally outperform video-based eye-trackers.

The disintegration of event files over time: Decay or interference?

Bernhard Hommel[1] & Christian Frings
[1] *Leiden University, hommel@fsw.leidenuniv.nl*

When facing particular combinations of stimuli and responses, people create temporary event files integrating the corresponding stimulus and response features. Repeating one or more of these features retrieve the entire event file, which impairs performance if not all features repeat (partial-repetition costs). We studied how durable event files are over time and how sensitive they are to intervening objects or stimulus-response events. After-effects of relevant and irrelevant stimulus-response bindings were assessed after intervals of 1-5 seconds between creation and retrieval of the binding that were either unfilled (Experiment 1A), filled with 0, 2, or 4 presentations of the same neutral stimulus (1B), or of changing stimuli (1C), or filled with 0, 2, or 4 task-unrelated stimulus-response combinations (2A) or the same number of repetitions of the binding-inducing stimulus-response combination (2B). Taken altogether, the findings show a strong impact on the duration of the interval but no systematic effect of the type and number of intervening events. This suggests that event files disintegrate over time, as a function of spontaneous decay, but not due to interference from other bindings.

Super-additive processing of category- and context-related information in stereotype formation

Tingting Huang[1] & Klaus Rothermund
[1] *Friedrich-Schiller-Universität Jena, Germany, tingting.huang@uni-jena.de*

Social stereotypes are represented in a context-dependent way, with specific attributes being ascribed only to combinations of categories and contexts (e.g., "old people are slow when they are crossing the street"), not to categories or contexts alone. In our study, we wanted to identify conditions under which such an integrative processing of category and context information can be achieved during stereotype learning. In a learning task, participants (n=66) learned the likelihoods of different people behaving in a smart way, depending on whether or not they belonged to a certain category ("purple eyed"), and in which context they were shown (depicted by various background colors). In the learning phase, the probabilities of the compound stimuli were either equal to the sum of the probabilities of their constituting category and context elements (additive condition), or they were larger than the sum of the probabilities of the category and context stimuli that made up the compound (super-additive condition). During the test phase, participants guessed the likelihood of being smart for category-context combinations that were not presented during learning (transfer test). We found that probability estimates for the transfer stimuli (controlling for baseline estimates) were larger in the super-additive than in the additive condition. Our results suggest that a general Gestalt-like integration strategy in stereotype learning can be induced when conditions of additivity are violated during learning.

Sequential structure in subjective patterns of randomness

Ronald Hübner[1]
[1] *Universität Konstanz, ronald.huebner@uni-konstanz.de*

It is an interesting finding that subjective randomness differs from stochastic randomness. For examining subjective randomness, people are asked to place a dot at a randomly selected position in an empty square or rectangular frame. Results show that persons are not capable of placing dots randomly. Rather, cumulating the dots across participants reveals a clear tendency for the dots to cluster near the center and the diagonals of the frame. Interestingly, it has also been shown that this structure is highly similar to aesthetically pleasing ones. In the present study, we conducted two experiments with a square and a rectangular frame, respectively. However, instead of asking participants to randomly place a dot in a frame just once, they were required to repeat the placement in an empty frame ten times in a row. As a result, the cumulated dots again clustered near the center and the diagonals. However, if the dots are accumulated across participants separately for each of the ten placements, then one sees a systematic sequence of patters. In the first frame, dots were placed in the left upper quadrant by most participants, whereas in the second frame dots were placed near the center. This suggests that, if a sequence of randomly placed dots is required, participants are planning a certain sequence of locations ahead, which is surprisingly similar across different persons.

Effects of Cueing on Processing Taboo and Neutral Words in L1 and L2

Anke Huckauf[1], Ina Koniakowsky & Tatjana A. Nazir
[1] *Ulm University, anke.huckauf@uni-ulm.de*

There is evidence that processing of affective content in the native language differs from a foreign language (e.g., Caldwell-Harris, 2014; Bowers & Pleydell-Pearce, 2011; Vives, Aparaci & Costa , 2018). These findings are typically observed for higher-level cognitive tasks such as decision-making. In the current study we investigated whether this phenomenon could extend to lower-level perceptual processes. Native Germans with solid background in English were requested to perform a 2AFCtask on words that were presented either below or above a fixation point. Stimuli consisted of five neutral and five swearwords, each in German (L1) and English (L2). The spatial task was to indicate whether the target occurred above or below fixation, the semantic task was to decide whether the target was a neutral or a swearword. In 50% of the trials, the spatial location of the target was cued 100ms prior to target onset. Reaction times revealed an advantage of L1 over L2 in the sematic but not in the spatial task. Moreover, in the semantic task, cuing accelerated reaction time to neutral words but not to swearwords. However, this cuing-effect did not vary with language. In the spatial task, cuing accelerated reaction time to all types of stimuli. Pupillometric data showed an overall effect of cuing in the semantic task, with greater dilations with cues. The data suggest that our paradigm does not capture any automatic language-dependent processing of affective content. Rather, language proficiency and valence affect performance depending on the task.

Validity of the 'posture first' hypothesis in cognitive-motor tasks may depend on cognitive task constraints

Nicole Hudl[1], Robert Stojan, Otmar Leo Bock & Claudia Voelcker-Rehage
[1] *Technische Universität Chemnitz, nicole.hudl@hsw.tu-chemnitz.de*

Walking and concurrently processing a cognitive task might negatively affect gait performance (Woollacott et al., 2002), measurable as higher step count and variability. Due to the age-related limitation of cognitive resources, higher task interference occurs. Thus, in older adults (OA), it has been suggested that the walking task is prioritized over the cognitive task (Task Prioritization Model, Yogev-Seligmann et al., 2010). However, task prioritization might depend on the constraints of the cognitive and motor task. We investigated 45 OA (65-79 years). Participants were asked to perform two cognitive-motor tasks under single (ST) and dual-task (DT) conditions; i.e. treadmill walking at a fixed speed of 1m/s and performing (1) a computer-paced Stroop task and (2) a self-paced counting backwards task (minus 3). Outcome variables were reaction time (RT), accuracy (ACC), and gait parameters (step count and variability). Preliminary results showed no DT-related cognitive performance changes in the Stroop task ($p > .05$), but in the self-paced counting backwards task (less answers; $p = .000$). In contrast, we found DT-related increase of steps while performing the Stroop task compared to walking only ($p = .000$). This was not the case while performing the counting backwards task. To conclude, results of the self-paced counting backwards DT support the typical motor task prioritization hypothesis, while this was not the case for the computer-paced Stroop task. This probably indicates that task constraints influence task priority under DT conditions.

The limitless mind: Structuralist and Gestalt-like representations of behavior

Lynn Huestegge[1], Iring Koch, Aleks Pieczykolan & Tim Raettig
[1] *Julius-Maximilians-University Würzburg, lynn.huestegge@uni-wuerzburg.de*

Compositional (structuralist) theories of behavior are ubiquitous in cognitive sciences, and they are also a prerequisite of interpreting key press studies in terms of a pars pro toto for the control of behavior in general. For example, dual-task theories typically assume that dual-task processing is composed of two combined single-task processing streams, plus some additional mechanisms to account for performance costs (e.g., prolongation/interruption of task processing stages, or altered activation/inhibition dynamics). Here, the compositional assumption is put to a test by having participants switch between single- and dual-action demands. In a set of experiments, we neither observed consistent partial repetition benefits nor costs. Instead, dual action demands appeared to be represented similar to a third, holistic action demand, unrelated to its two components. We interpret these observations by proposing a Gestalt view of action control. However, when the two actions no longer shared a common (spatial) dimension, partial repetition benefits emerged, indexing compositional action representation. The results highlight the role of dimensional overlap between actions as a precondition for forming holistic action representations. We propose that in daily life, multiple action control is usually co-ordinated by means of common dimensions and goals, so that Gestalt-like representations of action demands are likely the norm rather than the exception.

Constructing a test for assessing the ability to learn and recognize voices: A pre-study

Denise Humble[1], Stefan R. Schweinberger, Christian Dobel, Axel Mayer & Romi Zäske
[1] *Universitätsklinikum Jena, Friedrich-Schiller-Universität Jena, denise.humble@uni-jena.de*

Familiar voice recognition is an ability that routinely guides our daily communication and depends on the prior acquisition of speech-invariant long-term representations of initially unfamiliar voices. However, both voice learning abilities and familiar voice recognition abilities differ widely across listeners (Aglieri et al., 2017, Skuk et al. 2019). We aimed at constructing a standardized and time-efficient test to quantify voice memory abilities in an international research context that covers a broad ability spectrum. In an online and a laboratory-based experiment, participants first learned eight voice identities presented as short sentences of pseudo speech and then recognized these trained-to-be-familiar voice identities among two foils. At test, the difficulty of the recognition tasks was manipulated by the acoustic similarity of targets and foils (considering F0, formant dispersion and harmonics-to-noise-ratio) as well as by presentation duration. Recognition performance was significantly higher for longer presentation durations as well for voice identity triplets with a greater acoustic dissimilarity. The overall performance shows broad ranges from ACCmin = 0.26 to ACCmax = 0.69 (against a chance level of 0.33). Taken together, we present interim results of the construction of the final test and give an outlook on item-response-based item selection.

Investigating the grammatical SNARC effect for collective nouns

Fabian Hurler[1], Nikole Patson, Tessa Warren & Barbara Kaup
[1] *University of Tübingen, fabian.hurler@uni-tuebingen.de*

Prior research showed a grammatical spatial-numerical association of response codes (SNARC) effect when participants were asked to respond to singular and plural nouns. A different strand of research showed that participants in sentence completion tasks sometimes prefer to use plural verbs in conjunction with collective nouns, which are grammatically singular but denote a collection of multiple entities (e.g. cutlery). Building on these findings, we used the SNARC paradigm to investigate whether collective nouns are interpreted as conceptually singular or plural during on-line word reading. In two experiments, participants were asked to give left- and right-side responses to simple singulars, plurals and collectives in a quantity related semantic task (one vs. multiple entities?) or a verb agreement syntactic task ("is" vs. "are"?). Surprisingly, we only found grammatical SNARC effects for the more superficial syntactic task in Experiment 2, not for the deeper processing task in Experiment 1. Experiment 2 showed an interaction pattern for singulars and plurals as well as singulars and collectives with a relative left-side advantage for singulars and right-side advantage for plurals and collectives, thus indicating that reception of collective nouns automatically evokes plural quantity information, similar to grammatically plural nouns. The absence of relevant effects in Experiment 1 could be due to task ambiguity. In an effort to increase trust in the results of Experiment 2 and our interpretation thereof, we will run a replication of this study.

Selection Mechanisms in Perceptual Long-Term Memory

Fabian Hutmacher[1] & Christof Kuhbandner
[1] *Universität Regensburg, fabian.hutmacher@ur.de*

It has been a long-standing belief that perceptual long-term memory is rather limited regarding both the quantity and quality of stored memory representations. Interestingly, recent studies have demonstrated that storing information in perceptual long-term memory is an effortless and natural product of perception and that the stored memory representations are detailed and durable (Hutmacher & Kuhbandner, 2018; 2019). However, not all incoming information is stored equally well. So what are the selection mechanisms that determine which information is stored? One possible answer to this question is provided by the so-called 'attentional boost effect' (Swallow & Jiang, 2010; 2014), which claims that memory performance is enhanced for perceptual information processed at behaviorally relevant moments in time – not only for information that is important for executing an ongoing task, but also for concurrently perceived, unrelated information. However, to date, it has remained unclear what a behaviorally relevant moment in time actually is. It could be either the moment in which one perceives a stimulus or the moment in which one reacts to a stimulus, a distinction which has not been made in previous studies. By disentangling stimulus-logged and response-logged attentional boost effects, the data presented here allow for distinguishing between these two options. Implications for models of perceptual long-term memory are discussed.

On the (un)controllability of attitude formation: Recent evidence regarding the 'when' and 'how'

Mandy Hütter[1] & Steven Sweldens
[1] *Eberhard Karls Universität Tübingen, mandy.huetter@uni-tuebingen.de*

Recent research relying on a multinomial processing tree model that separates parameters representing controllable and uncontrollable learning demonstrates that both controllable and uncontrollable processes contribute to attitude acquisition in evaluative conditioning. The present research is concerned with two ways of exerting control and the conditions under which they occur. We distinguish between integrated and valence-plus-tag representations. Whereas valence-plus-tag representations store the CS-US pairing and a tag that indicates whether US valence should be applied or reversed, integrated representations store the US valence that results from applying the instructions. We conducted four experiments (total N = 447) to investigate the way in which participants exert control. We demonstrate that the encoding of integrated representations is more likely when participants receive validity information before the conditioning phase as compared to after. Moreover, integrated representations show a smaller decline over the course of 24 hours than valence-plus-tag representations. Moreover, valence-plus-tag representations are less stable than integrated representations so that the tag can become dissociated. Under such conditions, the uncontrollable parameter can be artificially inflated. Finally, we use both a control paradigm that instructs participants to exert control and a relational paradigm that provides information on the relationship between CS and US without control instructions. The current research thus sheds light on the representations formed when participants exert control, relates control paradigms to relational paradigms, and delineates the boundary conditions for the validity of the uncontrollable parameter as a parameter of uncontrollable attitude acquisition.

Differential associations between different forms of childhood maltreatment and facial emotion processing

Benjamin Iffland[1] & Frank Neuner
[1] *Universität Bielefeld, benjamin.iffland@uni-bielefeld.de*

Biased cognitive processing has been linked to experiences of child maltreatment. However, different types of maltreatment may bring about differences in emotion and attention processing. The present study aimed at detecting differential associations between various types of childhood maltreatment and attentional biases in facial emotion processing. A non-clinical sample was recruited and consisted of 67 individuals with varying degrees of maltreatment. In an evaluative conditioning task, images of faces with neutral emotional expressions were either associated with short videos of intense negative statements, or associated with neutral videos. Subsequently, these faces were used as stimuli in a face in the crowd recognition task in which the familiar faces had to be recognized within a crowd of unfamiliar neutral faces. In multiple linear regression analyses, differential associations between types of maltreatment and facial emotion processing were found. While emotional abuse was associated with faster detection of negatively associated faces, detection of negatively associated faces was decelerated in association with physical abuse. Emotional neglect, however, was associated with an impaired recognition of familiar stimuli regardless of the emotional content. Results indicated that interindividual differences in cognitive biases may be due to the activation of diverse cognitive schemas based on differential experiences of maltreatment.

Motor-cognitive cross-talk in nested tasks: The Multi-Lane Tracking Task

Francesca Incagli[1], Eric Grießbach, Rouwen Cañal-Bruland & Oliver Herbort
[1] *Julius Maximilians University of Würzburg, francesca.incagli@uni-wuerzburg.de*

In many daily situations, we have to plan, perform and control different aspects of a supposedly simple behavior. For instance, when walking down the sidewalk we coordinate our limbs and may simultaneously consider whether it is safe to cross the road. Despite the apparent ease, this multitasking situation is demanding because different tasks have to be planned and controlled simultaneously and because the two tasks are highly interdependent. This behavior is thought to be hierarchically organized, that is, a high-level cognitive process is implemented while a low-level motor process is controlled. The aim of the present study was to investigate cross-talk stemming from a continuously performed motor task on a superordinate decision task. To this end, a new paradigm – the Multi-Lane Tracking Task – is proposed. Participants were required to perform a tracking task (i.e. balancing the orientation of a bird running on one of three lanes) while implementing a left/right lane-switching decision to collect rewards and avoid obstacles. In the task, the cost of lane switches depended on the current bird orientation. The main result was that the lane-switching decisions were not only influenced by external rewards but also by the bird orientation at the time the lane-switching decision was made. This suggests that participants considered both the reward values and the motor costs associated with the specific action before implementing the decision.

Cross-modal assosiation in visual search task: Role of task-relevance and importance of acoustic stimuli

Orsolya Inhóf[1], Zsófia Dina Sümegi, Balázs Beda & Andras Zsido
[1] *University of Pecs, inhof.orsolya@gmail.com*

Acoustic information can affect faster detection of visual stimuli. This effect is measured less in more complex attention tasks, like in visual search. In this case the integration of modality can depend on the relationship of the stimuli (compared to the detection task, where task-irrelevant stimuli can also affect the visual attention). In this research we measured the change in visual processes caused by task-relevant and irrelevant and important and neutral stimulus with 59 participant. We use a drawn picture of a drum as target stimulus between other drawn objects, and the sound of a drum and a bell as acoustic stimuli. The source of the acoustic information and the target stimuli could be on the same or on the opposite side. We measured the effect of this congruency on reaction time. We also want to measure the effect of the importance of the stimuli. To one group of participants (30 people) we presented unimportant (PlayStation login) sound. Another group of participants (29 people) heard voices that were important to them (Facebook notification) during the task. These sounds were rarely presented and not connected to the target stimuli in meaning, so they were task irrelevant. Based on our results, in case of spatial congruence with the often presented stimulus, the target stimulus was found faster, regardless of its meaning. However participants could block the spatial information of task-irrelevant sounds, even the important ones.

Financial incentives enhance the efficiency of empathy-based decisions

Vassil Iotzov[1], Anne Saulin, Jochen Kaiser, Shihui Han & Grit Hein
[1] *Universitätsklinikum Würzburg, iotzov_v@ukw.de*

It is a controversial question whether financial incentives undermine intrinsic motivation. This question is yet hard to answer, as most previous studies have focused on incentive-related changes in behavior instead of incentive-related changes in the underlying motives. Combining drift-diffusion modeling and fMRI, we investigate how financial incentives affect one of the strongest prosocial motives, i.e, the empathy motive, and resulting empathy-based decisions. Our results show that financial incentives facilitate empathy-based decisions, tracked by changes of neural response in the anterior insula. Neural activity in that same region correlates with the individual strength of the empathy motive. These findings show that financial incentives enhance the efficiency of empathy-based decisions instead of undermining them.

Measuring Rule and Exemplar-Based Processes of Judgment in a Hierarchical Bayesian Framework

David Izydorczyk[1] & Arndt Bröder
[1] *Universität Mannheim, izydorczyk@uni-mannheim.de*

People can rely on two qualitatively different types of processes to make judgments and decisions: Rule-based processes and exemplar-based processes. Methods to measure the dominant process are often based on the assumption that individuals would only use one process at a time. As a consequence, data is aggregated across participants or they are classified as using either exemplar-based or rule-based processing according to the best fitting model. However, more recent research suggests that both kinds of processes might operate together or in parallel. Hence, Bröder and Colleagues (2017) proposed the measurement model RuleEx-J which combines both processing modes by quantifying their relative contributions in a numerical judgment task via an a parameter. Improving on the RuleEx-J model, we used a Bayesian approach which offers a principled foundation for statistical inference while simultaneously affording creative freedom and modelling flexibility. In a simulation study we tested different parameterizations of the RuleEx-J model, different priors and simulation conditions. First simulation results suggest that the Bayesian RuleEx-J model shows a good parameter recovery and provides less biased parameter estimates than the original version. The reanalysis of existing data as well as new data provided first evidence for parameter validity of the Bayesian model.

Central limitations contribute to the spatial interference effect in bimanual pointing

Markus Janczyk[1], Cosima Schneider, Moritz Durst & Constanze Hesse
[1] *University of Bremen, janczyk@uni-bremen.de*

In bimanual actions, programming parameters for one hand influences programming and executing movements with the other hand. A well-known observation in this regard are the longer response times (RTs) when both movements are incongruent (e.g., when they have different amplitudes) compared to when they are congruent (e.g., both have the same amplitude). This spatial interference effect may be attributed to central processes of translating the stimuli into according motor movements or, alternatively, to problems during motor execution of incongruent movements. Empirical evidence has been reported for both, central and motor contributions. We here report two experiments employing the effect propagation logic and the psychological refractory period approach to distinguish between both possible sources for this congruency effect. Task 1 was a bimanual pointing task, and Task 2 was a binary tone discrimination task with a vocal response. Stimuli in both tasks were separated by a stimulus onset asynchrony (SOA) of 50 or 1000 ms on each trial. First, a spatial interference effect was observed in Task 1. Second, the same (or even a larger) RT difference was observed in Task 2 (in particular with a short SOA). In other words, the spatial interference propagated into Task 2. This result does not support a motor source for the spatial interference effect, but is in line with the idea that the congruency effect is caused by limitations in central processing.

Relation between Parameters of the Parallel Constraint Satisfaction Network Model of Decision Making and Other Individual Differences

Marc Jekel[1], Tillmann Nett & Andreas Glöckner
[1] *Universität zu Köln, mjekel@uni-koeln.de*

The parallel constraint satisfaction model of decision making (PCS-DM) has been proposed as a formal model of probabilistic reasoning and decision making (Glöckner & Betsch, 2008; Glöckner, Hilbig, & Jekel, 2014). The model assumes that participants automatically weight and integrate all available pieces of information and partially distort information in the decision process for reaching maximally coherent interpretations of evidence for choice options. The model has two individual free parameters: sensitivity to differences in validities P and preference-consistency for options lambda. Based on participants' probabilistic inferences in an online study, we individually fitted the two parameters and tested in how far they relate to other personality constructs as predicted such as HEXACO, cognitive reflection, numeracy, risk aversion, and loss aversion.

Auditory streaming and short-term memory: Effects of talker variability on serial recall and auditory distraction

Abdullah Jelelati[1], Larissa Leist, Thomas Lachmann & Maria Klatte
[1] *TU Kaiserslautern, a.jelelati@sowi.uni-kl.de*

Immediate serial recall of visually presented verbal items is impaired by task-irrelevant background speech. According to the "changing-state"-account of this "irrelevant speech effect" (ISE), pre-attentive, obligatory processing of changing sound elements in a coherent speech stream results in cues to serial order, which then interfere with the deliberate rehearsal of the serial order of the list items. In the current experiment, we analyse whether the ISE is attenuated when the coherence of the irrelevant speech stream is reduced by different talkers. In part 2 of the experiment, we assess the talker variability effect in serial recall performance for spoken items, which has also been attributed to auditory streaming. We expect a significant correlation between talker variability effects in both paradigms, resulting from individual differences in pre-attentive auditory streaming. Results and implications for theoretical accounts of the ISE and the talker variability effect in serial recall are discussed.

Opening a file drawer – Surprisingly robust evidence for semantic interference from distractor pictures in picture naming

Jörg D. Jescheniak[1], Stefan Wöhner & Andreas Mädebach
[1] *Leipzig University, jdj@uni-leipzig.de*

Semantic context effects in picture naming tasks have been important in devising and evaluating models of word production. By now, there is strong evidence that semantic-categorically related distractor words slow the naming response more strongly than unrelated distractor words (e.g., "dog" vs. "bell", when the target picture shows a horse; picture-word interference task). In contrast, the literature suggests that, in the absence of additional specific features of the experimental procedure, this does not hold for distractor pictures (picture-picture interference task) and the seeming absence of a corresponding effect has been important in the theoretical debate. Over the years, we have been collecting data with the picture-picture interference task in various contexts, with different item sets and a large number of participants, partly as control experiments in which we did not expected semantic effects. However, these experiments revealed semantic interference from distractor pictures in a highly consistent way and we present this body of evidence here. Our experiments differed on a number of variables (e.g., spatial arrangement, visual similarity, stimulus realism of target and distractor, response set membership of the distractor), but neither of these factors appears sufficient to explain the emergence of semantic interference. These results are therefore in contrast to previous picture-picture interference studies which did not find reliable semantic interference. It is as yet not clear how to account for this discrepancy. However, our data suggest that the generality of semantic interference from distractor stimuli should be appreciated when evaluating word production models.

Time saving bias in resource management

Magne Joergensen[1]
[1] *Simula Metropolitan Center of Digital Engineering, magnej@simula.no*

This talk examines to what extent resource managers are able to give normatively correct decision in complex, but realistic, software development project scenarios. We described three scenarios where resource managers were asked to decide between actions affecting the productivity of a high or a low productivity team. The decision goal was either to minimise the total effort or the total duration of a software project. Ninety-nine software professionals, all of them with resource management experience, were randomly allocated one of the scenarios. The great majority of the resource managers perceived the scenarios as realistic and occurring in practice. Most of their decisions were, however, not the normatively correct ones. In particular, when the scenarios corresponded to those used to demonstrate the traditional time-saving bias (typically in a car driving context), the great majority of the managers made non-optimal decisions. Correct analyses of the resource management problems are complex, and we found that the resource managers instead made decisions in accordance with simpler, often incorrect, heuristics assuming that the team with the largest absolute or relative change in productivity will have the strongest impact on total effort and time.

Interference between cognitive control and balance control

Leif Johannsen[1], Andrea Kiesel & Iring Koch
[1] *RWTH Aachen University, Leif.Johannsen@psych.rwth-aachen.de*

Process interference or sharing of attentional resources between cognitive tasks and control of body balance during upright standing has been well documented. Attentional costs increase with greater balancing demands of a postural activity, for example in standing compared to sitting [Lajoie et al., 1993]. It seems, however, that the resolution of cognitive conflict, such as the Stroop effect, is facilitated by standing compared to sitting, despite the imposition of greater balancing demands [Rosenbaum et al., 2017]. In this study, we aimed to assess if a similar facilitation of cognitive conflict control by standing upright can be observed in the Simon task as well. In addition to the traditional outcome measures of the Simon task (response latency, accuracy), we evaluated the influence of the Simon effect on the time series of balance performance in an event-related strategy. Our results demonstrate the expected Simon effect influencing performance in the bimanual 2-CRT task. Standing showed more variable body sway with greater congruency effects in response latency compared to sitting (contradicting Rosenbaum et al., 2017). Surprisingly, increased response latency in both incongruent conditions coincided with reduced body sway. Assuming response conflict in the incongruent conditions requires inhibition of the incorrect response tendencies, our results may imply that cognitive inhibition spreads to the postural control system and leads to increased stiffness with reduced postural state exploration.

Using multiple process tracing measures to build and test cognitive models

Joseph Johnson[1] & Mary Frame
[1] *Miami University, johnsojg@miamioh.edu*

Process tracing measures provide a wealth of data, but are often underutilized. The most common practice--condensing process data into summary statistics which are compared across experimental conditions--sacrifices some of the high resolution by which such techniques are originally implemented. Here we will discuss how to get the most out of process data using cognitive models. Specifically, we will illustrate how multiple process tracing measures such as eye-tracking, mouse-tracking, verbal protocols, response times, and physiological measures can inform models of the cognitive processes underlying decision making. Many contemporary models are able to make predictions about different types of process data, but these still are typically performed on summary statistics such as the number of information acquisitions. Importantly, these models can also allow us to use process-tracing data at full resolution by specifying choice dynamics over the course of a trial. We will illustrate this approach using a sequential sampling model that directly relates information sampling to preference accumulation. Specifically, we will show how the entire sequence of information acquisition data can be used as an input to the model, which then generates predictions about preference accumulation that can be tested via mouse-tracking. Finally, we will introduce other possibilities and discuss the modeling advantages of this approach (e.g. fewer free parameters and assumptions).

Do Turn Warning Cues and Postural Stabilization Mitigate Passenger Motion Sickness While Reading?

Judith Josupeit[1] & Eike Schmidt
[1] *TU Dresden, judith.josupeit@tu-dresden.de*

Motion sickness of car passengers, also called carsickness, has a lifetime prevalence of 2/3. Especially, visual activities like reading can increase its occurrence. We tested whether an inflation of the lateral seat cushions could mitigate carsickness by providing information about the direction of upcoming turns and stabilizing the passenger while turning. Sixty-six participants took part in a 15-minute drive sitting on the passenger seat reading continuously instructed to not look outside. Carsickness was assessed via Simulator Sickness Questionnaire (SSQ) and Misery Scale (MISC). The inflation served two purposes: Before the turn as a directional cue and while turning as a stabilization. In the resulting 2x2 between-subjects design, either of the countermeasures could be active or not. There was a significant increase in carsickness over time. Descriptive statistics of the SSQ and the MISC showed tendencies of less carsickness for the countermeasure groups compared to the control group, but none of the values reached statistical significance. In the current configuration, neither of the countermeasures led to a large mitigating effect. The between-subject approach and the comparably small sample size, did not allow testing for small or medium effect sizes. Future studies should focus on inter-individual differences in carsickness susceptibility while optimizing timing and modality of the countermeasure. Further, allowing participants to look outside when being provided with a cue could increase the mitigation potential.

(No) bottom-up influences on voluntary task switching in different reward contexts

Vanessa Jurczyk[1], Kerstin Fröber & Gesine Dreisbach
[1] *Universität Regensburg, Vanessa.Jurczyk@psychologie.uni-regensburg.de*

In humans, voluntary task switching is susceptible to bottom-up influences like a switch of the relevant stimulus identity (Mayr & Bell, 2006). A recent study with ants (Czaczkes, Koch, Fröber & Dreisbach, 2018) has shown that even irrelevant cue changes increase switching behavior, but only if they were presented within a high-reward context. To investigate whether a reward context would also increase switching behavior in response to meaningless cue changes in humans, we conducted two voluntary task switching studies. On each trial, participants chose between two tasks preceded by one of two different color cues. Reward was manipulated between blocks (Experiment 1: no vs. high reward; Experiment 2: low vs. high reward). In both experiments, the cue change did not modulate the voluntary switch rate. However, the voluntary switch rate was significantly lower in high-reward blocks as compared to no-reward or low-reward blocks. This suggests that bottom-up influences on deliberate task switching in humans are indeed limited to task-relevant information. Moreover, the finding of a decreased voluntary switch rate within a high reward context further supports the claim that unchanged high reward promotes cognitive stability.

The validity of trait implicit self-esteem

Adrian Jusepeitis[1]
[1] *FSU Jena, adrian.jusepeitis@uni-jena.de*

Despite incoherent conceptualizations and findings many researchers still use the concept of implicit self-esteem (ISE) and associated measures as if their validity and usefulness were self-evident. Some studies demonstrated how relatively easy it is to manipulate measures of ISE, suggesting that ISE is a state-like attribute. However, it also has been shown that ISE is in fact partially predicted by remembered parenting behaviour, and displays a certain degree of temporal stability highlighting its rather trait-like nature. Aiming to reconcile these seemingly contradictory findings we decided to apply a latent state-trait approach to measures of ISE. We are conducting a longitudinal study measuring ISE with two different indicators (IAT, NLT) at four points in time (initial sample size N=120). Additionally, explicit trait and state self-esteem (ESE) are measured as well as relevant covariates of self-esteem (neuroticism, depression). Taking into account recent criticism of the IATs validity, we apply measurement models to extract more pure estimations of self-associations for the IAT. Thereby, we hope to shed light on the temporal dynamics of these associations and supposed confounders of the IAT effect. Finally, we investigate whether estimates of trait ISE extracted in this manner are able to predict self-esteem correlates over and above trait ESE.

Visual imagery of static and dynamic object categories

Zuzanna Kabulska[1], Tonghe Zhuang, Seth Levine, Caterina Pedersini & Angelika Lingnau
[1] *Regensburg University, zuzanna.kabulska@psychologie.uni-regensburg.de*

During visual imagery, mental images are driven by internal signals in the absence of external inputs. Here we asked how categorical information is modulated by task demands. To this aim, we measured participants' fMRI signal while they imagined static and dynamic animals and tools. We found that imagery and perception of tools in both tasks activate similar brain regions, involving superior parietal lobule (SPL) and lateral occipital cortex (LOC), but only ~23% of voxels overlapped between the two processes. Representational similarity analysis (RSA) furthermore demonstrated that the LOC captures information about object categories, irrespective of the task (static, dynamic). Additionally, RSA showed that information about imagined static objects is carried in the middle temporal gyrus, whereas information about imagined dynamic objects is spread across several brain regions. To examine the underlying functional connectivity, we used psychophysiological interaction (PPI) analysis. We found that the functional connectivity between animal-selective seeds and regions in the right ventral pathway was modulated by the difference between perception of animals and tools. Moreover, we found a decreased functional coupling between LOC and category-selective regions during visual imagery, and an increased coupling between SPL and the frontal cortex during static visual imagery. Our results highlight the differences between perception and visual imagery. Moreover, our results enhance our understanding of the neural basis of visual imagery, showing that imagined stimulus categories can be distinguished in the LOC based on patterns of activation, and that imagining dynamic objects engages a wider network than imagery of static objects.

The cognitive architecture of action representations

Zuzanna Kabulska[1] & Angelika Lingnau
[1] *Regensburg University, zuzanna.kabulska@psychologie.uni-regensburg.de*

Understanding other people's actions is essential for our survival – we need to be able to process others' goals and to behave accordingly. Although for most of us this ability comes with effortless ease, the underlying processes are far from being understood. In the current study, we aimed to examine (a) the representational space of actions in terms of features and categories, (b) the dimensions that underlie this structure, and (c) what makes some actions more similar to others. To address these questions, we used three rating studies as well as inverse multidimensional scaling in combination with hierarchical clustering. We found that the structure of actions can be divided into twelve general categories, for instance sport, daily routines or food-related actions. Moreover, we found that the feature-based structure underlying action representations can be mapped on eleven dimensions, such as involved body parts, change of location and contact with others. Additionally, we observed that the categorical structure of actions could be best explained by four out of the eleven dimensions: object-directedness, posture, pace and use of force. Results from these studies unveil the possible categorical and feature-based structures underlying action representation and additionally show what information is important to distinguish between different actions and to assign meaning to them.

Signal detection theory for multiple signals

Christian Kaernbach[1] & Joshua Lorenzen
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, office@kaernbach.de*

Signal detection theory (SDT) usually assumes a single axis on which observations take place, with observations to the right indicating a high probability of the signal being present and observations to the left indicating a low signal probability. Applied to memory research, "signal present" means the detection of a learned item (target), i.e., of a stimulus seen before. The classical single-axis model assumes a single type of observation, whatever the target. Usually, however, there are many possible targets. It is not evident that they all project to the same axis in the same manner. Moreover, participants are able to identify targets by telling their names. This cannot be modeled with classical SDT. A multi-axis model assumes as many axes as there are learned targets, with each axis corresponding to a specific target. High values on observation scale X would indicate a high probability of "target X present". Such a model can in addition to yes-no responses also predict naming performance. However, it differs significantly from the classical model. The "internal sensitivity" of this model differs from the experimental observable "effective sensitivity", with the latter decreasing as a function of the number of learned targets. The predictions of a multi-axis model are compared to experimental data presented last year (Kaernbach et. al, 2019). In contrast to the analysis of last year, the experimentally observed naming performance is much worse than predicted by the multi-axis model. Possible causes are discussed, and possible future experiments are suggested.

Probing anticipatory feature-based attention

Svantje Tabea Kähler[1], Thomas Jacobsen & Mike Wendt
[1] *Helmut-Schmidt-University/University of the Federal Armed Forces Hamburg, kaehler@hsu-hh.de*

The concept of feature-based attention refers to processes which facilitate responding to stimulus objects associated with a particular feature (e.g., color). We investigated the deployment of attention to the colors black and white by asking participants to identify the shape of an object presented in one of these colors (i.e., target color), while ignoring an adjacent object presented in the other color, and intermixed trials of a probe task. In the probe task, participants searched for predefined target letters which occurred randomly in either of the two colors. (In this task, stimulus color was irrelevant.) In Experiment 1, the target color of the shape task was varied between blocks of trials. Probe task performance was facilitated when the target letter of the probe task was presented in the target color of the current block's shape task. This result is consistent with both top-down deployment of feature-based attention and bottom-up priming from previous trials. In Experiment 2, the target color of the shape task varied randomly from trial to trial, and was indicated by a cue presented in advance of the imperative stimulus. Probe task trials occurred with the same probability after cues indicating black and white target color. By consequence, the cue was valid regarding the color of the target letter in the probe task in half of the trials and invalid in the other half. Responses were faster in validly cued probe task trials, suggesting anticipatory (top-down) deployment of attention to the cued color.

The influence of individual aptitudes and instructional scaffolds on knowledge revision and science inquiry learning

Keke Kaikhosroshvili[1], Nikita Banga, Katrina Bennett, Camilo Quiceno & Sarah Bichler
[1] *Ludwig-Maximilians-Universität München (LMU)*

Revision is an important step within the Knowledge Integration Framework which proposes that successful inquiry learning involves adding, sorting, integrating and revising ideas. Evidence suggests that learners' aptitudes influence how well they revise thereby resulting in improved learning outcomes. Since revision requires greater engagement from learners, those with high academic self-concept and mastery-oriented goals may revise better. However, learners do not tend to spontaneously revise; scaffolds - tailored to individuals' prior knowledge - are needed to guide this process. This study investigates firstly, the role of individual aptitudes of learners on revision. Secondly, it examines the effectiveness of constructive vs. example-based scaffolds to foster learner's revision and learning outcomes. Adult participants complete an online learning unit on climate change and engage with one of two scaffolds that support the revision of an explanation item. We hypothesize that learners with high academic self-concept and mastery-oriented goals will score higher in the revision task. It is expected that guidance, in the form of scaffolding, will be more likely to predict revision than individual aptitudes and that more successful revision will result in improved learning outcomes. High prior knowledge learners are predicted to revise better and have better learning outcomes following a constructive scaffold, while low prior knowledge learners will benefit more from an example-based scaffold. Moderation regression analysis will be run to test these hypotheses. Implications of this study will be important for designing robust instruction which promotes knowledge revision and improved learning outcomes for all learners.

Testing and modeling the role of sensory uncertainty in the perception of causality

Susan Kang[1], Martin Rolfs & Sven Ohl
[1] *Universität Osnabrück, susan.kang@uos.de*

An event consisting of a disk that moves straight towards another stationary disk, then stops whereas the second continues the former's motion in the same direction and speed is typically perceived as a causal launch—the vivid impression that the first disk physically caused the movement of the second disc. In the present study, we investigated the role of uncertainty in disk location for perceiving causality. In the experiment, we manipulated the overlap (in nine discrete steps) of the two disks at the point in time when the first disk stopped and second disk started to move. Moreover, we manipulated sensory uncertainty by increasing the retinal eccentricity of the event (either 0, 4, 8, or 12 degrees of visual angle). Both increasing overlap and eccentricity significantly decreased the proportion of perceived launching events. We compared a Bayesian model to several models that were based on parameters for the precision of the estimated disk location and a discrimination threshold (between a causal and non-causal percept). A heuristic model assuming a linear change of the precision parameter and the discrimination threshold with increasing eccentricity accounted best for the observed reports in our psychophysical task. In summary, increasing sensory uncertainty decreased the precision of position estimates at the time of contact. In addition, as uncertainty increased, observers accepted less overlap when reporting a launch. This heuristic outperformed a Bayesian model, suggesting the use of sub-optimal decision strategies in the perception of causality.

Working memory biases perception and decision making at different levels of abstraction

Zhiqi Kang[1], Thomas Christophel & Bernhard Spitzer
[1] Max Planck Institute for Human Development; Berlin School of Mind and Brain, Humboldt-Universität zu Berlin, kangzhiq@student.hu-berlin.de

Previous work has shown bidirectional interactions of Working Memory (WM) and perception, in that the contents of WM can alter what we perceive and vice versa. However, from a decision-theoretic perspective, subjective perceptual reports can be altered through at least two separate mechanisms (i) multiplicative modulations of perceptual sensitivity (that are expressed e.g., in the local slope of the psychometric function) and (ii) additive shifts of the response criterion (that are expressed e.g., in parallel displacement of the psychometric function). Here, using a novel spatiotemporal sampling paradigm and reverse correlation analysis of psychometric weight, we demonstrate both types of interaction and show that they are functionally dissociable. Concurrent WM content modulated local perceptual sensitivity, consistent with a low-level bias of visuospatial attention. However, this effect was ephemeral and dissipated quickly with perceptual task engagement. Independently, we observed a strong additive response bias that was lasting and bidirectional, indicating a locus of interference at a late decisional processing stage. Together, these findings indicate that WM and perception may interact at distinct stages of the cortical processing hierarchy and at different levels of abstraction, consistent with a dynamically distributed view of WM storage.

ERP correlates of Distractor-Induced Deafness

Eric Kasswan[1], Henry Ipczynski, Matti Gärtner & Lars Michael
[1] Medical School Berlin, eric.kasswan@student.medicalschool-berlin.de

In previous studies on the distractor-induced blindness paradigm, an inhibitory process of selective attention was found. This effect always occurred when distractors had the same visual characteristics as the following target, leading to a reduced detection rate. Niedeggen, Michael & Hesselmann (2012) showed that with increasing number of distractors a frontal negativity in the ERP increases. In the present study, a similar experimental setup is used with auditory stimuli as distractors and targets, with a visual cue indicating the target. Behavioral data show a comparable reduction of target detection in trials with distractors presented prior to the cue. ERP data show corresponding frontal negativity at 200 ms when the target was not detected and a P3 related to further target and cue processing. Auditory distractors seem to trigger an inhibitory process and lead to a deterioration of the detection rate of auditory targets, which is strikingly similar to the mechanisms assumed for visual stimuli in the distractor-induced blindness paradigm.

Effects of data visualization on subjective assessments and evaluation of climate data

Mariam Katsarava[1], Robert Gaschler & Helen Landmann
[1] *FernUniversität Hagen, mariam.katsarava@fernuni-hagen.de*

Research and research communication on climate change seems to be a domain where data visualization is especially prominent. In the present studies, we are exploring the effect of different forms of data visualization on subjective assessments of data content and evaluation of trends. Seemingly arbitrary design choices might influence emotional and cognitive processing. In Study 1, we follow up on recent work suggesting that edgy shapes are associated with negative valence. Accordingly, we have participants evaluate graphs showing climate change data while varying whether data points are marked by triangles or other shapes. We expect that participants will rate the climate data presented with triangles as more threatening. Study 2 explores the impact of the form of data presentation (graphs versus tables) on the evaluation of trends in climate data. Past studies indicate that data comprehension is better in graphs, compared to tables. However, it remains unclear whether the advantage of graphs occurs at the expanse of subjective certainty with which the data trend is assessed. We expect that this advantage will enlarge even more in labelled graphs compared to a baseline group evaluating the same graphs without labelling. Both studies are conducted as online-experiments as part of research-oriented teaching with data collection finishing in December 2019.

The so-called other-"race" effect in face memory: A question of appearance

Jürgen M. Kaufmann[1], Stefan R. Schweinberger & Madeleine Frister
[1] *Friedrich-Schiller-Universität Jena, Germany, juergen.kaufmann@uni-jena.de*

While other-"race" (OR) faces and caricatures of same-"race" (SR) faces evoke similar ERP patterns, behavioural effects differ (advantage for SR caricatures, disadvantage for OR faces). These paradoxical findings might be explained by qualitatively similar processes at learning, which have different consequences for recognition: Norm deviations are used for forming basic face representations. In caricatures, distinctive information is idiosyncratic and helpful, but for OR faces, salient deviations are misleading, as they are unidirectional relative to the norm. In three experiments, we simulated an OR effect with highly distinctive same-"race" faces: In each experiment, one characteristic in SR faces was manipulated, always in a uniform direction (E1: big noses, E2: freckled skin, E3: distinctive blue eyes), resulting in deceptive distinctiveness. In a learning/recognition task, we compared performance and ERPs for these faces to veridical SR and OR faces. We found strikingly similar ERPs for OR and manipulated SR faces, accompanied by comparable costs in performance, in contrast to veridical same-"race" faces, supporting a perceptual account of the OR effect. This suggests qualitatively similar processes mediating the learning of unfamiliar SR and OR faces, but with different consequences due to differences in the usefulness of respective distinctive information. Deceptive distinctiveness can explain the phenomenon that is it harder to learn faces of people who look systematically different from what we are used to. This phenomenon is not specific to (the questionable concept of) other "races", and is related to deviations from an observer´s mental norm in physical appearance instead.

Emotion and cognition influence multisensory integration

Julian Keil[1], Georgios Michail, Michael Niedeggen, Daniel Senkowski & Christian Kaernbach
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, keil@psychologie.uni-kiel.de*

We receive information about our environment through multiple sensory modalities. For example, we evaluate the threat of approaching thunder and lightning, by integrating auditory and visual information. How cognitive and emotional processes affect this integration is under debate. In five experiments, we assessed multisensory integration using the sound-induced flash illusion (SIFI), in which two auditory beeps presented simultaneously with one visual flash can induce the illusion of two flashes. We used orthogonal tasks to modulate cognitive and emotional processes to examine their influence therein. In the first experiment, we found that increased cognitive load induced by an n-back task enhances the susceptibility to the SIFI. In the second experiment we replicated this effect while recording EEG. The analysis of neural oscillations indicated that the interaction between cognitive load and perception is reflected in frontal theta and beta band power. In the third experiment, we used a visual cueing paradigm and show that visual cues prior to the presentation of SIFI stimuli can enhance the illusion rate, possibly due to increased perceptual load. In the fourth and fifth experiment, we used emotional pictures and sounds to examine the influence of emotional processes on the SIFI. In both experiments, we show that emotional stimuli presented prior to the onset of the SIFI can reduce the illusion rate, possibly due to increased arousal. Taken together, our experiments highlight the role of cognitive and emotional processes in perception and advance our understanding of the state-dependency of multisensory integration.

Exploring TVA-based assessment as a diagnostic tool within the context of a typical neurology ward

Alexander Kessner[1], Otto W. Witte & Peter Bublak
[1] *University Hospital Jena | WG Neuropsychology, Alexander.kessner@med.uni-jena.de*

The Theory of Visual Attention (TVA) is a formalised mathematical theory which enables the estimation of performance parameters reflecting individual attentional abilities. Clinical TVA-based studies, hitherto, have mainly focused on selective groups of patients suffering from specific diseases. Here, we aimed to evaluate the usability of TVA-based whole (WR) and partial report (PR) paradigms as a diagnostic tool within a clinical-neurological routine context. Within a 3-month period, we tested 20 unselected patients and 20 healthy control subjects matched for age, sex, and education. They were recruited from the Department of Neurology at the University Hospital, Jena, Germany. Whole and partial report of brief letter arrays were used to assess TVA-based parameter estimates of attentional capacity and attentional weighting. Patients also received comprehensive neuropsychological testing in the domains of executive function, attention, working and episodic memory, language, and visuospatial functions. Patients and healthy control subjects differed significantly with respect to visual short term memory storage capacity and the visual threshold. Relationships between TVA-based parameter estimates and results obtained in the different neuropsychological domains were analysed. Also, specific patterns of TVA-based parameter estimates were identified in different diagnostic entities (e.g. Parkinson's disease) which provide starting points for future research.

Estimating individual theta frequency as a predictor of working-memory capacity

Patrick Khader[1] & Kerstin Jost
[1] *Medizinische Hochschule Brandenburg, Patrick.khader@mhb-fontane.de*

The capacity of visual working memory (vWM) is limited to 3 to 4 items. Theta oscillations have been discussed as a major neurophysiological determinant of this limitation: There is evidence that cycles of gamma oscillations, which are assumed to represent the items held in vWM, become nested within theta cycles. Consequently, theta frequency determines how many gamma cycles can be nested - the lower the theta frequency, the more gamma cycles. Thus, individual theta frequency may be the factor behind age-related and individual differences in WM, rendering it a potential marker for WM in numerous fields of applications. However, individual theta frequency cannot be determined easily in power spectra, because, unlike alpha, theta does not have a pronounced peak. We, therefore followed a different approach utilizing the finding that theta increases with increasing task demands, whereas alpha decreases. The crossing of two power spectra from more vs. less demanding tasks, the transition frequency (TF), can thus be taken as a proxy for individual theta frequency. In an exploratory study, we measured individual alpha peak frequency (IAF) and TF in periods of eyes closed, eye open, and continuous mental calculation as well as behavioral and ERP markers of WM performance in a change detection task. We found only a weak correlation between IAF and TF and no correlation with WM capacity, which might be due to the fact that the power spectra not always crossed, yielding no TF. This methodological challenge should be addressed in future studies.

Are green and red related to truth and falsity? An investigation of colour-validity associations with a stroop-task

Alina Kias[1], Lena Nadarevic & Nikoletta Symeonidou
[1] *University of Mannheim, akias@mail.uni-mannheim.de*

In spite of the common use of green and red as signals for truth and falsity in everyday life (e.g., in quizzes or exam marking), the possible link between these colours and concepts lacks systematic investigation. For this reason, we used a stroop-task to test the hypothesized associations between green and truth as well as red and falsity. Words semantically related to truth and falsity appeared in red, green or grey on the computer screen. The participants' task was to categorize each word based on its semantic meaning (i.e., true or false) and to do so as fast and accurately as possible. The results yielded strong evidence for the predicted associations: Reaction times primarily revealed facilitation effects in the form of faster categorization of truth-related words presented in green than in the other colours while falsity-related words were categorized faster when presented in red. In contrast, error rates mainly showed interference by incongruent colours (e.g., truth-related words presented in red). To our knowledge, this is the first time that automatic associations between green and truth as well as red and falsity have been demonstrated by means of an implicit measure.

Assessing subjective prime awareness on a trial-by-trial basis interferes with masked semantic priming effects

Markus Kiefer[1] & Marcel Harpaintner
[1] *Ulm University, markus.kiefer@uni-ulm.de*

Priming in a lexical decision task elicited by briefly presented masked words is frequently considered as an index of unconscious automatic semantic processing. In order to confirm that the masked prime is unconsciously processed, an explicit psychophysical prime identification test is typically administered after the priming experiment. Recently, it is has been criticized that this classical sequential approach to assess prime identification after the main experiment does not capture trial-wise fluctuations of prime awareness within the priming phase. Based on this criticism, a trial-by-trial prime awareness rating using the Perceptual Awareness Scale (Ramsøy & Overgaard, 2004) within the priming experiment has been introduced. However, it is possible that ratings of the perceptual experience related to the masked prime interferes with concurrent semantic prime processing. The present study therefore compared masked semantic priming effects assessed within the classical sequential procedure, in which prime identification is assessed after the priming experiment, with those obtained in a condition, in which prime awareness is rated trial-wise within the priming experiment. Analysis of mean reaction times as well as drift diffusion modelling showed that priming effects were significantly smaller in the condition with trial-wise awareness ratings compared to the condition without such ratings. This shows that assessing subjective perceptual experience on a trial-by-trial basis is not a neutral tool to assess fluctuations of prime awareness. Instead, the rating procedure heavily interferes with semantic processes underlying masked priming, presumably due to attentional demands associated with concurrent prime identification.

Automated Detection and Monitoring of Pain: A video-based approach

Lisa Kiel, Sonja Dana Roelen[1], Jarek Krajewski & Sebastian Schnieder
[1] *Institut für Experimentelle Psychophysiologie, s.roelen@ixp-duesseldorf.de*

To this date, self-reports are the gold standard for pain assessment in medical settings. However, self-report, is not a viable option for everyone (e.g. children or speech-impaired patient groups), as only insufficient insights into the person's everyday condition outside of treatment sessions are obtainable. Our aim is to support practitioners during their treatments and to enable continuous monitoring of the therapy progress in a telemedical setting. The objective of this study is to develop and design a measuring environment to objectively and automatically assess and classify different levels of pain. To this end, video-recordings of participants are produced during the intermitted administration of varying levels of pain stimuli in a laboratory setting. Using a video-based approach we extracted micro-expressions and head-movement indicators in a sample of N = 50 participants exposed to five pre-defined heat pain stimuli, administered by means of a Peltier-based contact thermode. In addition to independent observer ratings, continuous self-ratings of perceived pain-levels are captured using a slider-based monitoring system operated by the participants. Subsequently, the inference of pain intensity is based on a multidimensional feature vector, representing a combination of parameters extracted from various measured modalities, expressional features and state of the art classification algorithms. This video-based approach can prospectively be integrated into a multimodal platform for automatic and unobtrusive pain detection which can be utilised in physiotherapy and other medical contexts to enhance treatment success.

Context-specific control depending on posture

Andrea Kiesel[1], Markus Spitzer, Michael Stumpf & David Dignath
[1] *University of Freiburg, kiesel@psychologie.uni-freiburg.de*

Cognitive control processes can be modulated by body postures and movements of our body. For example, Koch, Holland & van Knippenberg (2008) demonstrated that approach and avoidance cues impact on performance in conflict (Stroop) tasks and in task switching settings indicating improved cognitive control for avoidance rather than approach cues. Here we investigated whether such associations between body postures/movements and cognitive control settings can be learned. We associated neutral body postures/movements to the left or right with specific cognitive control requirements. To manipulate control requirements, we used the context-specific proportion congruency (CSPC, Crump & Milliken, 2009) effect. In each trial, participants first moved their upper body to the left or right and then performed a Flanker task. Depending on whether a participant moved to the left or right, the proportion of Flanker-congruent or Flanker-incongruent trials varied. On context repetitions, we observed that the Flanker effect was smaller for the body posture/movement related to mostly incongruent compared to mostly congruent trials. This CSPC effect indicates that body postures/movements can serve as contextual cues for cognitive control settings and that this relation is learned in the course of the experiment. We thus conjecture that mechanism of "embodied cognition" can be changed by training/experience rather fast.

Same same, but different: Comparing insights from eye- and mouse-tracking during exemplar categorization

Pascal J. Kieslich[1] & Rima-Maria Rahal
[1] *University of Mannheim, kieslich@psychologie.uni-mannheim.de*

Eye- and mouse-tracking are tools used to elucidate cognitive processes in a variety of circumstances. Yet, little attention has been devoted to the question of how the processes they describe compare. We used a classic mouse-tracking paradigm in which participants assign typical and atypical exemplars to one of two categories by clicking on the corresponding button. In this paradigm, we implemented eye- and mouse-tracking simultaneously, in an effort to systematically address similarities and differences in assumptions, prerequisites and possible conclusions. In a first step, we investigated how different eye- and mouse-tracking measures for decision conflict and decision effort are interrelated. Next, we replicated the classic typicality effect on mouse trajectory curvature (i.e., greater curvature towards the distractor category for atypical than for typical exemplars), and demonstrated that it can also be found in eye-tracking measures that are assumed to capture decision conflict. In addition, we assessed how closely mouse and eye behavior are temporally related, finding overall that eye movements precede mouse movements. However, this lag differed between individuals and different types of trials. Lastly, we investigated how specific mouse and eye movement patterns relate to each other and if there are instances where uninformative movement patterns in one method might be complemented through measures obtained from the other method. We conclude by discussing the commonalities and unique advantages of both methods.

Will prior semantic category learning affect later attentional deployment?

Geun Hyun Kim[1], Yunyun Mu & Anna Schubö
[1] *Philipps-Universität Marburg, gh.kim@uni-marburg.de*

Categorization is an effective way of helping people sort things and understand the world by semantic networks. We investigated the role semantic category learning plays in later attention capture and the effect of categories' familiarity and typicality. We used behavioral measures and EEG markers of attention. In Exp.1, we examined two participant groups: One had to distinguish between leaves, the other distinguished between fruits in the learning task. In the search task, both groups reported the orientation of a target with fruits or leaves appearing as irrelevant distractors. Results showed an attention bias toward the category formerly relevant in learning, however, this effect was not significant for the fruit group. We concluded that previously learned categories can bias attention more than unlearned ones, but the familiarity and typicality of the objects also matters. In Exp.2, we tested the familiarity and typicality of fruits, vegetables, tools and vehicles. The results showed that fruits were rated more familiar and more typical than other categories, which was in accordance with the results of Exp.1. We concluded that previously learned categories attract attention in subsequent tasks, and that the degree of the distraction is contingent on the familiarity and typicality of categories.

The detrimental impact of punishment on conflict adaptation in a clinical population characterized by heightened punishment sensitivity and "too much" cognitive control

Joseph A. King[1], Senne Braem, Julius Steding, Laura-Sophie Diekmann & Ehrlich Stefan
[1] *TU Dresden, joseph.king@ukdd.de*

Background: Previous research in healthy participants showed that conflict control adjustments (congruency sequence effects) following performance-contingent punishment in a flanker task are dependent on trait punishment sensitivity [as gauged by the Behavioural Inhibition System (BIS) scale]. Here we employed this task in a clinical population characterized by heightened punishment sensitivity and cognitive overcontrol - anorexia nervosa (AN) – and age-matched healthy controls (HC). Methods: To distinguish between state and trait factors, potential group differences in flanker congruency (sequence) effects following punishment were tested in separate cohorts of acutely underweight patients (acAN; n = 40 per group) and weight-recovered former patients (recAN; n = 25). Participants performed 576 trials of a 4-choice flanker task in which a punishment signal was randomly presented ("-1", denoting the loss of a point) on 25% of the trials if performance was not fast and accurate. Results: As in previous clinical studies in AN, both patient groups had abnormally elevated BIS values. While corroborating the finding of greater congruency sequence effects following punishment in HC in the employed task, noteworthy group differences were observed in both samples. First, despite generally elevated accuracy in the acAN group, congruency sequence effects were reversed in patients' error rates following punishment. Second, flanker congruency effects in reaction times were larger following punishment in recAN. Conclusion: These findings underline the notion that punishment sensitivity may be a trait marker in AN and provide experimental evidence that punishment has a detrimental impact on adaptive control in the disorder.

Correlates of motion sickness in event-related potentials and pupil diameter

Lukas Kirst[1], Benjamin Ernst & Marco Steinhauser
[1] *Catholic University of Eichstätt-Ingolstadt, lukas.kirst@ku.de*

Most accounts explain motion sickness (MS) as a symptom of conflict between sensory input and the mental model of body movement. The visual oddball P3 and the habituation of auditory event-related potentials provide a measure of the ability of the brain to predict sensory input, and preliminary findings point to an association with MS, specifically drowsiness symptoms and heightened arousal. In the present study, participants were confronted with an MS-inducing condition (roller coaster) or a control condition (straight drive) in a virtual reality environment. Before and after the virtual reality exposure, the participants completed an MS questionnaire and were presented with an auditory paired click paradigm and a visual oddball paradigm. In the condition with high MS, susceptible participants showed reduced habituation to the repetitive auditory stimulation, as measured by auditory evoked potentials in the paired click paradigm. MS was furthermore associated with changes in pupil diameter. Auditory evoked potentials and oddball P3 also predicted MS susceptibility. Our results demonstrate that MS is linked to arousal and altered processing of predictable sensory inputs.

Social context both biases and enhances memory for emotional words - Behavioral and ERP evidence

Johanna Kißler[1], Ria Vormbrock & Sebastian Schindler
[1] *Bielefeld University, johanna.kissler@uni-bielefeld.de*

Two EEG experiments are presented investigating processing of and subsequent memory for positive, negative and neutral trait adjectives presented under different task conditions. In experiment 1, participants were presented with adjectives as supposed personality feedback following a self-introduction (condition A) or as stimuli for explicit learning (condition B). One week later, they were asked back into the laboratory and received a surprise recognition memory test. In experiment 2, a new sample was presented with the same stimuli as in experiment 1, but for judgement of self-descriptiveness (condition A) or concreteness (condition B). Again, a surprise recognition memory test occurred one week later. Overall, discrimination accuracy was best when words were presented as supposed personality feedback following a socially relevant situation (experiment 1 - condition A). This held both in comparison to the explicit learning condition in experiment 1 and both conditions in experiment 2. Moreover, particularly in experiment 1, memory was biased towards positive words. Event-related potentials (ERPs) recorded during the encoding session of experiment 1 revealed a larger late positive potential (LPP: 400-700 ms) for words presented as personality feedback (condition A), the effect being largest for positive feedback. In experiment 2, the LPP was larger during self-descriptiveness judgement (condition A) than in the concreteness judgement (condition B) with no difference between contents. Together, the data reveal how social relevance modulates perception of and memory for emotional stimuli at distinct processing stages attesting to the tight relationship of emotional and social processes in humans.

Learning from insight: Age differences in schema-coherent long-term memory formation

Jasmin Kizilirmak[1], Larissa Fischer, Justus Krause & Björn Schott
[1] *Deutsches Zentrum für Neurodegenerative Erkrankungen, jasmin.kizilirmak@dzne.de*

In old age (>60 years), episodic long-term memory (LTM) formation becomes increasingly impaired due to age-related healthy and sometimes pathological atrophy of the medial temporal lobe, especially the hippocampus. On the other hand, recent evidence from neuroimaging and lesion studies suggests that learning novel information coherent with prior knowledge can tremendously reduce or even circumvent the role of the hippocampus in LTM formation via means of the medial prefrontal cortex (mPFC) inhibiting the hippocampus' novelty response. We could show repeatedly that a special kind of learning, that is, when a semantic association is very suddenly comprehended (via insight or Aha!), learning is hippocampus-independent and instead relies more on midline structures such as the mPFC and precuneus. Here, we present a behavioral study on learning from insight that compared memory performance for learning from insight, using a German version of the Compound Remote Associate Task. We compared performance on insight problem solving and later memory performance for young adults between the age of 18 and 30 years (n = 30) with adults age 60 to 80 (n = 30). Based on this work, we aim to develop learning strategies that employ learning from insight to help compensate age-related decline of episodic LTM formation.

Manipulating uncertainty: Evaluating multisensory integration models of temporal binding

Annika Klaffehn[1], Roland Pfister & Wilfried Kunde
[1] *Julius Maximilians University of Würzburg, annika.klaffehn@uni-wuerzburg.de*

Actions and their effects are perceived temporally shifted toward each other compared to the same events in isolation. While this phenomenon of temporal binding was initially discussed as a perceptual bias that is unique for intentional actions, similar observations have now also been made in other event chains. What brings about this effect, however, cannot yet be clearly pinpointed. In this study, we consider the temporal binding paradigm with respect to multisensory cue integration by manipulating temporal certainty of actions and their effects. We discuss the results in light of the "principle of inverse effectiveness" in multisensory cue integration which suggests that the perceived timing of less certain events is pulled strongly towards related and temporally certain events while temporally certain events are relatively unaffected by uncertain events.

A Formal Examination of Privileged Social Categories

Samuel Klein[1] & Jeffrey Sherman
[1] *University of California, Davis, sawklein@ucdavis.edu*

A longstanding question among developmental, evolutionary, and social psychologists is whether some social categories are privileged in our impressions of others (Fiske & Neuberg, 1990; Kinzler, Schutts, & Corell, 2010). Historically, this literature has supported race, gender, and age as examples of privileged social categories. However, there is less consensus on the relative position of these three social categories. Using process dissociation (PD), we propose to measure the relative extents to which race, gender, and age influence judgements of others. In a series of studies examining this question, participants will be instructed to categorize a set of target faces on a single category (e.g., race categorization). Between participants, the relevant category on which they are instructed to judge targets will vary. For example, in one condition, participants will be instructed to make race categorizations on faces that vary in both race and gender, making gender the irrelevant category information. Using facial morphing techniques, we are including a variable for category salience to test how accessible these categories need to be to influence judgements. For example, it may be that one category dominates another, but only when fully salient and accessible. The PD model will allow us to independently estimate the extent to which the relevant and irrelevant category information influence final judgements. We hope this work will provide an account of how privileged social categories interact to influence judgements of others.

Age effects on metaperception: Linking individual differences in cognitive control and perception

Lena Klever[1], Jutta Billino & Pascal Mamassian
[1] *Justus-Liebig-Universität Gießen, Lena.Klever@psychol.uni-giessen.de*

Perceptual decisions are usually accompanied by a subjective sense of (un)certainty. The metaperceptual ability to access this uncertainty and to judge the validity of one's perceptual decisions is known as perceptual confidence. In younger adults, better perceptual performance is typically linked to greater confidence in being correct. Aging, however, might challenge perceptual confidence judgments as noise in the sensory systems increases and cognitive control resources decrease. Using a confidence-forced choice paradigm, we explored age effects on visual confidence in a group of younger (19 – 38 years) and older adults (60 – 78 years). On each trial, participants performed two contrast discrimination judgments and indicated afterwards during which contrast judgment they felt more confident. We then determined discrimination thresholds for trials in which perceptual judgments were chosen as confident and in which they were declined as confident. Our findings indicate that both younger and older adults can reliably track their own uncertainty as perceptual performance was linked to confidence judgments in both age groups. On average, however, metaperceptual performance was reduced in older compared to younger adults. Interestingly, though, we observed great variability in metaperceptual performance – especially in the older adult group. These individual differences in metaperceptual performance were closely linked to cognitive control capacities. Hence, our findings suggest that cognitive control capacities might be a crucial resource for performing metaperceptual tasks. In an ongoing study, we further explore the link between cognitive control capacities and perceptual confidence judgments across different modalities.

The processes underlying interference-induced and delay-induced forgetting in younger and older adults

Oliver Kliegl[1] & Karl-Heinz T. Bäuml
[1] *Universität Regensburg, oliver.kliegl@ur.de*

Two of the most prominent causes of episodic forgetting may be interference-induced and delay-induced forgetting. While interference-induced forgetting refers to the finding that retrieval of some target material can suffer when additional information has been encoded before retrieval, delay-induced forgetting denotes the observation that retrieval is typically impaired when the delay between study and retrieval is prolonged. We compared the effects of interference-induced and delay-induced forgetting on recall totals and response latencies of younger and older adults. Subjects studied a list of target items that they recalled after short delay (control condition) or prolonged delay (delay condition); in a third condition, study of further nontarget items preceded encoding of the target items (interference condition). Relative to the control condition, recall totals decreased and response latencies increased in the interference condition, and both effects were larger in older than younger adults. In contrast, both recall totals and response latencies were reduced in the delay relative to the control condition, and the effects were similar in size across age levels. The latency results indicate that induced coactivation of nontarget items caused the forgetting in the interference condition, whereas unsuccessful sampling of target items caused the forgetting in the delay condition.

How to quarrel better: mediation improves conflict resolution in romantic couples

Olga Klimecki[1]
[1] *University of Geneva, olga.klimecki@unige.ch*

To date, the extent to which neural activity related to romantic love is affected by couple conflict is unknown. Furthermore, there is still a scarcity of studies on interventions that can promote conflict resolution in romantic couples. To fill these gaps, we conducted two randomized controlled studies (Study 1 N = 74; Study 2 N = 72). In both studies, romantic couples discussed a topic of recurrent disagreement with or without a mediator. Romantic couples in the mediated condition reported more agreements and higher satisfaction compared to the non-mediated condition. Functional magnetic resonance imaging data show that seeing the romantic partner was related to activations in striatum, insula, and precuneus prior to the conflict. However, these activations decreased after the conflict. Nonetheless, couples in the mediated condition had higher post-conflict activations the nucleus accumbens – a key region for reward – than couples in the non-mediated condition.

The Quiet Eye and Response-Selection Demands. Inhibition of Potential Action Alternatives

André Klostermann[1]
[1] *University of Osnabrück, Institute of Sport and Movement Science, anklosterman@uos.de*

It is incontestable that high motor performance requires an optimal coupling between perception and action. In sports as well as in professional tasks, the Quiet Eye (QE) – defined as the final fixation before movement initiation – has been found to explain a considerable amount of variance in motor performance and expertise. In the current series of studies, the underlying mechanism of this perception-action variable was further investigated by testing predictions of the inhibition hypothesis which ascribes the QE's functionality to shielding processes over movement parametrization. By manipulating inhibition demands during response selection and movement control in a far-aiming task which required to throw balls as accurate as possible at virtual target disks, in two Experiments (N = 26) it was found that – in line with the predictions – QE duration increased with increasing inhibition demands (Exp 1: ηp2 = .43; Exp 2: ηp2 = .34). This effect was mainly driven by the similarity rather than the number of possible action alternatives. Moreover, the relation between inhibition demands and QE duration were sustained through both response selection and movement control, which is perfectly in line with the notion of a continuous perception-action cycle in motor behavior.

Does altered subcortical emotional salience processing and a 'jumping to conclusions' bias lead to psychotic symptoms in Parkinson's patients?

Franziska Knolle[1]
[1] *Technische Universität München, franziska.knolle@tum.de*

Current research does not provide a clear explanation for why some patients with Parkinson's Disease (PD) develop psychotic symptoms. In schizophrenia research, the 'aberrant salience hypothesis' of psychosis has been influential in explaining the development of psychotic symptoms, proposing that dopaminergic dysregulation leads to inappropriate attribution of salience/attention to otherwise irrelevant stimuli, facilitating the formation of hallucinations and delusions. However, this theory has received limited attention in the context of PD-psychosis. We investigated salience processing in 14 PD-patients with psychotic symptoms, 23 PD-patients without psychotic symptoms and 19 healthy controls. All patients received dopaminergic medication. We examined emotional salience using a visual-oddball fMRI-paradigm that has been used to investigate early stages of psychosis. Furthermore, a subgroup of all participants completed a behavioural 'jumping to conclusions' task. We found significant differences in brain responses to emotional salience between the patient groups. PD-patients with psychotic symptoms revealed enhanced brain responses in the striatum, the hippocampus and the amygdala compared to patients without psychotic symptoms. PD-patients with psychotic symptoms showed significant correlations between the levels of dopaminergic drugs and BOLD signalling, as well as psychotic symptom scores. Furthermore, our data provide first indications for dysfunctional top-down processes, measured in a 'jumping to conclusions' bias. Our study suggests that enhanced signalling in the striatum, hippocampus and amygdala together with deficient top-down regulations is associated with the development of psychotic symptoms in PD, similarly to that proposed in the 'aberrant salience hypothesis' of psychosis in schizophrenia.

Isolating persisting task inhibition in a prime-probe task-switching paradigm

Iring Koch[1], Chiara Koch & Stefanie Schuch
[1] *RWTH Aachen University, koch@psych.rwth-aachen.de*

The ability to switch flexibly between tasks is a core component of cognitive control functions. It is a well-received idea in the study of task switching that this switching is facilitated by inhibition of competing task representations ("task sets"). Task-set inhibition is often examined using the n-2 task repetition paradigm, in which participants switch between three different tasks (e.g., task A, B, and C). Inhibition can then be assessed by comparing performance of n-2 task repetitions (e.g., ABA) and n-2 switches (CBA), and impaired performance in n-2 task repetitions is taken as indication of persisting inhibition. Note, however, that this comparison is usually derived from continuous sequences of tasks using a "sliding window" analysis, in which each trial functions both as prime and probe at the same time, depending on the position of the analysis window. To separate the prime and probe function, we designed a novel paradigm using sequences of three explicitly cued tasks. Our analysis focused only on the last trial, which included either a multivalent target (i.e., containing distractor features that were associated with responses in the competing tasks) or a univalent target. We observed n-2 repetition costs in this paradigm, but only for multivalent targets (i.e., with distractor interference). These data suggest that at least a part of task inhibition is reactively retrieved based on prime-probe similarity, whereas a pure persisting-inhibition account would predict inhibition of task set independent of distractor interference in the probe trial.

Differences both in affective and semantic contents explain the representation of occupational labels

Ferenc Kocsor[1]
[1] *Institute of Psychology, University of Pecs, kocsorferenc@gmail.com*

Studies on person perception showed that stereotypes can be activated by presenting labels associated to particular groups. However, it is not clear whether these semantic information activate stereotypes directly, or via an indirect cognitive pathway leading through brain regions responsible for affective responses. To disentangle the effects of semantic and affective content, first we scrutinized whether the representation of occupational labels is independent of the emotions they evoke. Participants (n=70) were asked to complete two tasks. In the first task they had to arrange 20 labels, randomly chosen from an item pool of 60 labels representing occupations, on a two-dimensional surface along the two axes. Participants were free to use any considerations for the arrangement along the axes which they thought makes a proper differentiation among the labels. With this spatial arrangement method, based on the coordinates of the labels, the relative semantic distance between the occupations were calculated. In the second task the axes' names were defined a priori. Subjects were asked to arrange the labels according to valence and arousal, which referred to the extent to which the words evoked pleasant or unpleasant feelings, and excitement or calmness, respectively. The relative difference between the coordinates gave the affective distances between each of the labels. Based on the semantic and affective distances, two separate cluster analyses were carried out. The comparison of the two cluster structures revealed significant overlap, suggesting that semantic representation of occupations largely relies on the affective content evoked by the presentation of the labels.

Effects of motor proficiency for unipolar depression and healthy people

Dirk Koester[1], Caroline Schwarzer, Wanja Brüchle, Thomas Schack, Udo Schneider & Karin Rosenkranz

[1] BSP Business School Berlin, dirk.koester@businessschool-berlin.de

The present work investigated the role of motor proficiency depressed patients. Physical activity has been suggested to entail changes in brain structure (e.g., increased hippocampyl volume) and improvements in cognitive functions (e.g., Kandola et al., 2016). Specifically, physical activity was found to ease some symptoms of depression (e.g., Balchin et al., 2016). Here, we asked whether healthy people differ from patients with unipolar depression in terms of their motor coordinative abilities? Thirty patients and 30 normal/healthy people participated in a motor proficiency test (based on Tittlbach et al. 2005 & Wydra, 1992)and their sum scores were compared. Motor proficiency was better in healthy people than in patients. The difference between the healthy group and the patients was significant ($t58 = 3.917$; $p < .05$). This effect was maintained when splitting the groups for sex (male: $t32 = 2.954$; $p < .05$ & female: $t28 = 2.962$; $p < .05$). Participants with no signs of depression showed a better performance in motor proficiency than patients with unipolar depression. This effect seems to be independent of age and sex (at least in the tested age range, adults). The results form the basis for future potential use in the investigation of therapeutic methods. Future steps will include an intervention programme for the patient group (together with a balance control group). The results may provide insights into the basic relation between physical activity and affective states during disorders and in normal/healty people.

Binding Time: Exploring the integration of visual stimulus duration into event files

Katrin Köllnberger[1], Johanna Bogon & Gesine Dreisbach

[1] Universität Regensburg, katrin.koellnberger@psychologie.uni-regensburg.de

The environment consists of a myriad of perceptual and (or) action features. Perceiving and reacting to them creates so-called event files via feature binding. This study intended to investigate, if the duration of visual stimuli is also integrated into such event files. Experiment 1 used a simple color classification task (yellow vs. green). Participants had to respond with a right or left keypress. All stimuli (colored circles) were presented either short (20 ms) or long (300 ms). We expected partial repetition costs (as an indicator of binding). That means performance should be better when both color and duration repeat or switch relative to partial repetitions (only color or duration repeats). Results showed no partial repetition costs indicating no integration of duration into visual event files. In Experiment 2, we investigated whether duration is integrated into event files, when the duration of a visual object has more daily life relevance. Again, participants had to respond to yellow and green circles, but this time the colored circles were presented as part of a traffic light. As a control, participants had to react to green and yellow circles that were arranged vertically. This revealed partial repetition costs in both, the traffic light- and the control-condition. Ongoing research is conducted to determine the boundary conditions for integration of duration into visual event files.

Multitasking might involve costs but also benefits – effects of resource competition on performance outcomes of individual processing styles

Valentin Koob[1], Jovita Brüning & Dietrich Manzey
[1] *Universität Bremen, koob@uni-bremen.de*

Studies on individual differences in multitasking revealed that people either adopt a serial or an overlapping processing mode when faced with multiple task demands. However, in line with the notion that multitasking causes costs, these studies seemed to indicate that none of the processing modes is beneficial in terms of higher dual-task performance compared to single-task performance. Here, we challenged this view by examining whether a facilitation of overlapping processing in terms of lowered task similarity improves the efficiency of this type of processing mode and consequently also increases its prevalence. For this purpose, individuals were tested with tasks differing in the degree to which they compete for the same versus different processing resources in the task-switching with preview paradigm (TSWP). In our ongoing data collection, we test n=48 participants and identify their preferred processing modes with the TSWP paradigm under two conditions of varying between-task resource competition. One condition comprised tasks that rely on spatial processing code only, whereas the other contained tasks reflecting a mixture of spatial and verbal processing code. So far, results do not indicate a significant adaption to the degree of resource competition in the individual processing modes. However, participants using an overlapping processing mode outperform those using a serial one. Moreover, individuals preferring an overlapping processing mode even achieve dual-tasking benefits relative to their single-task performance in the condition of low resource competition. These results highlight the importance of individual differences and task similarity when predicting multitasking performance.

The importance of distinguishing between evaluation and motivation in development and application of implicit measures

Nicolas Koranyi[1], Klaus Rothermund & Laura Anne Grigutsch
[1] *Friedrich Schiller University Jena, nicolas.koranyi@uni-jena.de*

Different lines of research suggest that motivation ("wanting") and evaluation ("liking") reflect separate systems of behavior regulation. Further, it has been speculated that the selective dysregulation of one but not the other system underlies clinical disorders like addiction, impulse control disorders, depression, and schizophrenia. However, the distinction between "wanting" and "liking" has not yet been adequately acknowledged in the development and application of implicit measures. This means that in most cases we do not know whether a measure properly captures "wanting", "liking", or both. It is argued that well-designed validation studies have to be carried out to address this question systematically. Finally, we provide empirical evidence that a separate assessment of "wanting" and "liking" is possible with two qualitatively different versions of the Implicit Association Test (IAT).

Attentional filtering and value modulation as mediators of self-control

Franziska Korb[1], Johanna Kruse, Uta Wolfensteller & Thomas Goschke
[1] *TU Dresden, franziska.korb@tu-dresden.de*

The aim of our research is to elucidate mechanisms underlying volitional self-control, i.e. the ability to resist temptation and inhibit impulsive responses in favor of long-term goals. We propose that attentional filtering and value modulation serve as two sub-mechanisms by which anticipated future outcomes may promote self-control. We conducted a series of mouse-tracking experiments to specifically examine the dynamics of attentional filtering. One key finding was the apparent lack of self-control in samples of healthy young adults, unless subjects were prompted to think of the long-term consequences. Although participants then displayed more "self-control", their behavior reversed again when they were not asked to attend to long-term consequences. These results raise the questions whether (a) permanent reminders of long-term implications are essential for self-controlled behavior and (b) which processes seemingly impulsive choices are based on. To tackle the sub-mechanism of value modulation, we applied inhibitory 1 Hz rTMS over the left dorsolateral prefrontal cortex (dlPFC) before a decision task. The dlPFC is thought to modulate value representations in the ventromedian PFC through anticipation of long-term consequences. The task comprised everyday-life conflict situations, in which subjects either had to resist a temptation or endure an aversion. Results indicated that, regardless of conflict type, subjects are generally hesitant to agree to an action in our control stimulation condition. In contrast, participants were less likely to resist a temptation when dlPFC function was perturbed, i.e. they displayed less self-control.

Vaccination as a social contract

Lars Korn[1], Robert Böhm, Nicolas W. Meier & Cornelia Betsch
[1] *University of Erfurt, Lars.Korn@uni-erfurt.de*

Most vaccines protect both the vaccinated individual and the society at large by reducing the transmission of infectious diseases. In order to eliminate infectious diseases, individuals need to consider social welfare beyond mere self-interest — regardless of ethnic, religious, or national group borders. It has therefore been proposed that vaccination poses a social contract in which individuals are morally obliged to get vaccinated. However, little is known about whether individuals indeed act upon this social contract. If so, vaccinated individuals should show positive reciprocity toward other vaccinated individuals and negative reciprocity toward non-vaccinated individuals. Moreover, a social contract should be universally valid, i.e., reciprocity should occur irrespective of context factors, such as others' group membership. The present studies investigated reciprocal prosociality toward vaccinated and non-vaccinated others as a behavioral indicator for seeing vaccination as a social contract. Three pre-registered experiments tested the reciprocity hypothesis and its universality, investigating how a person's own vaccination behavior, others' vaccination behavior, and others' group membership influenced a person's prosociality toward the respective others. The pattern of results revealed by an internal meta-analysis (N = 1,032) suggests that especially those who get vaccinated, and therefore comply with the social contract, show negative reciprocity toward non-vaccinated individuals. Moreover, reciprocal prosociality was independent of others' group membership, suggesting a universal moral principle. Emphasizing that vaccination constitutes a social contract could be a promising intervention to increase vaccine uptake, prevent free riding, and, eventually, eliminate infectious diseases.

Attention Capture by Gaze and Emotion – First in Time, First in Line?

Roxana Kotter[1] & Anne Böckler
[1] *Julius Maximilians University of Würzburg, roxana.kotter@uni-wuerzburg.de*

Direct gaze and emotional expression both constitute powerful social signals that capture attention. Previous theories postulate attention capture for direct gaze in approach-oriented emotions (e.g., angry, happy) and averted gaze benefits in avoidance-oriented emotions (e.g., fearful, disgusted). However, it remains unclear how humans integrate these social signals, especially, if a temporal benefit of one cue leads to an attention-capture advantage pertaining to the social signal. Our studies therefore investigated the temporal modulation of gaze and emotional expression. Participants identified a target letter on one of four faces. We manipulated gaze direction (direct and averted gaze) and emotional expression (neutral, angry, fearful, happy, and disgusted) with a) between-subject constant emotional expressions (temporal antecedence of emotion condition; Study I) as well as b) within-subject shifting of expressions from neutral to emotional (concurrent gaze and emotion conditions; Study II). When emotions had temporal benefit, direct gaze captured attention; an effect that was further modulated by emotion (Study I). When emotional expressions shifted (Study II), direct gaze seemed to capture attention in approach-oriented expressions while averted gaze facilitates target identification in avoidance-oriented expressions. Overall, gaze and emotion information in faces can be integrated both sequentially and simultaneously. The integration of gaze and emotion in holistic faces seems to underlie adaptive social interaction in humans.

Boosting emotional facial expressivity: Transcutaneous vagus nerve stimulation (tVNS) enhances facial mimicry

Julia Kozlik[1], Rico Fischer, Maria Maraver & Lorenza Colzato
[1] *University of Greifswald, julia.kozlik@uni-greifswald.de*

Since Darwin the vagus nerve has been proposed as an essential anatomical foundation enabling optimal social interactions. Specifically, vagal activity is assumed to be causally related to facial expressivity. Although repeatedly proposed supporting empirical evidence is exclusively correlative in nature. Here we aimed at directly testing the proposed causal link between vagal activity and facial expressivity as indexed by facial mimicry. For this, we employed transcutaneous vagus nerve stimulation (tVNS) as a non-invasive neuromodulation technique. Specifically, we manipulated vagal activity by superficially stimulating the cymba conchae ¬– a vagally innervated region of the external ear. In two sessions, participants received active or sham stimulation before and during performing a facial mimicry task including electromyographic recordings. We observed a typical facial mimicry effect which, importantly, was more pronounced in the active as compared to the sham condition. Thus, our study is the first to demonstrate a causal role of vagal activity in facial expressivity which expands existing knowledge about the neuroanatomical regulation of facial mimicry and highlights the role of vagal activity for optimal socio-emotional functioning.

Trait Anxiety as a Marker of Aberrant Precision Weighing in Perceptual Decision Making

Nils Kraus[1] & Guido Hesselmann
[1] *Psychologische Hochschule Berlin, n.kraus@phb.de*

Introduction: Predictive coding accounts of human brain functioning conceive anxiety as the tendency to change the reliance on either priors or sensory data in Bayesian belief updating in order to reduce uncertainty. Therefore, with higher levels of sensory uncertainty, trait anxiety scores should correspond to the degree of influence that priors have in perceptual decision making tasks. Methods:Participants (N=60, further 60 intended) with varying degrees of trait anxiety had to judge the global motion direction of random dot kinematograms. The precision of sensory evidence was varied through the amount of coherently moving dots. Prior expectancies were induced by arrow cues indicating motion direction. A generalized linear mixed-effects analysis was conducted to calculate the impact of sensory evidence, prior expectancies and trait anxiety as well as possible interactions on accuracy rates. Results:Preliminary data analysis shows an interaction effect of predictive cues, the degree of motion coherence and trait anxiety on accuracy rates in a motion perception task. The influence of priors on decision making is elevated in high trait anxious individuals. This effect is especially pronounced in conditions where sensory evidence is reduced and therefore overall perceptual uncertainty is high. Discussion: The preliminary results speak for a possible link of trait anxiety and reliance on priors in perceptual decision making. In a next step, we will investigate whether the influence of priors is globally enhanced in high trait anxious individuals or whether the observed effect is indicative of a general tendency to overcompensate for low precision in one informational domain.

Differences in event-related potentials indicate differential use of mental rotation processes in parity judgements of humanoid and alphanumeric stimuli

Daniel Krause[1], Benjamin Richert & Matthias Weigelt
[1] *Paderborn University, daniel.krause@uni-paderborn.de*

The Rotation-Related-Negativity (RRN), an ERP component emerging 300-600 ms after stimulus onset at parietal electrodes (Provost et al., 2013), increases with higher requirements of mental rotation. In the experiment, stimulus sets of human figures (backview; left/ right arm abduction) and alphanumeric characters („R“; normal/ mirrored) were used. Participants (n = 26; 21.77 years, SD = 1.95) had to judge parity between an upright (0°-orientation) and a comparison stimulus (stimulus disparity; 0°, 45°, 90°, 135° or 180°). There was a significant main effect of orientation for the behavioral (reaction time), $F = 72.69$, $p < .001$, $eta^2p = .74$, as well as for the neural data (RRN), $F = 32.97$, $p < .001$, $eta^2p = .57$. The interaction with stimulus type was not significant for the reaction time, $F = 0.67$, $p = .511$, $eta^2p = .03$, but for the RRN, $F = 3.26$, $p = .031$, $eta^2p = .12$. Lower RRN-amplitudes for parity-judgment of letters indicate a more pronounced use of alternative processes (e.g., memory retrieval) other than mental rotation to identify letters as being normal or mirrored. Future studies might clarify if the assumed differential use of memory retrieval also explains that the correlation between RRN-amplitude and the slope of the reaction time as a function of disparity is only evident for the stimulus set of letters, but not for bodies.

A late valence-dependent fronto-central component in the event-related potential of augmented feedback processing predicts behavioral adjustments in practicing a motor task

Daniel Krause[1], Laura Faßbender, Timo Koers & Lisa Maurer
[1] *Paderborn University, daniel.krause@uni-paderborn.de*

We examined how the valence of augmented feedback influences motor learning, more specifically immediate adaptive behavior after feedback. For that purpose, event-related potentials (ERPs) in the EEG were scrutinized in learning a complex arm-movement sequence and the predictive value of different ERPs was analyzed for trial-to-trial behavioral adjustments during practice. Twenty-four healthy subjects (13 female; 22.1 years; SD ±3.4) practiced one session with 192 feedback trials according to an adaptive bandwidth feedback approach with a high informational level of feedback information (i.e., direction and magnitude of errors). The bandwidth for successful performance (increase of a score for a monetary competition) was adaptively manipulated in terms of the current performance level to obtain a balanced feedback rate regarding positive and negative valence. This allowed a variation of feedback-valence without a confounding by success rate (and hence outcome expectations). Consistent with our hypotheses, the EEG data showed a valence effect for the feedback-related negativity (FRN) and a later fronto-central component (Late-Fronto-Central-Positivity; LFCP) at the FCz electrode as well as for the P300 at the Pz electrode. Behavioral adjustments were larger after feedback with negative valence and they were predicted by the LFCP, but not by the FRN or the P300. The data supports the assumption that learning in contexts with availability of high level of feedback information relies more on processes associated to supervised learning (reflected by the LFCP) than on reinforcement learning (reflected by the FRN).

Who knew?! The impact of simple intervention methods on debiasing the anchoring heuristic

Kristina Krause[1], Gunter Busch, Annika Kaufmann, Lisa Spindler, Clara Stosch & Franziska Bocklisch
[1] *Technische Universität Chemnitz, kristina.krause@psychologie.tu-chemnitz.de*

Using the anchoring heuristic can lead to errors in judgements under uncertainty. People commonly anchor on available information. These so-called self-generated or experimenter-provided anchors are processed intuitively, quickly and automatically, often leading to judgmental biases towards the anchor value. In order to counteract this anchoring effect, we focus on the dual processing model, which distinguishes between two different internal decision systems, supporting either quick, unconscious (system 1) or slow, elaborated decisions (system 2). A reduction of the anchoring effect was expected by encouraging people to consider system 2 and thus taking into account more detailed information. Therefore we tested the efficacy of two simple interventions, e.g. prospective hindsight vs. writing down one´s range, both inducing deeper elaboration of given information. The experiment has been carried out using an online survey, created on the basis of a 2×2×2 mixed-design. A total of 123 participants (mainly students of Chemnitz University of Technology) took part in the study. The results show that both interventions were not able to reduce the anchoring effect. We discuss potential reasons for that and propose other variables to be considered in following studies before the interventions should be declared ineffective.

Perspective determines the way you interpret pointing gestures

Lisa-Marie Krause[1] & Oliver Herbort
[1] *Julius Maximilians University of Würzburg, lisa-marie.krause@uni-wuerzburg.de*

Though ubiquitous in human communication, pointing is often misunderstood. Here, we examined how the observer's perspective affects pointer-observer misunderstandings. We hypothesize that observers rely on different visual cues when interpreting distal pointing gestures from different viewpoints. That is, observers extrapolate the pointing arm when seeing it from the side but use the pointer's index finger position in their visual fields when assuming viewpoints close to the pointer. Hence, small changes in the observers' head positions should have a negligible effect on interpretations in the former case but a relatively large effect in the latter case. We tested this hypothesis in a virtual reality and a real word experiment, in which participants estimated the location on a screen at which a pointer was pointing. We manipulated the observer's viewpoint, view height, and the pointed-at region. As expected, small modifications in the observer view height resulted affected judgements considerably when standing behind the pointer but not when seeing the pointer from the side. This pattern could be found in the real world and VR setting. In conclusion, the data suggests that observers base interpretations on the index finger position in the visual field when sharing the pointer perspective but extrapolate the pointing arm when seeing the pointer from the side.

Smiling helps! Effects of positive emotional expression on the perception of facial asymmetry

Helene Kreysa[1], Julia Festini, Christian Dobel, Stefan R. Schweinberger & Gerd Fabian Volk
[1] *Friedrich Schiller University, Jena, Germany, helene.kreysa@uni-jena.de*

Facial palsy is a relatively common affliction, resulting in temporary loss of movement in half the face. Patients complain that communicative partners are disturbed by their asymmetric looks, which can increase social stigma and depression risk (Dobel et al., 2013), especially if patients do not recover completely (approx. 30%). We investigated the validity of this perception by assessing the willingness of healthy participants to interact with patients depicted during acute palsy and again after complete recovery. In addition, we tested the effect of smiling in these faces with and without facial palsy, compared to a neutral expression. The facial movement required for a smile increases the asymmetry of patients' faces and could appear particularly disturbing. On the other hand, smiling faces are usually rated as more attractive and approachable than neutral faces. Study 1 was an eyetracking study, in which student participants rated smiling and neutral faces of patients with acute facial palsy and after recovery, indicating the extent to which they would like to interact with the depicted person. Studies 2a and 2b looked at the same behaviour in teenagers aged 10 and 17, who might be less prone to socially desirable response patterns. In all cases, healthy faces were rated more positively than faces affected by facial palsy. Importantly however, smiling substantially reduced the negative effect of the palsy. These findings suggest opportunities for counselling patients, but also add to more general ideas on how person perception combines a variety of facial cues into a distinct percept.

How does the voice affect the perception of a face? A comparison across age-groups

Helene Kreysa[1], Yasin Alkiz, Marieke Jahneke, Elena Lorenz, Paulina Michal & Chiara Spielmann
[1] *Friedrich Schiller University, Jena, Germany, helene.kreysa@uni-jena.de*

Faces and voices both affect how an individual is perceived by interlocutors. In addition, both modalities carry information about the individual's age. In two experiments, we combined photos of middle-aged faces (ca. 40-50 years of age; Ebner et al. 2010) with voices (Zäske et al., 2019) that were either substantially younger or substantially older than the faces (approx.. 20 vs. > 65 years old). Participants were asked to rate each person for trustworthiness, attractiveness, and dominance, and, in a final block, to guess the person's age. The difference between Experiment 1 and 2 was the age of the participants: Experiment 1 tested 27 students (M = 22 years old); Experiment 2 tested 29 senior citizens (M = 75 years). The students rated faces combined with younger voices as more attractive than the same faces combined with older voices; for senior raters, voice age did not affect attractiveness ratings. For dominance ratings, the pattern reversed: Students experienced faces combined with older voices as more dominant, senior raters found faces with younger voices more dominant. Trustworthiness ratings were not affected by voice age or participant age. Age guesses tended to be close to the actual age of the face. Interestingly, despite age differences of roughly 20 years between faces and voices, only very few (primarily female) face-voice pairings were experienced as strange or mismatching. In summary, these experiments contribute to recent efforts to tease apart differential contributions of faces and voices to first impression formation (Mileva et al., 2018).

Is the Survival Processing Effect resource dependent?

Michael Kriechbaumer[1], Meike Kroneisen, Edgar Erdfelder & Siri-Maria Kamp
[1] *Universität Koblenz-Landau, Campus Landau, kriechbaumer@uni-landau.de*

Words that are rated in terms of their relevance for a hypothetical survival scenario tend to be remembered better than words processed in a scenario unrelated to survival. While evolutionary psychology considers this a clear example of adaptive memory, there is an ongoing debate about potential mechanisms that enable the positive effect survival processing has on memory. Recent research could not consistently identify whether the effect diminishes in conditions of high cognitive load. In further attempts to investigate the nature of resource dependency, we conducted three experiments, varying both the scenario in which words were processed (survival vs. non-survival) and the time each word was presented during encoding (5 seconds vs. 2 seconds). Assuming survival processing to be resource dependent, we predicted the reduction or even the disappearance of the survival processing benefit in the conditions with reduced presentation time. However, there was no consistent evidence for or against resource dependency across the experiments. We suggest and discuss further, more in-depth research concerning the influence of encoding time on the amount of the effect.

TVA to the rescue? What should a theory of visual attention, visual working memory and foraging contain?

Arni Kristjansson[1]
[1] *University of Iceland, ak@hi.is*

Theoretical accounts of attention that have been dominant over the last close-to 50 years have trouble explaining recent results from studies on visual foraging tasks, where observers have to select many targets of different types among distractors within a single trial. For example, the results suggest that theories with simple fixed capacity limits may be too restrictive. Participant's strategies may reflect a more complex interaction between capacity and task demands. Secondly, typical response time patterns from visual search tasks, that have been used to inspire prominent theories of visual attention, are only seen for the last target within a foraging trial. These selections are also much slower than the majority of other selections within trials. Thirdly targets that are distinguishable from distractors by a single color should pop out in a feature map, according to standard theories, but clearly they do not. Fourth, selection times are often comparable for feature and conjunction foraging which contradicts standard theories of attention, while patterns of the order of target selection differs strongly between those conditions. I will discuss what sort of additions and modifications should to made to theoretical accounts of attention, and whether current theories should be modified or whether we should even „start from scratch" by building a new theory of visual attention to account for the results. I will also speculate whether the flexibility of the theory of visual attention (TVA) may make it uniquely suited to account for performance patterns in foraging studies.

The influence of mood on old new recognition and source memory for happy and sad faces

Meike Kroneisen[1]
[1] *University of Mannheim, kroneisen@uni-landau.de*

Facial identification is important because it informs us regarding how to react to an approaching person, who might be friend or foe. In social situations, the emotional expressions of faces are important and very salient aspects of nonverbal communication. Previous work has shown that the facial expression (happy or angry) influences the memory of this face in a later recognition test. It is possible that positive expressions facilitate facial processing, therefore, more cognitive re-sources are available to process facial identity. Research on mood dependent memory shows that the likelihood of recalling something is higher when encoding and retrieval moods match than when they mismatch. We wanted to examine whether memory for positive and negative faces is influenced by the emotional state of the participant. Results indicate that old-new discrimination but not source memory is affected by whether a face was presented with a positive or a negative expression, independently of the emotional state the person was in.

TVA in the wild - Using the TOJ-TVA paradigm in games and virtual reality

Alexander Krueger[1], Jan Tünnermann, Lukas Stratmann & Ingrid Scharlau
[1] *Paderborn University, alexander.krueger@uni-paderborn.de*

As a formal theory, Bundesen's theory of visual attention (TVA) allows the precise estimation of several theoretically meaningful parameters involved in visual selection and recognition. As of yet, TVA has almost exclusively been used in restricted empirical scenarios such as whole and partial report and with strictly controlled stimulus material. We present a series of experiments in which we test whether the advantages of TVA can be exploited in more realistic scenarios with varying degree of stimulus control, for instance with photographs of different scenes, in a driving simulator with computer games, or with brief experimental sessions conducted on a mobile device . Besides answering the question whether TVA is helpful to study attention in the wild, our focus is on possible trade-offs between factors such as motivating tasks, length of experiment, and number of participants.

The influence of saccade programming on the duration estimation of peripheral stimuli

Alina Krug[1], Peter Veto & Anke Huckauf
[1] *Ulm University, alina.krug@uni-ulm.de*

Previous studies on the influence of retinal location on duration estimation showed heterogenous results: Some studies showed an underestimation of stimulus duration with increasing eccentricity (Kliegl & Huckauf, 2014). However, in other studies, perceived duration did not differ between eccentricities (Cheng, 2014). Although in previous studies, it is argued that saccadic eye movements cannot have caused the effects, there were no controls for saccades. The present study aimed at investigating the influence of saccade programming on the duration estimation of peripheral stimuli. Using a temporal bisection task observers had to classify comparison stimuli of 13.3-213.3 ms presented on the horizontal meridian at 3° or 9° eccentricity as 'short' or 'long'. A 600 ms cue with a SOA of 0, 200, or 400 ms was presented prior to the comparison stimulus to elicit saccade programming and an exogenous covert attentional shift. An eye tracker controlled saccadic eye movements. In trials without saccades, there was no significant difference between 3° and 9° eccentricity, even in the 0 ms SOA condition not replicating the effect of duration underestimation with increasing eccentricity. These findings raise the question of whether saccades accounted for the reported eccentricity effects in duration estimation. A possible explanation are differences between study designs. There was no significant difference between eccentricities in the 200 and 400 ms SOA condition, therefore demonstrating the influence of saccade programming. However, it cannot be ruled out that the length of the SOA was considered during duration estimation and lead to the obtained results.

Self-control is linked to interoceptive inference: Craving regulation and the prediction of aversive interoceptive states induced with inspiratory breathing load

Johann Kruschwitz[1], Henrik Walter, Anne Kausch, Martin Paulus & Thomas Goschke
[1] *Charité - Universitätsmedizin Berlin, johann.kruschwitz@charite.de*

The interoceptive inference framework suggests that our brain continuously anticipates future states of our body and aims to avoid events that might counteract homeostasis by minimizing prediction errors through active inference; e.g. appropriate actions. If predicted interoceptive models are inaccurate, behavior inconsistent with our long-term homeostatic goals may result; e.g. in failures in self-control. Using a within-subject design including an inspiratory breathing-load task to examine the prediction of aversive interoceptive perturbation and a craving-regulation for palatable foods task, we examined the relationship between self-control and aversive interoceptive predictive models. Those individuals who were more accurate in predicting their interoceptive state with respect to anticipated versus experienced dyspnea were significantly more effective in the down-regulation of craving using negative future-thinking strategies. These individuals also scored higher on a measure of trait self-control. In a subsequent fMRI study, these behavioral findings were successfully replicated. On a neural level, the anterior insula (AI) and presupplementary motor area (preSMA), recruited in both tasks, partly accounted for these effects: levels of AI activation during the interoceptive anticipation were associated with self-controlled behavior in the craving-task, whereas levels of interoceptive prediction during the breathing task were conversely associated with activation in preSMA during the down-regulation of craving, whose anticipatory activity was correlated with self-control success. These findings highlight that AI and preSMA may create processing advantages in self-control situations referring to the prediction of future internal states.

The forward effect of testing across the adulthood: Testing the episodic context account

Veit Kubik[1] & Torsten Schubert
[1] *Fernuniversität in Hagen & Martin-Luther-Universität Halle-Wittenberg, veit.kubik@psych.uni-halle.de*

Retrieval practice is more effective than restudy practice to potentiate subsequent learning of new information. Here, we examined this forward effect of testing (FET) across adulthood and to test predictions of the episodic context account. Due to the latter, retrieval practice, relative to restudy practice, invites subjects to reinstate the prior context of the initial study, which should help to reduce proactive interference. 108 younger adults (18–39 years) and 108 older adults (55–85 years) studied three separate, new lists of words in expectation to freely recall them in a final cumulative recall test. During the initial study phase of Lists 1–3, subjects were presented with two separate sublists (of Lists 1–3). Then, they were instructed to either recall or restudy each list. Importantly, we let a third group indicate the sublist, which the items occurred in originally. Thus, subjects needed to think back to and reinstate the original temporal context. After the study phase of List 3, all groups were instructed to selectively recall List 3. For both age groups, retrieval practice led to greater List-3-recall performance and fewer prior-list intrusions than restudy practice and temporal discrimination. Critically, practicing temporal discrimination let older adults, but not younger adults, recall more items than restudy practice and also produce less intrusions from prior lists independent of age. Together, these findings suggest that retrieval practice is a robust learning strategy of new information and that the FET (in older adults) can be partly explained via the episodic context account.

Spatial abilities contribute to monitoring temporal deadlines in children: Testing the spatio-temporal hypothesis in multitasking

Veit Kubik[1], Christian Ritter, Alain Chavaillaz & Andrea Frick
[1] *Fernuniversität in Hagen & Martin-Luther-Universität Halle-Wittenberg, veit.kubik@psych.uni-halle.de*

Prior research in adults showed that spatial thinking contributes to multitasking performance (Mäntylä, 2013). We tested this spatiotemporal hypothesis for the first time in children between 8 and 12 years of age. In a newly developed touchscreen paradigm, children (N = 116) were asked to monitor up to four counters that ran at different paces, and to press a button whenever a counter had reached the end of its cycle. Children also solved two mental rotation tasks measuring dynamic spatial abilities, as well as two tasks assessing executive functions and visuo-spatial working memory. Regression analyses showed that a significant part of the variance in children's multitasking performance was explained by mental rotation, beyond age, executive functions, and visuo-spatial working memory. These results are the first to corroborate the spatiotemporal hypothesis in children and highlight the prominent role of spatial abilities in higher-order cognition, such as coordinating multiple tasks.

Anodal transcranial direct-current stimulation (tDCS) improves voluntary task scheduling in dual-task situations

Sebastian Kübler[1], Tilo Strobach & Torsten Schubert
[1] *Martin-Luther-Universität Halle-Wittenberg, sebastian.kuebler@psych.uni-halle.de*

Dual-task (DT) situations require task-order coordination processes that schedule the processing of two temporally overlapping tasks. Evidence for these processes stems from the observation that when participants can freely decide about task order they tend to repeat the task order of the previous trial resulting in fewer order switches compared to order repetitions. This order repetition bias suggests that intentionally switching compared to repeating task order requires additional and intention-based task-order coordination processes. In two experiments, we investigated whether the dorsolateral prefrontal cortex (dLPFC) is causally involved in implementing these intentional scheduling processes by employing transcranial direct-current stimulation (tDCS). For this purpose, we applied a DT consisting of an auditory and a visual 3-choice reaction time task with random stimulus order. Importantly, participants were instructed to freely decide about task order. Additionally, in a control condition, participants were instructed to perform the two tasks with constant (and not changing) task order. Anodal (Experiment 1) and cathodal (Experiment 2) tDCS was administered over the left dLPFC. As a result, anodal stimulation improved whereas cathodal stimulation impaired DT performance in order switch trials compared to sham stimulation. Performance in order repetition trials as well as in the control condition was unaffected by stimulation. In sum, our experiments indicate that the dLPFC is indeed causally involved in intentionally switching task order and, thus, contributes to self-organized task scheduling in multitasking situations.

No Picture-Word-Interference in Communicative Settings

Anna Katharina Kuhlen[1] & Rasha Abdel Rahman
[1] *Humboldt-Universität zu Berlin, anna.kuhlen@hu-berlin.de*

The picture-word interference (PWI) task is frequently used in cognitive psychology to study the processes underlying speech production. In this task a speaker names target pictures whilst processing aurally or visually presented distractor words. It is a robust finding that speakers take longer to name the target whilst processing a semantically related compared to an unrelated distractor. Yet, in day-to-day conversation, interlocutors routinely produce semantically related words. To investigate whether semantic interference is also observed in social interaction we embedded a PWI task in a communicative setting: Two participants played a card game during which one named the distractor and, after a stimulus-onset-asynchrony (SOA) of either -150ms or -650ms, the other named a semantically related or unrelated target. In Exp.1 (N=32) target naming latencies did not differ between semantic conditions, at neither SOA. In Exp.2 (N=32) we embedded audio recordings of the distractor naming obtained from Exp.1 in a classic single-subject PWI setting. In this setting we observed, as expected, semantic interference at SOA -150ms. In Exp.3 (N=32) the card game encouraged a focus on the semantic relationship between distractor and target. As in Exp.1 we did not observe semantic interference at SOA -150ms. However, at SOA -650ms we observed semantic facilitation. We conclude that the processes leading to semantic interference in single-subject settings are attenuated in communication. Depending on communicative context and inter-turn interval semantic relatedness between the partner's and the own utterances either proves irrelevant, or facilitates speech production.

Is All Metamemory Monitoring Spared from Aging? Further Evidence for Aging-Impairment of Recollection Monitoring

Beatrice G. Kuhlmann[1] & Monika Undorf
[1] *University of Mannheim, kuhlmann@psychologie.uni-mannheim.de*

Overall, metamemory monitoring is consistently found to be spared from aging. However, in a detailed examination, we previously observed a specific age-related deficit in the monitoring of recollection (Kuhlmann & Undorf, 2018). In the current experiment, we examined older adults' ability to monitor recollection- versus familiarity-based memory when asked to separately predict these memory types in Judgments of "Remembering" and "Knowing" (JORKs) and when learning positively valenced pictures, which should be particularly relevant to them. Thirty younger (19-29 years, M=22.78) and 30 older (60-85 years, M=71.78) adults studied a mixed list of neutral and positively valenced pictures, providing a JORK immediately after studying each picture. Model-based estimates of recollection- and familiarity-based memory were derived from a classical process-dissociation procedure with exclusion tests requiring recollection of the picture's screen position (top vs. bottom) at study. Both age groups predicted more remembering and knowing for positive than neutral pictures but this positivity effect was smaller in older adults. Both age groups were able to predict familiarity-based memory but increases in familiarity from "forget" to "know" pictures were somewhat less pronounced in the older adults. While younger adults were able to predicted recollection-based memory, older adults' recollection did not differ between "remember" and "forget" pictures. Valence did not affect monitoring in either age group. Taken together, our results replicate the age-related deficit in recollection monitoring, even for positively valenced pictures, and further suggest that older adults have difficulties in predicting familiarity via JORKs.

Retrieval Facilitation in Source Memory

Beatrice G. Kuhlmann[1] & Nikoletta Symeonidou
[1] *University of Mannheim, kuhlmann@psychologie.uni-mannheim.de*

Source memory refers to memory for the origin of information, such as who told you something. In a typical source-monitoring task, participants study items (e.g., words) presented by one of two sources (e.g., speakers). At test, the items are presented in a source-neutral manner (e.g., printed, not spoken) and participants have to judge whether this item was presented by Source A, Source B, or is new. Here, a source memory failure may simply be due to difficulties with retrieving stored source details (e.g., perceptual features of the speaking voice) from memory rather than a lack of source storage. In two experiments with student participants (Experiment 1: N = 146, Experiment 2: N = 108), we demonstrate that the reinstatement of the original source at test (i.e., spoken presentation of the test items) facilitates retrieval of stored source details from memory. In Experiment 1, retrieval facilitation from source reinstatement was most effective for difficult to discriminate (i.e., highly similar) sources. In Experiment 2, a partial reinstatement of the speaker's face and name (but not the voice) was already effective for facilitating source retrieval. In Experiment 3, we tested 72 older adults (≥ 60 years old) with the difficult to discriminate sources and full reinstatement. In contrast to the consistent reinstatement benefit observed in younger adults, older adults only benefitted from source reinstatement for weakly encoded sources. We will discuss implications of our results for research on source memory and the age-related deficit in source memory.

Monkey sees, monkey does? Self-generated vs. instructed strategies

Anja Kühnel[1]
[1] *Medical School Berlin, anja.kuehnel@medicalschool-berlin.de*

If people are presented with a task they might form a strategy for successful completion. In other cases a strategy might be instructed. The question posed in the present experiment is, if both strategies (intention based/self-generated or instruction based) differ in their impact on a given task. To study this, a change blindness task is used. Letter matrices of 8*4 letters are presented with an embedded word. In every trial two letters change. One in the embedded word (rendering it a nonword) and one independent letter. In the first two blocks no cues are given, but the participants might use the embedded word for change detection. If they generate the strategy that word search can be used for change detection they should be quite successful. In blocks three to six cues are presented prior to each trial. They are either visual or verbal cues. Both cue forms are valid in 75% of the trials. It thus might be a valid strategy to attend to the cues but also search for the word (which is valid in 100% of the trials). To answer the question if both instruction based and intention based strategies differ, it will be analysed how much and which specific changes were detected in the different conditions.

Are there two independent evaluative conditioning effects in relational paradigms? Dissociating the effects of CS-US pairings and their meaning

Niels Kukken[1] & Mandy Hütter
[1] *Eberhard Karls Universität Tübingen, niels.kukken@uni-tuebingen.de*

Recent research into evaluative conditioning (EC) shows that information about the relationship between the conditioned and unconditioned stimuli can exert strong effects on the size and direction of the EC effect. Additionally, the co-occurrence of these stimuli seems to exert an orthogonal effect on evaluations. This finding has been interpreted as support for two independent types of EC effects. However, previous research devoted to this question relied on aggregated evaluative measures, allowing for alternative interpretations. In four experiments, we developed and validated a multinomial processing tree model that distinguishes effects of the pairings from effects of the meaning of the pairings. Our findings suggest that two independent EC effects contribute to overall evaluative change in a relational EC paradigm. The model that we developed offers a helpful method for future research in that it allows for an assessment of the effects of manipulations on processes rather than overall performance on an evaluative measure.

Novel advances in measuring implicit and explicit group evaluations

Hannah Kunde[1], Franziska Emmerling & Claudia Peus
[1] *Technische Universität München, hannah.kunde@tum.de*

Classic efforts to investigate intergroup preferences and its underlying cognitive processes are limited as they often compromise internal validity due to the use of visually non-neutral stimuli (e.g., own- vs. other-race faces) or external (i.e., ecological) validity due to choosing group affiliations based on a minimal group paradigm. To overcome these limitations, we developed a novel paradigm which combines the strengths of both approaches by using real-world groups while eliminating visual confounds. This paradigm uses neutral face stimuli, associates them with ecologically valid groups, and measures implicit and explicit evaluations of those group affiliations on multiple dimensions. To validate the paradigm, we conducted three experiments (N=305) based on group labels which have been extensively studied in social psychology: political orientation (two independent samples in UK and Germany) and a minimal group paradigm (one sample in Germany). Across all three samples, the participants remembered the group affiliations of the newly learned faces with a mean accuracy of 82.6%, 95%-CI [81.1;∞]. Three out of five implicit measures differentiated correctly between in- and outgroup-associated faces and aligned with explicit evaluations. We replicated the effectivity of our paradigm across cultures (i.e., UK versus Germany) and types of group (i.e., ecologically valid versus minimal groups). Our newly developed and validated paradigm can easily adapt to various research contexts as the stimuli's group affiliations and, thus, the content they represent can be created flexibly within the paradigm itself. The paradigm will, therefore, be of use to various communities of experimental psychologists.

Investigating the interplay of response selection and visual attention by combining the PRP and TVA paradigms

Erika Künstler[1], Sebastian Kübler, Otto W. Witte, Torsten Schubert & Peter Bublak
[1] *Universitätsklinikum Jena, Erika.Kuenstler@med.uni-jena.de*

Dual-task costs – the decrement in performance in one or both tasks under a dual-task condition – are commonly explained through the central bottleneck model, and are often studied with the Psychological Refractory Period (PRP) paradigm. PRP proposes that whilst perception and motor response can operate in parallel, the response selection stage is subject to a central bottleneck. However, whilst the central bottleneck model can explain what occurs on a processing level, there is still the question as to how information is processed on a more basic perceptual level. We therefore integrated the "Theory of Visual Attention" (TVA; a mathematically formulated model which allows visual attentional parameters to be independently quantified) into the PRP paradigm. Specifically, we want to investigate whether response selection influences visual attention processing. The results showed that both the processing speed (parameter C) and the storage capacity of the visual short-term memory (parameter K) varied as a function of the stimulus onset asynchrony. This indicated that these attentional processes share a common capacity limitation with the response selection. However, the visual threshold (parameter t0) remained unaffected, suggesting that the earliest stages of visual processing are performed independently of the central bottleneck.

Biased risk perception in decisions about cognitive enhancement

Nora Katharina Küpke[1] & Guido Mehlkop
[1] *University of Erfurt, nora_katharina.kuepke@uni-erfurt.de*

Die Einnahme leistungssteigernder Medikamente ohne medizinische Notwendigkeit, sogenanntes Pharmaceutical Cognitive Enhancement, hat sich zwischen 2015 und 2017 verdreifacht. Auf Grund zunehmend herausfordernder Arbeitsbedingungen wird weltweit weiterhin mit steigenden Nutzerzahlen gerechnet. Dabei werden neben synthetischen, verschreibungspflichtigen Medikamenten auch pflanzliche Medikamente wie Gingko biloba eingesetzt. Der Natural Bias, der zu einer systematischen Unterschätzung der Risiken pflanzlicher Medikamente führt, wurde im Bereich Cognitive Enhancement bisher wenig untersucht. Bis heute gibt es außerdem keine Studie, die hierbei den zugrundeliegenden Prozess des Urteilsfehlers über die Affektheuristik berücksichtigte. Auf Grundlage der risk-as-feelings Perspektive wurde eine präregistrierte Online-Vignettenstudie mit 819 Teilnehmenden durchgeführt. In einem 2 (Eigenschaft des Medikaments: natürlich vs. synthetisch) x 2 (Wahrscheinlichkeit der Nebenwirkungen: hoch vs. niedrig) x 2 (Schwere der Nebenwirkungen: stark vs. leicht) between-subjects Design wurde untersucht, inwiefern pflanzliche Medikamente im Vergleich zu identisch wirkenden, synthetischen Medikamenten zu einer geringeren Risikowahrnehmung, Angst vor Nebenwirkungen und einer höheren Einnahmeintention führen. Die Einnahmeintention natürlicher Medikamente ist bei gleichen Risiken höher als die Einnahmeintention synthetischer Medikamente. Die präregistrierten Mediationsanalysen zeigen, dass natürliche Medikamente im Vergleich zu synthetischen Medikamenten zu einem positiveren Affekt und in Folge dessen zu einer geringeren Risikowahrnehmung, zu einer geringeren Angst vor Nebenwirkungen und zu einer höheren Einnahmeintention führen. Informationen zu natürlichen Eigenschaften eines Medikaments beeinflussen implizit die Risikowahrnehmung und Gesundheitsentscheidung von Konsumenten, indem sie einen affektiven Prozess anstoßen, während risikorelevante Informationen wie die Wahrscheinlichkeit von Nebenwirkungen zweitrangig sind.

Model selection by cross validation for computational models of visual working memory

Nicholas Lange[1] & Henrik Singmann
[1] *University of Warwick, lange.nk@gmail.com*

In a typical visual working memory task, the participant is shown a display containing one or multiple items, followed by a delay, followed by a response screen on which the participant is asked to provide the remembered feature value at a marked location in a near-continuous response space. Theories of the limitations of visual working memory have given rise to numerous computational models to account for the distribution of participants' errors in these tasks. Classes of models differ in the assumptions they make about the nature of memory precision. For example, variable precision models assume that memory precision varies across items and trials even when the number of items across trials is fixed, while fixed precision models assume that precision is invariant. In model comparisons, variable precision models tend to provide the better fit of the model to the observed data, as measured by information criteria. In this project, we explore how well these models fare when the models are judged not just by how well they predict the observed data, but also by how well they predict unseen data. We use cross validation approaches to test the out-of-sample predictive ability of these visual working memory models. Thus, rather than focusing on models' ability to merely fit the observed data, we propose to take the generalizability of a model into account when selecting between computational models.

Maintaining focus during preparation: Individual differences in long-foreperiod repetition benefits

Robert Langner[1], Liyu Cao, Lynn Huestegge & Michael Steinborn
[1] *Heinrich Heine University Düsseldorf, robert.langner@uni-duesseldorf.de*

When preparing for the moment of action in situations where the preparatory interval, or foreperiod (FP), varies unpredictably between trials, responses become faster with increasing FP length. This has initially been assumed to reflect a strategic process of conditional-probability monitoring, while a more recent view holds that it results from asymmetric sequential FP effects due to trial-to-trial reinforcement learning (Los et al., 2001). Accordingly, FP repetitions should be beneficial for speeded responding. In two experiments, we examined long-FP repetition benefits as a function of overall response speed and contextual temporal uncertainty (i.e., FP range). We observed that the usual long-FP repetition benefit turned into costs in the slowest quarter of participants if contextual time uncertainty (varied between experiments) was large. This pattern replicates previous findings in children (Vallesi & Shallice, 2007) and, together with self-report data on stress state, argues for the existence of another, possibly "energetic" source of sequential FP effects beyond reinforcement learning.

Can monetary reward influence central bottleneck processing in dual-task situations?

Leif Erik Langsdorf[1] & Torsten Schubert
[1] *Martin-Luther-Universität Halle-Wittenberg, leif.langsdorf@psych.uni-halle.de*

In dual-task (DT) situations of the psychological refractory period (PRP) type participants perform two temporally overlapping tasks with varying stimulus onset asynchrony (SOA). Dual-task-costs arise which can be explained by the bottleneck assumption. The reaction times for Task 2 (RT2) are usually prolonged at short SOA compared to long SOA. The so-called PRP Effect is explained by the assumption of a bottleneck requiring serial processing of response selection stages. In recent years, motivation has been shown to enhance cognitive processing. Hence, our aim was to investigate the effect of motivation, operationalized as monetary reward (MR), on bottleneck processing. We rewarded Task 2 in two experiments and asked which processing stage in DT will be affected by MR and whether the bottleneck can be changed by MR application. In Experiment 1, MR led to a decreased PRP-Effect. Indicated by greater differences between reward-condition and no-reward-condition at short SOA compared to long SOA. This pattern suggests, that MR effected pre-bottleneck stages of Task 1 and this effect is propagated onto Task 2. In Experiment 2, we added a response compatibility manipulation in Task 2. To test whether MR can change serial processing of response selection stages. The results showed an additive effect of compatibility and of MR on RT2, indicating that response selection processes were scheduled serially independently of MR. The results provide evidence for modulatory influence of MR on pre-bottleneck stages in DT processing.

Investigating the influence of salience on binding effects

Ruth Laub[1], Philip Schmalbrock, Christian Frings, Bernhard Hommel, Andrea Kiesel & Klaus Rothermund
[1] *Universität Trier, ruth.laub@uni-trier.de*

For the efficient control of goal-orientated behavior, the human cognitive system is provided with several mechanisms regarding stimulus selection, encoding, and processing. One of these mechanisms is the binding of stimuli and responses. According to the theory of event coding (Hommel, 1998, Hommel, 2004), an object and the belonging features of that object are integrated together with the executed response in one event file. Every reencounter with one or more of the stored features leads to the automatic retrieval of the previously constructed event file including the response features, thereby influencing ongoing actions. One factor that is assumed to modulate feature integration (but has not yet been systematically investigated in the area of action control) is the salience of a feature (Hommel, 2005). That is, features might be weighted by perceptual salience, leading to a benefit of salient features or stimuli for the integration process. Furthermore, an influence of salience on binding effects could be assumed for task-relevant target stimuli (in Stimulus-Response Binding), as well as for task-irrelevant distractor stimuli (in Distractor-Response Binding). A first series of experiments (N > 100) suggests that the influence of salience is not as substantial as assumed. The perceptual salience of an irrelevant stimulus does not per se lead to larger binding effects.

Being afraid of North African Immigrants – Explicit and Implicit Threat Bias against North African men in Germany

Ruben Laukenmann[1]
[1] *University of Mannheim, ruben.laukenmann@psychologie.uni-mannheim.de*

The Weapon Identification Task (WIT; Payne, 2001) and the First-Person Shooter Task (FPST; Correll, Park, Judd, & Wittenbrink, 2002) are speed task methods, measuring in their original version the stereotype association between black males with guns in comparison to white males with guns in the US. Both methods claim to measure the association of black men with violence, respectively the perceived threat posed by black men. In German society the stereotype of North African males being dangerous and violent might be present. This can be observed in the political discussion about asylum policies during the last years in Germany and the discussion about violent assaults in Cologne at new years eve 2015 by allegedly predominant North African immigrants. The talk presents a conceptual adaptation of the WIT and FPST with North African male faces in comparison to Caucasian male faces with knifes as weapons. The study was conducted with a student and an Amazon MTurk sample. Beside Implicit Bias measures, explicit face ratings and stereotype ratings for evaluation of threat posed by North African males are presented.

The Role of Achievement Emotions in Visual Working Memory Performance: A Registered Report

Sara Laybourn[1], Anne C. Frenzel & Martin Constant
[1] *Ludwig-Maximilians-Universität München, sara.laybourn@psy.lmu.de*

Previous research has demonstrated that emotions, which are induced prior to a visual working memory (VWM) task, can influence VWM performance. However, up to date there is a striking lack of research on whether the task itself induces emotional experiences, and whether they impact VWM performance. In our registered report we argue that the VWM task can be considered an achievement situation (success vs. failure being very salient), therefore leading to participants naturally experiencing achievement emotions (AE) including joy, pride, anger, and shame. Specifically, we hypothesize (1) that these AE correlate with individual differences in VWM performance, that this link is (2) mediated by subjective task performance (STP; i.e. how well or how poorly participants think they are doing) and (3) moderated by performance goal orientation. Further, we believe (4) that task difficulty and performance goal orientation interact in predicting VWM, STP and AE. N = 100 participants will be recruited to perform the continuous color wheel task, a common paradigm used to measure VWM. The task shall be comprised of two blocks each consisting of 240 trials, which include arrays of either four (easy) or eight (difficult) colored squares. Participants' AE and STP will be obtained by self-report once after each block. Additionally, during one block, AE and STP will be measured 'in situ' after every 30 trials. We expect that our findings will highlight the relevance of AE as a potentially confounding variable for interpreting an individual's VWM ability.

Symmetry and Face attractiveness

Helmut Leder[1] & Andreas Gartus
[1] *University of Vienna, helmut.leder@univie.ac.at*

In our everyday life, faces probably are the most frequent objects of aesthetic judgment, when we evaluate how attractive others are, we employ our sense of beauty. In our talk, we focus on one feature often deemed very relevant, and also universal in aesthetic preferences: symmetry. We present results regarding general preferences for beauty, and especially for beauty in faces (Tinio, & Leder, 2009; Tinio, et al., 2013), and challenge the general conclusions about universality of symmetry as an indicator of beauty in faces and abstract patterns. Specifically, we present data that deviations from symmetry are often, but not always, disliked (Gartus & Leder, 2013; Gartus & Leder, in prep). That symmetry is not liked by everyone to the same amount – i.e., that there exist large individual differences in preference for symmetry (Gartus & Leder, 2013). And also that art expertise, of painters and art historians, as well as cultural variation play important roles (Leder et al., 2018; ; Leder et al., in prep; Gartus, Völker, & Leder, in prep). Thus, symmetry is an important – and maybe one of the most important – features predicting attractiveness of faces and abstract patterns, but its influences on aesthetic judgment are also complex and intricate.

Validating mouse-tracking indices in online surveys

Franziska M. Leipold[1], Pascal J. Kieslich & Felix Henninger
[1] *Universität Mannheim, fleipold@mail.uni-mannheim.de*

Online surveys have become an extremely popular and widely used mode of data collection. However, despite the key goal of obtaining valid information, they are susceptible to multiple sources of measurement error that may lead to decreased data quality and, as a consequence, to biased estimates and invalid conclusions. One important source of measurement error are response difficulties which, therefore, need to be detected and prevented. Response difficulties may stem from different sources, such as complex formulations in task instructions or indecision between response options. However, none of the existing indicators that are systematically related to overall response difficulty (such as total response time) enable a differentiation between these different sources. The goal of the present study was to enable such a differentiation by tracking participants' cursor movements while they fill out an online survey. Specifically, we hypothesized that different mouse movement patterns should be related to specific properties of survey questions that may each increase response difficulty. In a preregistered online experiment, we manipulated the properties question length, complexity and difficulty and hypothesized that they should lead to increased response times, hovers (mouse movement pauses) and y-flips (regressive movements along the vertical axis of the screen), respectively. As expected, each manipulation led to an increase in the corresponding measure. However, contrary to our hypotheses, the manipulations affected the other indices as well. Nevertheless, the strength of the effects differed between indices and manipulations, indicating that some measures might indeed be more affected by certain question properties than others.

Differential effects of irrelevant sounds on short-term memory in children and adults

Larissa Leist[1], Kirstin Bergström, Thomas Lachmann & Maria Klatte
[1] *TU Kaiserslautern, lleist@rhrk.uni-kl.de*

Many studies have shown that irrelevant background sounds impair performance in immediate serial recall tasks. According to the duplex-mechanism account, performance disruption due to irrelevant sounds may result from attentional capture or interference-by-process, i.e., an overlap of the resources involved in preattentive, obligatory sound processing and task-related processes. In this study, we compared the effects of irrelevant speech and environmental sounds on performance in German third-graders and German adults. Based on prior evidence, we hypothesized that irrelevant speech evokes interference-by-process, whereas environmental sounds evoke attentional capture. Environmental sounds should cause a stronger disruption in children compared to adults, because of childrens' limited attentional control. We designed a task that required monosyllabic German nouns presented pictorially to be immediately recalled in serial order. Irrelevant speech evoked comparable impairments in both age groups, but only the children were significantly affected by the environmental sounds. The differential age effect supports the duplex-mechanism account of performance decrements due to irrelevant sounds.

Effects of frustration of the achievement motive on task processing: Findings from diffusion model studies

Veronika Lerche[1]
[1] *Universität Heidelberg, veronika.lerche@psychologie.uni-heidelberg.de*

In motive research, the analysis of experimental data by means of mathematical models like the diffusion model is not yet a common approach. Based on the results of two studies (N1 = 108, N2 = 104), I demonstrate that the diffusion model (Ratcliff, 1978) is a useful tool to gain more insights into motivational processes. The experiments were inspired by findings of a study by Brunstein and Hoyer (2002). They observed that individuals high in the implicit achievement motive who receive negative intraindividual performance feedback speed up in a response time task. The reduced mean response times were interpreted in terms of an increase in effort. In the two studies, in which I used a similar feedback manipulation, individuals with high implicit achievement motive decreased their threshold separation parameter. Thus, they became less cautious over the time working on the task. Accordingly, the decrease in response times previously reported might mainly be attributable to a change in strategy (focusing on speed instead of accuracy) rather than to an increase in effort. The results will be discussed in the context of emotion regulation strategies.

Age-Related Differences in Switching Attentional Demands

Magnus Liebherr[1], Stephanie Antons & Matthias Brand
[1] *University Duisburg-Essen, magnus.liebherr@uni-due.de*

In a world where people are constantly bombarded by an endless array of internal and external stimuli, especially older people show increasing problems. Particularly, processes of selection of appropriate actions, switching between different tasks, as well as quick adaptations to changes in the environment, are discussed in this context. During recent years, converging evidence indicated an inverted u-shaped curve of task-switching performance over the lifespan. However, the process of switching between different attentional demands is somehow neglected. Therefore, the present study aimed to investigate the effect of age as well as working memory and inhibition on the performance of switching between attentional demands, within two experiments. In the first experiment, 116 younger adults (age: M=22.31 years, SD=3.17) and 93 elderlies (age: M=68.29years, SD=6.18) completed the SwAD-task. In the second experiment, 64 participants (age: M=44.52 years, SD=14.21) completed the SwAD-task as well as further tasks of working memory and inhibition. Findings indicated longer response times in the elderly compared to younger adults in each condition of the SwAD-task. Furthermore, 25.6% of the variance of selective attention and 18.0% of divided attention under conditions of switching attention can be explained by the used variables: age, working-memory, and inhibition. Age-related differences in selective and divided attention are explained by a reduced processing which is accompanied by deficits in white matter integrity, an early age-related deterioration of the dorsolateral prefrontal cortex, a reduction in occipital activity, as well as a hemispheric asymmetry reduction in older adults.

Heartfelt Grief: A Within-Subject Experiment Measuring Heart Rate Variability

Simon Liegl[1], Tilman Grünbaum, Thomas Maran, Stefano Manno & Pierre Sachse
[1] *University of Liechtenstein, simon.liegl@uni.li*

The experience of grief, as a reaction to loss, acts as a postgoal emotion that is typically accompanied by a depletion of behavioral vigor, with the aim to preserve an organisms' resources instead of mobilizing them for immediate action. This process should be reflected in a decreased psychophysiological activity. However, as opposed to emotions high in arousal, like lust or fear, experimental and biological psychological research has mostly neglected the topic of psychophysiological correlates of postgoal emotions. This study aimed to overcome this gap by employing a three factorial within-subject design. We presented 42 participants with three sets of visual stimuli, consisting firstly of projective iconographic pictures depicting grief scenarios, secondly of pictures from the Adult Attachment Projective Picture System, and lastly, as a control measure, neutral pictures, displaying ambiguous line art with no discernable shapes. These sets and the stimuli within each set were presented in a randomized order. Data on participants' heart rate variability were collected throughout the experiment, acting as a measure for their psychophysiological arousal. This study therefore contributes to our understanding of the effects of emotions on the functional level of our cognition.

Taking driver frustration into account: Towards a speech-based emotion regulation in-car assistant

Martina Lienhop[1] & Michael Oehl
[1] *FernUniversität Hagen, mailto@martina-lienhop.de*

Frustration is regarded as an emotion that can turn into anger and (road) rage. These negative emotions and the aggressive driving behavior associated with them are in turn relevant causes of accidents and road fatalities. Adaptive driving assistance systems with the ability to detect the driver's emotional state could prevent driver's losses of driving performance caused by frustration through targeted intervention in emotion regulation processes. Here, speech interventions are particularly promising, because verbal communication with human passengers is familiar in such emotional states. Additionally, the cognitive strain burdened by spoken language and auditory interaction is quite little while executing at the same time the primary driving task. So far, little is known about the exact nature of speech interaction with voice user interface assistants in order to reduce the driver's frustration. Our experimental study focuses on the appropriate timing for intervention. The theoretical basis is Gross' process model of emotion regulation. Since in road traffic both situation selection and situation modification are only possible in exceptional cases, this study concentrates on the three subsequent strategies of emotion regulation proposed by Gross. In two driving scenarios, the influence of different sources of frustration was manipulated. Results of the study show that the success of the speech intervention is not only determined by timing, but it is to a large extent situation-dependent. Implications for a refined design of such assistants as well as for further research will be pointed out.

Saccadic eye movements do not trigger a joint Simon effect

Roman Liepelt[1], Emanuele Porcu, Anna Stenzel & Markus Lappe
[1] *FernUniversität in Hagen, Faculty of Psychology, Hagen, Germany, roman.liepelt@fernuni-hagen.de*

Although the joint Simon task (JST) has been investigated for more than a decade, its cause is still widely debated. According to ideomotor views of action control, action effects are a commonly cited explanation. However, action effects are usually confounded with the actions producing such effects. We combined a JST with eye tracking and asked participants to respond by performing specific saccades. Saccades were followed by visual feedback (central vs. lateral feedback), serving as the action effect. This arrangement allowed us to isolate actions from action effects and, also to prevent each actor from seeing the reciprocal actions of the other actor. In this saccadic JST, we found a significant compatibility effect in the individual setting. The typical enhanced compatibility effect in the joint setting of the JST was absent with central action feedback and even when lateralized visual action feedback was provided. Our findings suggest that the perception of action effects alone might not be sufficient to modulate compatibility effects for eye movements. The presence of a compatibility effect in the individual setting shows the specific requirements of a saccadic compatibility task – the requirement to perform prosaccades to compatible and antisaccades to incompatible target locations. The lack of a difference between compatibility effects in joint and individual settings and the lack of a modulation of the compatibility effect through lateralized visual action feedback shows that the finding of a joint Simon effect that has frequently been reported for manual responses is absent for saccadic responses.

Spatial action-effect binding depends on type of action-effect transformation

Marvin Liesner[1], Wladimir Kirsch, Roland Pfister & Wilfried Kunde
[1] *Julius Maximilians University of Würzburg, marvin.liesner@uni-wuerzburg.de*

Spatial action-effect binding denotes the mutual attraction between the perceived position of an effector (e.g., one's own hand) and a distal object that is controlled by this effector. Such spatial binding can be construed as an implicit measure of the inclusion of the controlled object into the agent's body representation. In two experiments, we investigated how different transformations of hand movements into movements of a visual object affect spatial action-effect binding. In Experiment 1, we found a significantly lower drift of the proprioceptive position of the hand towards the visual object when hand movements were transformed into inverted cursor movements rather than cursor movements in the same direction while the actual physical distance between hand and object was held constant. Experiment 2 showed that this reduction reflected a complete elimination of spatial binding in the inverted condition. The results will be discussed against the idea that conflicting sensory inputs lead to the suppression of those input channels that are less relevant for the current task. Furthermore, they broaden our understanding of the prerequisites for an experience of ownership over artificial, non-corporeal objects by showing that direct control over how an object moves is not a sufficient condition for a sense of ownership because proprioceptive drift can be fully abolished even under conditions of full controllability.

The role of multisensory precision control in the body representation for action

Jakub Limanowski[1]
[1] *University College London, j.limanowski@ucl.ac.uk*

When controlling hand movements, the brain can rely on seen and felt hand position or posture information to represent 'its' body for action. It is thought that the brain combines these estimates into a multisensory hand representation in a probabilistic fashion, accounting for how reliable each estimate is in the given context. In this talk, I will present behavioural, brain imaging, and computational modelling work centred on a virtual reality based manual action task; the results jointly suggest that during action, the weights (i.e., the expected precision) assigned to visual vs proprioceptive information about body position can be changed in a 'top-down' fashion by endogenous attention. Such a contextualising function of attention on sensory evidence is in line with predictive coding models of body representation, along which the expected precision of sensory prediction errors is augmented or attenuated—depending on the current context—based on internal model beliefs. I will conclude that to some degree body representations can be 'shaped' by top-down mechanisms such as attention.

Picking the small and missing the giant- Automatic encoding of objects' real-world size

Katharina Limbach[1], Maria Johann & Sarah Weigelt
[1] *TU Dortmund, katharina.limbach@tu-dortmund.de*

Our visual system enables us to perceive and recognize objects with apparent ease and at arresting speed. Recent research shows that the size of an object in the real world is automatically encoded and acts as an organizational principle in the neural representation of objects. Information about the real-world size helps us to navigate and informs the way we interact with objects. Real-world size of objects has been shown to interfere with performance a) when making visual size judgements in a Size-Stroop task and b) when searching for objects, such that objects that are depicted 3-4 times their size ('giant targets') are missed more often than the same objects in their actual size. Here, we wanted to replicate these two effects and hypothesized that participants with larger Stroop-effects would also show greater difficulties when searching for mis-scaled giant targets. Forty young adults (mean age: 23.1 yrs) completed both paradigms and showed the hypothesized Size-Stroop effect in two versions (original stimulus (Konkle, & Olivia, 2012) and new stimulus set). This adds to the evidence that real-world size is assessed automatically. To our surprise, we did not find that giant targets are missed more often compared to targets in their actual size, despite using the original stimulus set (Eckstein, Koehler, Welbourne, & Akbas, 2017). We also could not demonstrate a relationship between performances in both tasks, which might be related to the relatively low performance in the search tasks for normally sized objects.

Personality Traits Modulate Gaze Behavior Towards Dynamic Stimuli High in Social Information

Felizitas Löffler[1], Lucas Haraped, Thomas Maran, Simon Liegl, Nino Mix & Pierre Sachse
[1] *Universität Innsbruck, felizitas.loeffler@student.uibk.ac.at*

Human gaze behavior gives us insights into our personality. While previous studies showed a positive association of social attention and extraversion and a negative association with neuroticism our study aims to investigate differences in social gaze regarding varying amounts of displayed social information and personality. Using eye tracking technology (Tobii TX300), a total of 102 participants, Mage = 21,39 (Sd = 2,47), were observed while looking at a three-minute video of a walk through a well-attended shopping center in first person view. We defined dynamic socially relevant areas of interest, namely front view face, front view body and rear-view body of the people seen in the video and measured social attention as gaze duration on these areas. Moreover, we assessed BIG-5-personality using the NEO-FFI questionnaire. Results revealed a positive correlation between extraversion and the duration of looking at faces and front bodies, while neuroticism was adversely associated with both measures. Notably, this tendency was not the case for rear-view bodies. Consistent with previous studies we replicated findings concerning personality and social gaze and showed that the amount of social information, that a social stimulus poses seems to be a relevant factor. Further, the results are discussed regarding the theory of the dual function of social.

Components of learned control routines transfer between unique tasks with common structural elements

Cai Longman[1], Fraser Milton & Andy Wills
[1] *University of the West of Scotland, cai.longman@uws.ac.uk*

Research investigating transfer of learned control routines between unique tasks with a common underlying structure has tended to focus on routines that are relevant to an entire class of tasks rather than components of those routines. We investigated how different kinds of training affected performance on unique test tasks where participants classified dot patterns according to their similarity to perceptual category templates by entering response 'codes'. Eight training conditions (N=60 per group) were contrasted in which participants gained experience of: (a) the kinds of stimuli; (b) the kinds of categories; (c) the kinds of responses; (d) the kinds of stimuli and categories; (e) the kinds of stimuli and responses; (f) the kinds of categories and responses; (g) the kinds of stimuli, categories and responses; or (h) none of the structural elements of the test tasks. Evidence of transfer was strongest in the training group who had experience with all elements of the test tasks confirming that control routines can transfer beyond the learning context. However, test performance was better in all training groups relative to the control group, indicating that prior experience with some of the structural elements of the test tasks was also beneficial to performance. The improvements in performance reported here cannot easily be explained by transfer of learned associations, but can be explained by the transfer of (components of) learned control routines.

Effects of healthy aging in noun-noun compound production: An ERP-study

Antje Lorenz[1], Pienie Zwitserlood & Rasha Abdel Rahman
[1] *Humboldt-Universität zu Berlin, antje.lorenz@hu-berlin.de*

We investigated the production of nominal compounds (tablecloth, lipstick, sunflower) to test models of speech production and lexical representation. Young (18-35 years) and older (65 + years) speakers named pictures of objects with compound names in the presence of morphological, semantic, and unrelated distractor words in a picture-word interference paradigm. Event-related potentials (ERPs) were analysed in addition to picture-naming latencies. In both age groups, constituent distractors of compound targets (lip or stick for the target LIPSTICK) speeded compound naming, while naming was slowed by distractors from the same semantic category as the compound (powder - LIPSTICK). No effects were obtained for distractors from the same category as the compound's first constituent (toe - LIPSTICK). Age-related effects were observed in morphological distractor conditions, but not in semantic conditions. This is in line with prolonged/ deficient morpho-phonological encoding with age. Naming latencies confirmed weaker effects of second- than first-constituent morphological distractors in the elderly, whereas young speakers showed no such difference. Furthermore, the transparency of the semantic relation between morphological distractors and targets affected ERP effects, again only for older speakers. For the elderly, stronger ERP effects were obtained with higher semantic transparency of second-constituent distractors, which is likely to reflect enhanced semantic processing. Interestingly, ERP effects of first and second-constituent distractors were present in overlapping time windows, suggesting parallel processing of morphemes in both age groups. Our data corroborate single-lemma, but multiple-morpheme representations for compounds in production, which are stable across adulthood.

When rules change: Adolescents learn from gains and losses in a reversal-learning paradigm

Corinna Lorenz[1], Jutta Kray & Kerstin Unger
[1] *Saarland University, corinna.lorenz@uni-saarland.de*

Developmental research suggests adolescents to deviate in value-based feedback learning as they show a stronger reward-sensitivity than both children and adults. However, there is mixed evidence for non-linear developmental trends of reward-related processes across adolescence. To investigate the development of feedback-based learning we adapted a reversal-learning paradigm. During the task, participants chose one picture out of picture pairs that were either assigned to positive or negative feedback. Positive feedback led to winning, or not losing points and negative feedback to not winning, or losing points, dependent on the incentive condition. After 5-6 trials, the rule changed and participants needed to adapt to reversed picture-feedback-associations. Here, we focused on the effect of incentive condition on performance in learning over time and in adaption to reversing stimulus-response associations and report findings from 54 early- (10-12 years), 56 mid- (13-15 years) and 48 late-adolescents (16-18 years). Results revealed that adolescents learned with repetitions as indicated by decreased error responses over time and age, and responded faster with increasing age. Moreover, they responded faster in reaction to potential gains than losses. In response to reversed learning rules, adolescents became more accurate with age, while the incentive condition had no effect. In sum, adolescents showed adaptive learning performance and age-related effects were rather reflected in linear trends. As such, despite evidence for an adolescent-specific approach to rewards, we could show no reward-related peak in feedback-based learning performance.

Does the mismatch negativity reflect predictive processes?

Joshua Lorenzen[1] & Julian Keil
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, lorenzen@psychologie.uni-kiel.de*

We conducted an EEG experiment to investigate the predictive nature of auditory event-related potentials. According to the predictive coding theory, perception is seen as a process that continuously aims to minimize potential mismatches between the sensorial input and dynamic mental models trying to predict and interpret it. If a mental model fails to explain sensorial input (e.g. not foreseeing it) a prediction error response is thought to be caused, signaling the need to modify it or to change to an alternative interpretation. Event-related potentials (ERPs) are argued to reflect this prediction error. To test this hypothesis, we measured 20 subjects' electrophysiological responses to four different types of (un)expected stimuli. First, subjects were habitualized to a short melodic pattern in which three sine tones are always followed by one specific standard tone. This pattern was played in a loop for seven minutes. In a subsequent experimental phase, some of the trials replaced the standard (70% of trials) by deviant events (30% of trials). There could either be silence (10%), white noise (10%), or both white noise and the standard played simultaneously (10%). The difference wave between the ERPs to standards and deviants reflects the processing of the mismatch, the so-called mismatch negativity (MMN). If the MMN reflect predictive processes, responses to noise and omissions should be equal. Importantly, the MMN to noise-tone combinations should be smaller than following the other deviants, due to a partial prediction success. We discuss our result's implications for predictive coding theory.

The Base Rate Neglect in Episodic Memory

Yong Lu[1] & Marek Nieznański
[1] *Cardinal Stefan Wyszyński University in Warsaw, luyong@student.uksw.edu.pl*

The main objective of the present research was, for the first time, to assess a potential similarity in the representational bases for the base rate neglect in memory versus conditional probability judgment. The base rate neglect refers to the human and even animal tendency to overestimate the conditional probability judgment of a low base rate event when the event is meaningfully related to the condition. In one experiment, participants learned target and filler words, each of which was presented on a separate list (List 1 or List 2) and in a distinct colour (red or blue), with a manipulation of different base rates for these colour and list categories. During recognition tests, participants made prior and posterior episodic judgments (e.g., "What colour was the word?", "Given that the word was in red, in which list was the word?") on the target words, which respectively parallel independent and conditional probability assessments that figure in Bayes' theorem. The results implied that biased prior and posterior judgments presumably cause the base rate neglect, inasmuch as a low (high) base rate prior cue is likely to lead to a bias toward retrieving high (low) base rate posterior evidence. There was also a finding showing that memory analogues of probability estimates reflect the base rate neglect in both low and high base rate categories, but is presumably stronger with posterior judgment of Colour | List than List | Colour relative to the high base rate category.

Performance Feedback Enhances Test Potentiated Encoding: Oscillatory Correlates of the Testing Effect

Petra Ludowicy[1], Pedro M. Paz-Alonso, Thomas Lachmann & Daniela Czernochowski
[1] *TU Kaiserslautern, petra.ludowicy@sowi.uni-kl.de*

Compared to repeated presentation of study material, a retrieval attempt prompted by a memory test enhances later memory recall success (testing effect). Memory performance is further increased by presenting the material again following the memory test, providing both implicit information about the correctness and a restudy opportunity (test-potentiated encoding, TPE). Less is known about how reinforcement by explicit performance feedback affects TPE. Here, 25 native speakers learned 180 weakly associated word pairs once. Next, all word pairs were repeated twice as either restudy or retrieval practice trials with correct-answer feedback. For half of the retrieval practice trials, explicit performance feedback was presented after the retrieval attempt in order to facilitate error monitoring before restudying the material. Electroencephalography (EEG) was recorded during all study phases and during a final cued recall test on the following day. Behaviorally, retrieval compared to restudying on Day 1 increased memory performance on Day 2. Explicit feedback further enhanced TPE in the final test. Event-related oscillatory activity increased in the theta and decreased in the alpha band across conditions. For previously tested items, in particular for performance feedback trials, a selective increase in frontal alpha/beta power (12 – 15 Hz) was observed between 500 - 700 ms after item presentation in the final test. This suggests that the cognitive processes underlying recall on Day 2 are modulated by prior retrieval attempts. In sum, our results suggest that testing compared to restudying leads to a modification of recall processes, especially when combined with additional feedback.

Modality of task-irrelevant response-effects in implicit sequence-learning

Clarissa Lustig[1] & Hilde Haider
[1] *Universität zu Köln, clarissa.lustig@uni-koeln.de*

In a previous study, we found that a sequence of task-irrelevant effect-tones can be learned implicitly when the effects are not consistently mapped to the responses. Furthermore, this effect-sequence can trigger the development of explicit knowledge about a later induced contingent response-sequence. However, with visual effects, we were not able to replicate these findings (Lustig & Haider, 2019). One possible explanation is that visual effects are generally less salient than auditory effects (Ziessler & Nattkemper, 2002). Alternatively, the visual effects might have interfered with the visual presented targets as both are presented in the visual modality (e.g. Mayr, 1996; Ruess et al., 2018). To investigate this issue, participants performed a serial reaction time task by responding verbally to randomly presented auditory stimuli. The experimental condition received visual presented response effects, whereas in the control condition tones were presented as response effects. In both conditions, the respective effects were contingently mapped to the verbal responses and both followed a correlated sequence. First results indicate that the participants in the experimental condition had more explicit knowledge about the response sequence than the participants in the control condition. We conclude that the modality of the response effects and the to-be-performed task mediates the influence of response-effects on the development of explicit knowledge about a response sequence.

Effects of attitudinal congruency of online news snippets on usage of the term "fake news"

Robert Luzsa[1] & Susanne Mayr
[1] *Uni Passau, robert.luzsa@uni-passau.de*

The term "fake news" is currently in the focus of the public and scientific debate. Previous research often examined how good humans or algorithms are at detecting "fake", that is, fabricated or intentionally misleading news stories. However, few studies investigated how the term is used by subjects, that is, what kind of news messages they label as "fake", and no study has addressed the question whether usage of the term is influenced by subjects' attitude towards the topic. Based on findings on the perceived credibility of attitudinally congruent and incongruent news as well as on research on heuristics and biases the following hypothesis can be deduced: Subjects should be more likely to label attitudinally incongruent news, that is, news that contradict their own attitudes, as "fake news" than attitudinally congruent news. Two online experiments (N1 = 116; N2 = 120) tested this hypothesis. After measuring subjects' attitudes regarding several topics participants were exposed to attitudinally congruent or incongruent non-fake news snippets taken from German news media. Subjects were asked to rate the news' credibility and to indicate how strongly they agreed that the news was "fake news". The findings of both studies support the hypothesis. Incongruent news were not only judged less credible than congruent ones, but they were also rated more strongly as "fake news". The results demonstrate that attitudinal congruency plays a crucial role in subjects' perception of "fake news" and should be considered as a factor that may bias subjects' ability to detect "fake news".

Two types of between-task conflict trigger respective processing adjustments within one dual-task

Devu Mahesan[1], Markus Janczyk & Rico Fischer
[1] *University of Greifswald, devu.mahesan@uni-greifswald.de*

In dual tasking, two different kinds of between-task conflict, i.e., backward crosstalk effects (BCE) are discussed. A conflict at response selection stage when Task 1 (T1) and Task 2 (T2) have dimensional overlap (i.e., compatibility-based BCE) and a conflict at the motor execution stage when response inhibition resulting from a T2 no-go-trial interferes with simultaneous response execution in T1. Recent research suggests that these BCEs not only differ in their underlying cognitive processes, but also in how cognitive control is regulated (Durst & Janczyk, 2019). We investigated whether these different types of between-task conflict can be produced in a single dual-task setup and whether they trigger their respective processing adjustments (i.e., sequential modulation). In two experiments, participants categorized numbers as smaller or larger than 5 in T1. In T2, the same numbers were responded to irrespective of numerical size (go-response). Dimensional overlap was provided by (non)corresponding size information in both stimuli, which was strengthened in Experiment 2 by presenting S1 and S2 in the same/different color in compatible/incompatible trial combinations, respectively. In T2, the additional number 5 served as the no-go stimulus to induce no-go-based BCE on T1. Together, our results showed that both types of between-task conflicts not only occur in the same dual-task, but also trigger their respective sequential modulation. Evidence for cross-conflict sequential modulations, however, remains weak and requires further research.

Time course and shared neurocognitive mechanisms of mental imagery and visual perception

Martin Maier[1], Romy Frömer, Johannes Rost, Werner Sommer & Rasha Abdel Rahman
[1] *Humboldt-Universität zu Berlin, martin.maier@hu-berlin.de*

A growing body of research suggests that seeing something with the mind's eye—mental imagery—may not be all that different from seeing something literally with one's eyes, since both engage similar brain areas. Yet, the time course of neurocognitive mechanisms that support imagery is still largely unknown. The current view holds that imagery does not share early mechanisms with perception, but starts directly with high-level, holistic representations. However, evidence of earlier shared mechanisms is difficult to obtain because imagery and perception tasks typically differ in visual input. To control for low-level differences, we tested imagery and perception of objects while manipulating the degree of associated object knowledge. Event-related brain potentials showed that imagery and perception were equally influenced by knowledge already at an early stage, reflected in the P1 component, revealing shared mechanisms during low-level visual processing. Later holistic processing observable in the N1 component was increased for successful compared to incomplete imagery. Further, activity over frontal brain areas suggested that stabilizing mental images demands increased monitoring from higher-level areas. It follows that imagery is not merely perception in reverse, but both are active and constructive processes that share mechanisms even in an early phase.

Increased error-related brain activity for more costly errors: The role of error evaluation based on error sources

Martin E. Maier[1] & Marco Steinhauser
[1] *Katholische Universität Eichstätt-Ingolstadt, martin.maier@ku.de*

The medial frontal cortex supports action control by representing and rapidly updating expectations about action outcomes. The error-related negativity (Ne/ERN) is an electrophysiological marker of this process, which occurs at the time of the erroneous response. For instance, in a four-choice flanker task, errors can occur either by pressing a button associated with the distractors (flanker errors), or by pressing a button not associated with the stimulus at all (nonflanker errors). When these error types entail different monetary losses, the Ne/ERN was previously shown to be increased for the more expensive error type. This indicates that error types are distinguished already at the time of the erroneous response. Here, we investigated if such error type evaluation is effective only if error types (flanker vs. nonflanker errors) are linked to different error sources (selective attention errors vs. other errors). To this end, we compared conditions with different distractor-target orders, utilizing the fact that flanker and nonflanker errors cannot be due to different error sources if distractors are presented after the target and thus cannot influence the error response. The results indicate that Ne/ERN amplitudes reflected the costs associated with each error type only if distractors preceded the target but not if distractors succeeded the target. This shows that in our paradigm, error type evaluation involves an evaluation of error sources.

Future-oriented encoding benefits in middle and old age: Retrieval practice versus semantic elaboration

Alina Mailach[1], Florian Hahne, Nils Heinrich, Robert Gaschler & Veit Kubik
[1] *Leipzig University*

Retrieval practice has been shown to enhance the acquisition of new information in future learning opportunities by reducing proactive interference from prior lists. While prior work examined this forward effect of testing (FET) mainly with younger adults, there is almost no evidence of this mnemonic benefit in middle and old adulthood (but see Pastötter & Bäuml, 2019). To examine the FET as a function of age and to investigate semantic activation as a potential operating mechanism of the FET, we let 216 older subjects (30–69 years) study three lists of words in expectation to freely remember them in a final cumulative recall test; in between lists, they either recalled the items of each list (retrieval-practice group), studied them again (restudy group), or semantically judged them (judgement-practice group). After having studied all lists, subjects needed only to recall the last List 3. The results revealed a FET in both middle-aged and older subjects, with the retrieval-practice group recalling more list items and producing fewer intrusions than the restudy group. Critically, the judgement-practice group recalled less than the retrieval-practice group and did not reliably produce more intrusions. Together, these findings highlight retrieval practice as an education tool to reduce age-related memory decrements though they did not provide support for semantic activation as a key operating mechanism.

Valence-dependent changes of neural processing of augmented feedback after extensive practice of a new motor task

Linda Margraf[1], Daniel Krause & Matthias Weigelt
[1] *Paderborn University, linda.margraf@upb.de*

To examine practice related changes in valence-dependent neural feedback processing, thirty-two students learned a sequential arm movement with 192 trials in each of five practice sessions. EEG was recorded in the first and last session. An adaptive bandwidth for movement accuracy led to equal amounts of positive and negative feedback. The 'feedback-related-negativity' (FRN; 250 ms after feedback onset) reflects reward prediction errors in reinforcement learning (Holroyd & Coles, 2002). In this study, a frontal located deflection in the time window of the FRN was more negative for negative feedback ($p>.001$; $\eta 2p=.41$). An increase of this negativity after the practice phase ($p=.002$; $\eta 2p=.26$), indicates that the smaller errors in the later practice might be harder to predict. The P300 (300 ms after feedback onset) is associated with updating of internal models (Donchin & Coles, 1988). Here, the P300 was more positive for positive feedback ($p>.001$; $\eta 2p=.35$), yielding that positive feedback is more effective for updating processes. The valence-independent increase ($p=.017$; $\eta 2p=.17$) after the practice phase might reflect an improved ability to update the internal model, based on feedback information. The late fronto-central positivity (LFCP; 450 ms after feedback onset) reflects processes of supervised learning (Krause, Koers & Maurer, in press). As expected, the LFCP was more positive for negative feedback ($p>.001$; $\eta 2p=.32$) and is assumed to be associated with behavioral adaptions based on feedback with higher complexity. Together, these results demonstrate changes in valence-dependent neural feedback processing after practice of a motor task.

A framework to study the digital behavior of large cohorts

Alexander Markowetz[1], Ionut Andone, Konrad Blaszkiewicz & Qais Kasem
[1] *Universität Bonn/ Murmuras, info@murmuras.com*

Smartphones and wearables generate a plethora of data and thus provide rich insights into the lives of their owners. However, in psychology and other human behavioral fields data is still collected by using conventional methods such as surveys and focus groups, which is not only more cost-intensive and time-consuming, but also prone to errors. In addition, these methods usually generate coarse, less granular insights based on one-off snapshots with considerable bias. In 2014, we have developed a framework for data collection via smartphones – the Menthal project. Menthal is a unique scientific study of the behavior of more than 700.000 smartphone users that has been running since 2014 at the University of Bonn. The Menthal app - which has been developed by computer scientists and psychologists - tracks phone usage, computes in-depth analysis, and provides feedback to the user. With Murmuras, a spin-off from Menthal, this constantly evolving technology is now available for other scientific institutions. Researchers can independently record the behavior of participants via a smartphone app and wearables (e.g. time on the phone, app usage, steps per day). The data can then be evaluated, analyzed and correlated via a web platform. Our framework is GDPR compliant and the data of the participants will only be used for agreed study purposes. All servers are adequately secured and hosted in Germany. By providing this framework, we hope to improve the speed, quality and quantity of data collection in all fields of social sciences – especially in psychology.

Smooth as Glass or Hard as Stone: On the Conceptual Space of Materials

Barbara E. Marschallek[1], Valentin Wagner & Thomas Jacobsen
[1] *Helmut-Schmidt-University/University of the Federal Armed Forces Hamburg, marschab@hsu-hh.de*

Following Fechner (1876), we drew on a bottom-up, exploratory "aesthetics from below" approach to elucidate the conceptual space of the aesthetics of different materials (Werkstoffe). This was done for ceramics, glass, leather, metal, paper, plastic, stone, textiles and wood, as well as for the superordinate category materials. Adopting a technique first used by Jacobsen, Buchta, Köhler, and Schröger (2004), we asked 1955 students, as well as 496 people of a broader cross-section of the population in Germany, to write down adjectives one could use to describe the aesthetics of the materials with two minutes time on task. (The second subsample replicated the results of the first subsample; we therefore report only joint analyses.) An analysis of the terms listed by at least 5 % of the participants identified the term smooth, followed by hard, rough and soft as the main terms. Furthermore, descriptive, sensorial qualities constituted the core elements of the conceptual space of the aesthetics of materials, with an outstanding reference to haptic qualities. Results of a valence rating study with additional 94 participants ascribed the listed terms a rather neutral valence. The term beautiful, frequently the preeminent term in various domains of aesthetics, was by no means one of the most relevant terms in this study. Comparisons between materials revealed commonalities and differences of word usage, with materials (in general) showing the highest overlap with most of the other subsets and glass the lowest overlap. Explanations and limitations regarding the outcomes are discussed.

Exploring the impact of Instagram and Facebook usage after learning on the retention of new memories

Markus Martini[1], Robert Marhenke & Pierre Sachse
[1] *University of Innsbruck, markus.martini@uibk.ac.at*

Studies showed that a brief period of wakeful resting after learning boosts the retention of new memories, whereas task-related cognition after learning weakens memory retention. In extension to existing wakeful resting studies, we explored the impact of social media usage after learning on memory retention. We tested healthy young adults who were required to learn and immediately recall two vocabulary lists. After recalling the first list, participants were asked to wakefully rest (eyes closed, relaxed) for several minutes and after recalling the second list, they were asked to use Instagram or Facebook for several minutes. Memories for both vocabulary lists were tested again at the end of the experimental session. Our results showed that social media usage after learning had detrimental effects on memory retention compared to wakeful resting. Findings are discussed in the light of existing wakeful resting and social media studies.

From verbal thought to automatic action: Is there evidence for response priming following verbally processed stimulus-response contingencies?

Torsten Martiny-Huenger[1]
[1] *UiT The arctic university of Norway, torsten.martiny-huenger@uit.no*

The present work is based on a theoretical framework explicating the mechanism of how verbal thoughts translate into behavior. The investigated question is whether verbally encountered stimulus-response contingencies result in a response-priming effect upon encountering the stimulus – even if it is irrelevant for the task. In four studies (N = 206), participants memorized a verbal if-then action plan that linked a stimulus ("If I see an *apple*") either to a response that implicated an elbow extension (push) movement ("then I will point at it!") or an elbow flexion (pull) movement ("then I will point at [touch] my chest!"). In a subsequent letter categorization task, images of fruits – including the critical stimulus – were presented for 150 ms before the target letter. Categorization responses were performed by pushing (elbow extension) or pulling (elbow flexion) a joystick. Following the "push" plan, I predicted facilitated joystick push responses when primed with the critical stimulus as compared to the control stimuli (vice versa for the "pull" plan). Whereas descriptive statistics are mostly in the predicted direction, statistical analyses of each study individually fail to reach conventional significance levels. However, analyses of the combined studies – comparing the push versus pull plans – provide evidence that the results are in line with the predictions. The results are discussed in light of the hypothesis that encountering stimulus-response contingencies in a verbal format and by the actual perception of the stimulus and execution of the responses results in similar behavioral consequences.

Does ethical living or practicing physical Yoga exercises influence the outcomes of meditation?

Karin Matko[1], Peter Sedlmeier & Holger Bringmann
[1] *TU Chemnitz, karin.matko@psychologie.tu-chemnitz.de*

Meditation is commonly practiced in a specific context, e.g., the eightfold Yoga path. To date, only few studies have investigated the effects of adding specific components of this path to the practice of meditation. Our study was the first to address this issue. Using an experimental single-case research design, we investigated the effects of mantra meditation alone or in combination with physical Yoga exercises and/or ethical practice on healthy participants. This study was part of a project evaluating a new Mind-Body program called Meditation-Based Lifestyle Modification. 46 participants were randomly assigned to four conditions and three baselines. The conditions were meditation alone, meditation plus exercises, meditation plus ethics, and meditation plus exercises and ethics. Participants enrolled in an eight-week course, starting consecutively according to their baseline. Personality traits were assessed during pre-testing. During baseline and treatment phases participants received daily questionnaires measuring a wide range of dependent variables. This talk will present preliminary results of this study and highlight the benefits of experimental single-case designs within the context of meditation research. While all participants showed an increase in emotion regulation, we found a great heterogeneity of responses in other variables. The ethical living component seemed to have a positive effect on wellbeing but inhibit increases in body awareness and decentering. Certain personality traits and experiences during meditation could predict the outcome of the treatment. With this study we hope to answer an urgent question in meditation research, namely, whether and how the traditional Yoga context influences the effects of meditation.

Time course of the suppression of visual priming effects by forward masks

Uwe Mattler[1] & Nicolas Becker
[1] *Universität Göttingen, uwe.mattler@psych.uni-goettingen.de*

Milner and Goodale proposed two separable pathways of visual information processing, one that generates conscious experiences of the stimuli (vision-for-perception), and another that uses action-related information from visual signals to control movements (vision-for-action). This distinction is supported by findings from neurological patients and dissociative effects of visual illusions in healthy participants. Backward masking experiments accord with the dual pathway perspective by showing priming effects of visual stimuli independent from perception of the prime. A recent report of suppressive effects of visual forward masks provided new evidence for a dual pathway perspective: When a forward mask precedes a prime that is followed by a backward masking target stimulus, the forward mask is limiting the effects of the prime independent from its effects on conscious perception. In a previous study, we found increased suppressive effects of strong rather than weak forward masks. Here we report a study that examined the time course of the suppressive effects of forward masks. Four experiments revealed that suppression of priming effects increases with the duration of the forward mask, but decreases when the inter-stimulus interval between the forward mask and the prime is increased. Findings suggest that forward masking procedures provide a tool to examine the vison-for-action pathway.

Resting state functional connectivity correlates of the Time-on-Task effect and reward-induced changes in task performance

Andras Matuz[1], Gergely Darnai, Ákos Arató & Arpad Csatho
[1] *Institute of Behavioural Sciences, University of Pécs, andras.matuz@aok.pte.hu*

Sustaining attention for prolonged periods of time can lead to a decay in performance and an increase in subjective fatigue, labeled in the literature as Time-on-Task effect (ToT). However, previous studies showed that the ToT effect is reversible by increasing task rewards. In this study, we explored the link between reward-induced changes in task performance after prolonged performance of the psychomotor vigilance task and resting state functional connectivity (FC) obtained by fMRI. At the behavioral level, participants (n = 39) showed robust ToT effects indicated by slower reaction times and higher subjective fatigue but after reward manipulation, their performance significantly increased. At the neural level, we found that the magnitude of the ToT effect was negatively related to FC of the bilateral putamen and the cerebellum. In addition, graph theoretical analyses showed that the ToT effect was negatively correlated with global efficiency but positively correlated with clustering coefficient, both indicating that higher functional integrity predicts lower sensitivity to the detrimental effects of ToT. Critically, reward-induced improvements in performance were positively associated with the FC of the right lateral sensorimotor region with the right anterior insula, left anterior supramarginal gyrus, left intraparietal sulcus and left insular cortex. Our results suggest that the positive effects of reward manipulation on restoring one's performance are associated with increased FC between brain areas involved in visual attention, perceptual-motor coordination and the processing of costs and punishments.

The influence of the writing instrument (pencil, tablet stylus or keyboard) on reading and writing performance at the letter and word level of kindergarten children

Carmen Mayer[1], Stefanie Wallner, Nora Budde-Spengler, Markus Kiefer & Petra Arndt
[1] *Universitätsklinikum Ulm/ ZNL TransferZentrum für Neurowissenschaften und Lernen, carmen.mayer@znl-ulm.de*

During the past years, writing by hand increasingly replaced by the use of digital devices. Current evidence regarding the influence of the writing instrument on reading and writing acquisition is mixed. The present training study therefore tested the influence of the writing tool on the acquisition of literacy skills at the letter and word level with various tests in a large sample of kindergarten children (n=145). We developed a training program consisting of 28 training sessions across seven weeks. Sixteen letters and 12 words were trained either by handwriting with paper and pencil, by writing with a stylus on a tablet PC or by typing on a virtual keyboard of a tablet with closely matched letter games. Before training, immediately after training and in a follow-up four to five weeks after training, we assessed reading and writing performance using standardized tests. We also assessed visuo-spatial skills before and after training. Children of the pencil group showed superior performance in letter recognition and had improved visuo-spatial skills compared with keyboard training. These beneficial effects of handwriting were not observed in the stylus group. Keyboard training, however, resulted in superior performance in word writing and reading compared with handwriting training with a stylus on the tablet. Our results show that handwriting with pencil fosters acquisition of letter knowledge and improves visuo-spatial skills compared with keyboarding. Writing with a stylus on a touchscreen seems to be the least favorable writing tool, possibly because of increased demands on motor control.

Does online collaboration work? Examining accuracy, detail, and efficiency of information sharing in sequential collaboration

Maren Mayer[1] & Daniel W. Heck
[1] *University of Mannheim, maren.mayer@students.uni-mannheim.de*

In recent years, the internet has become a popular source of information mostly through websites that provide user-generated content such as Wikipedia, other Wiki-based projects, or OpenStreetMap. Available information is growing every day as individual contributors edit entries in a sequential process. The editing starts with the creation of an entry followed by a sequence of incremental changes made to the entry's latest version. Thereby, every contributor adds new or corrects existing information based on their individual knowledge. In terms of the dependency of contributions, sequential collaboration clearly differs from the aggregation of independent individual judgments (wisdom of crowds) because changes are made to existing entries. It also differs from typical group tasks of information sharing in which contributors know each other and can directly interact (hidden profile). In fact, the intermediate level of dependency as present in sequential information sharing has so far not been studied systematically. Therefore, we will examine the accuracy, detail, and efficiency of sequential collaboration compared to other forms of information sharing. In two experiments, sequential collaboration will be compared (a) to aggregated individual judgments in terms of accuracy, and (b) to group collaboration in terms of detail of the generated information. Moreover, efficiency is evaluated in all experiments by comparing the number of contributors required to reach a certain level of precision.

Temporal event segmentation by auditory context

Susanne Mayr[1], Malte Möller, Ruyi Qiu & Iring Koch
[1] *University of Passau, susanne.mayr@uni-passau.de*

A core characteristic of auditory stimuli is that they develop over time. Referring to the event segmentation theory (Zacks et al., 2007), we assume that the temporal extension of contextual sounds might be able to support the segmentation of perceptual and response features into event files. This means that the on- and offset of a sound might indicate the start and end of an episode. As a consequence, perceptual features and responses appearing within a common auditory context should be bound more strongly than those appearing in different auditory contexts. Since previous research has shown that event file binding and retrieval contributes to the negative priming effect, this hypothesis was tested using the negative priming task. In prime and probe presentations, participants had to identify target sounds by key press responses while ignoring distractor sounds. An additional tone without any response assignment functioned as auditory context. In the "common context" condition, the context started with the prime sound presentation and ended with the given prime response. In the "unique context" condition, the context started with the prime sound presentation. However, it changed after the prime sounds ended but before the prime response was given. While the findings do not support common context as a binding principle, they revealed some evidence for the role of prime-probe contextual similarity in episodic retrieval processes. Further causes for the current findings and their theoretical implications will be discussed.

Information Always Comes at a Cost: Investigating Time and Money as Costs in Self-Truncated Sampling

Linda McCaughey[1], Johannes Prager & Klaus Fiedler
[1] *Heidelberg University, linda.mccaughey@psychologie.uni-heidelberg.de*

Searching for information to base one's decisions on always comes at a cost in a real-life context. Be it the time one has to invest or actual money one has to pay to access certain information, the cost linked to it is an integral aspect of information search. Hence, all paradigms that incorporate information search should also include information cost in order to develop more realistic settings and ensure the accuracy and generalisability of their findings. In this series of four studies (N= 330), we implemented both time and money as information cost for information sampled about one or two options. The amount of information obtained by sampling was determined by the participants themselves, meaning that they had to weigh the benefits of additional information (higher accuracy) against its cost (additional time or money spent). When information cost was time, which was implemented as a speed-accuracy trade-off, participants had an extreme focus on the benefit of accuracy and neglected the cost of further sampling. When information cost was financial, participants still tended to prefer accuracy, but to a less extreme extent. Independently of that, they showed fairly successful adaptation to parameter changes (such as payoff and task difficulty). These insights are highly relevant to a whole range of paradigms, including social paradigms examining person and group perception, since those judgements are determined by the size of the information sample to a large extent.

Task-relevant neural activity related to refixation behaviour

Radha Nila Meghanathan[1], Andrey Nikolaev & Cees Van Leeuwen
[1] *TU Kaiserslautern, radha.meghanathan@sowi.uni-kl.de*

Encoding of information during free viewing is determined by the scanning pattern of the eye. The task being performed is a crucial determinant of the saccade plan. We examined neural activity related to saccade planning during a visual search and memorization task. To capture the effect of task demands on the saccade plan, we compared EEG amplitudes between first fixations and refixations for task-relevant (targets) and task-irrelevant (distractors) items. In this task, target and distractor refixations are driven by different working memory processes. While target refixations are made for rehearsal of target items, distractor refixations are due to forgetting of distractor locations. We hypothesized that these differences in working memory processes to affect preparation of the following saccade. To test this, we assessed saccade related potentials (SRPs) in the interval preceding the saccade away from a fixation or refixation. SRP amplitudes were higher for first fixations than refixations in the occipital region only for task-relevant items. No difference was found for task-irrelevant items. This finding shows that both task-relevance and working memory contents affect the saccade plan.

How we forget what we no longer need: Insights from examining the role of post-cue encoding for list-method directed forgetting after longer delay

Elisabeth Meier[1], Magdalena Abel & Karl-Heinz T. Bäuml
[1] *Universität Regensburg*

Forgetting of outdated information can be examined by means of list-method directed forgetting. In this task, people study a list of words and then receive a forget or a remember cue for this first list before studying a second list. Typical results show list-1 forgetting in response to forget cues. At least for short retention intervals, forgetting of list 1 only appears when new material is encoded after the forget cue. This finding is consistent with the involvement of an inhibitory control process that regulates between-list interference by reducing access to list 1. Recent work indicates that list-1 forgetting can be long-lasting, but it is unclear if such persistent forgetting depends on list-2 learning, too. We examined this question by manipulating not only the cue after list-1 study (remember vs. forget) but also the presence of list 2 (with vs. without) and the delay between studying and a free recall test (30 sec vs. 20 minutes). Results showed list-1 forgetting after short and longer delay in the presence of list-2 encoding, but no such forgetting in the absence of list 2. These findings demonstrate a critical role of post-cue encoding for persistent list-1 forgetting. They are consistent with predictions derived on the basis of the inhibition account of list-method directed forgetting, suggesting that between-list interference may be a necessary component for long-lasting forgetting to arise.

Age-related changes in perception and recognition of social signals from faces

Bozana Meinhardt-Injac[1] & Günter Meinhardt
[1] *Catholic University of Applied Social Sciences Berlin, bozana.meinhardt-injac@khsb-berlin.de*

Faces are an extremely reach source of socially relevant information (e.g., age, gender, identity, emotions) in everyday human-human interactions. In my talk, I first describe the mechanisms involved in perceptual processing of faces and face recognition, as well as mechanisms that allow us to recognize and to represent emotional states of others. By focusing on characteristics and age-related changes in face perception, identity and emotion recognition we show that these processes are subject of life-long changes, but to different degrees. For example, our findings demonstrate stability in mechanisms of holistic face perception across the adult life-span, while an age-related decline in identity and emotion recognition was found irrespective of stimuli and task used. Importantly, our studies show that decline in identity and emotion recognition is associated with age-related changes in other cognitive functions (i.e., memory, mental rotation ability) and with age-related decrease in frequency of social contacts and emotional expressivity. Finally, we demonstrate that age-related differences in identity and emotion recognition are not reflected in less adaptive social behaviour of older adults during social interactions. The data are discussed with regard to the two-systems account of social cognition. We also provide an outlook how these age-related differences may be relevant for affective computing models in the context of human-robot interactions.

Improving the validity of Crosswise Model estimates

Julia Meisters[1], Adrian Hoffmann & Jochen Musch
[1] *University of Duesseldorf, julia.meisters@uni-duesseldorf.de*

Randomized response techniques such as the Crosswise Model (CWM; Yu, Tian, & Tang, 2008) were developed to control for socially desirable responding in surveys on sensitive attributes. The validity of the CWM has been evaluated positively in numerous studies; however, in some recent studies the CWM showed a specificity of less than 100%, indicating that a portion of the non-carriers of a sensitive attribute were falsely classified as carriers. This can lead to a problematic overestimation of the prevalence of sensitive attributes (Höglinger & Diekmann, 2017; Höglinger & Jann, 2018). In an online-survey of 2713 respondents, we investigated whether an insufficient understanding of the CWM instructions might be responsible for the suboptimal specificity observed. Our results show that detailed instructions combined with comprehension questions can enhance specificity as compared with only brief instructions and no comprehension checks; this was however only true for higher-educated respondents. A suboptimal specificity was also observed in a conventional direct questioning condition, indicating that suboptimal specificity might be a general drawback of self-reports on sensitive attributes. Moreover, a suboptimal sensitivity was observed in both the CWM and the direct questioning condition. A higher sensitivity in the CWM condition indicated that compared to direct questioning, the CWM reduces the risk of carriers of the sensitive attribute being falsely classified as non-carriers. Our results emphasize the importance of testing participants' understanding when using indirect questioning techniques, as well as the need to develop optimized instructions for lower-educated participants.

Does incongruent information about word frequency affect people's judgments of learning?

Pedro Simão Mendes[1], Karlos Luna & Pedro B. Albuquerque
[1] *University of Minho, pso.mendes@gmail.com*

Judgments of learning (JOLs) are usually higher for high-frequency words than for low-frequency words. This result can be explained by experience-based factors (e.g., fluency while encoding items) or by theory-driven factors (e.g., beliefs about how word frequency affects memory), and we studied which factor provides a better explanation. We presented a prompt about the frequency of a to-be-studied word, which could be congruent or incongruent with the actual frequency of the word and asked a pre-study JOL. Then, a high- or low-frequency word was presented, and we asked for an immediate JOL. Finally, participants completed a recall task. In Experiment 1, participants gave higher pre-study JOLs after a high-frequency prompt rather than a low-frequency prompt. Regardless of the prompt, immediate JOLs were higher for high-frequency than for low-frequency words. In Experiment 2, we introduced the counter-belief that low-frequency words are in general better remembered. Results showed that prompts had no effect on pre-study JOLs, but that immediate JOLs were still higher for high-frequency words. In both experiments, correct recall was higher for high-frequency than for low-frequency words, and higher for congruent than incongruent prompts. Results suggest that participants use the information available at the moment of making JOLs and seem to rely more on experience-based factors (actual word frequency) than on theory-driven factors (prompt) for immediate JOLs. Worse recall for words preceded by incongruent prompts may reflect encoding impairment.

Electrophysiological correlates of changing reward prospect in voluntary task switching

Jonathan Mendl[1], Vanessa Jurczyk, Kerstin Fröber & Gesine Dreisbach
[1] *Universität Regensburg, Jonathan.Mendl@psychologie.uni-regensburg.de*

The prospect of performance-contingent reward modulates cognitive control in favor of either increased cognitive stability or flexibility: While unchanged high reward prospect has been found to induce more stable behavior, increasing reward prospect leads to more flexible behavior (Fröber & Dreisbach, 2016). However, so far the underlying processes are not well understood. To gather more insight, we measured reward-cue-locked event-related potentials (P2, P3b, and the contingent negative variation [CNV]) while participants switched (voluntarily) between cognitive tasks that were preceded by reward cues of changing magnitude. Behavioral data again showed increased flexibility when reward prospect increased (smaller switch costs, higher voluntary switch rates [VSR] whereas unchanged high reward promoted stability [higher switch costs, lower VSR]). Consistent with previous studies, P2 amplitude was modulated by the current reward magnitude (i.e., low vs. high reward) whereas the CNV was influenced by the reward sequence (remain low, increase, remain high, decrease), with the smallest amplitude for unchanged low reward. Interpreting the CNV as a marker for response preparation, this indicates the poorest preparation when reward remains low. More importantly, we found the earliest effect of the reward sequence in the P3b component: the largest amplitude was obtained with increasing reward prospect. We discuss this P3b as an indicator of context updating in working memory which eases task switching and flexibility.

Aging, visual short-term memory capacity and posterior thalamo-cortical connectivity: A TVA based structural connectivity Analysis

Aurore Menegaux[1], Felix Bäuerlein, Natan Napiorkowski, Hermann Müller, Christian Sorg & Kathrin Finke
[1] *Technische Universität München, menegaux.aurore@gmail.com*

Aging impacts both visual short-term memory (vSTM) capacity and thalamo-cortical connectivity. According to the Neural Theory of Visual Attention, vSTM depends on the structural connectivity between posterior thalamus and visual occipital cortices (PT-OC). We tested whether aging modifies the association between vSTM capacity and PT-OC structural connectivity. To do so, 66 individuals aged 20 to 77 years were assessed by diffusion-weighted imaging used for probabilistic tractography and performed a psychophysical whole-report task of briefly presented letter arrays, from which vSTM capacity estimates were derived. We found reduced vSTM capacity, and aberrant PT-OC connection probability in aging. Critically, age modified the relationship between vSTM capacity and PT-OC connection probability: in younger adults, vSTM capacity was negatively correlated with PT-OC connection probability while in older adults, this association was positive. Furthermore, age modified the microstructure of PT-OC tracts suggesting that the inversion of the association between PT-OC connection probability and vSTM capacity with aging might reflect age-related changes in white-matter properties. Accordingly, our results demonstrate that age-related differences in vSTM capacity links with the microstructure and connectivity of PT-OC tracts.

Motion in vision and touch: Crossmodal motion information biases spatial localization

Simon Merz[1], Hauke S. Meyerhoff, Charles Spence & Christian Frings
[1] *Universität Trier, merzs@uni-trier.de*

After an object disappears, the spatial location of the vanishing point of this stimulus is shifted in the direction of motion, a phenomenon known as representational momentum. The present study focusses on the relationship between motion information and spatial location in a cross-modal setting. In two visuotactile experiments, we study how motion information in one modality affects the perceived final location of a motion signal (congruent vs. incongruent left-right motion direction) in the other modality. The results revealed a unidirectional crossmodal influence of motion information on spatial localization performance. Whereas visual motion information influences the perceived final location of the tactile stimulus, the tactile motion information leaves visual localization unaffected. These results therefore extend the existing literature on crossmodal influences on spatial location and are discussed in relation to current theories of crossmodal perceptual integration.

May the source be with you: Electrophysiological evidence for the beneficial effects of retrieval orientations on performance in a source memory task

Julia Meßmer[1], Michael Weigl & Axel Mecklinger
[1] *Saarland University, julia.messmer@uni-saarland.de*

Successful source memory retrieval is thought to rely on preretrieval processes including retrieval orientations (ROs), i.e. the specialized processing of retrieval cues depending on the type of searched-for information in memory. Contrasting event-related potentials (ERPs) on correctly rejected items (CRs) across retrieval tasks typically reveals slow-wave activity with task-specific timing, polarity and topography. However, the circumstances under which the adoption of ROs (as indicated by ERP slow waves) is beneficial for memory performance are not yet clear. One reason for heterogeneous results might be the induction of ROs by the use of memory exclusion tasks, in which participants are required to detect items of one target type (e.g. studied with a color) and reject items of another (nontarget) type (e.g. studied with a function) together with new items. This task enables the selective use of nontarget retrieval, probably reducing differences between retrieval tasks and thus RO. To overcome this limitation, the present research compared two types of source information (i.e. color or social group membership) and participants had to remember details within each source type, thus enforcing the retrieval of target information. Consistent with previous research, a positive frontal ERP component (600 - 800ms post-stimulus) differentiated between CRs in the group task and the color task. Moreover, this RO ERP effect was associated with better source memory performance. These results provide evidence for the beneficial effect of ROs on source memory performance, an effect that might be covered in memory exclusion task due to nontarget retrieval.

Predicting Group Decisions Based on Confidence Weighted Majority Voting

Sascha Meyen[1], Dorothee Sigg, Ulrike Von Luxburg & Volker Franz
[1] *Eberhard Karls Universität Tübingen, sascha.meyen@uni-tuebingen.de*

Under uncertainty, groups outperform individuals in prediction tasks. To leverage this effect without the cost of actual group discussions, many studies use simulated group predictions: Instead of performing an actual group discussion, individuals give their responses separately and those responses are then aggregated by a numerical computation. Studies typically use unweighted majority voting (MV) for this aggregation. But — if independent confidence ratings for the individual responses are available — the theoretically optimal aggregation method is confidence weighted majority voting (CWMV). However, it is not entirely clear how well CWMV reflects real group decisions. Therefore, we compared CWMV simulated and MV simulated group responses to real group responses in a setting that allowed to vary the confidence ratings of group members independently. Simulated group decisions based on CWMV matched the accuracy of real group decisions very well in our setup and produced better predictions than simulating group decisions with MV. Furthermore, the confidence that real groups put into their decisions was well predicted by CWMV. Interestingly, individuals underestimated their confidences and so did real groups but CWMV simulations were not found to be biased in this way. Our results highlight the importance of taking confidence ratings into account. When aggregating individual responses into simulated group responses, confidence ratings allow for more accurate decisions. Furthermore, real group decisions are better matched by CWMV rather than MV simulated group decisions. This implies that research on group decisions should use CWMV and not MV.

Individual Differences in Visual Attention: A Short, Reliable, Open Source, and Multilingual Test of Multiple Object Tracking in PsychoPy

Hauke S. Meyerhoff[1] & Frank Papenmeier
[1] *Leibniz-Institut für Wissensmedien, Tübingen, h.meyerhoff@iwm-tuebingen.de*

Individual differences in attentional abilities provide an interesting approach in studying visual attention as well as the relation of attention to other psychometric measures. However, recent research has demonstrated that many tasks from experimental research are not suitable for individual differences research as they fail to capture these differences reliably. Here, we provide a test for individual differences in visual attention which relies on the multiple object tracking task (MOT). This test captures individual differences reliably in 6-15 minutes. Within the task, the participants have to maintain a set of targets (among identical distractors) across an interval of object motion. It captures the efficiency of attentional deployment. Importantly, this test was explicitly designed and tested for reliability under conditions that match those of most laboratory research (restricted sample of students, approximately n = 50). The test is free to use and runs fully under open source software. In order to facilitate the application of the test, we have translated it into 16 common languages (Chinese, Danish, Dutch, English, Finnish, French, German, Italian, Japanese, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Turkish). We hope that this MOT test supports researchers whose field of study requires capturing individual difference in visual attention reliably.

Testing the controllability of Evaluative Conditioning: Insights from instruction-based paradigms and ambivalent attitudes acquisition

Adrien Mierop[1], Olivier Corneille, Christoph Stahl & Mandy Hütter
[1] *Catholic University of Louvain, adrien.mierop@uclouvain.be*

When presented with neutral stimuli (i.e., conditioned stimuli, or CSs) paired with valent ones (i.e., unconditioned stimuli, or USs), individuals may prove unable to fully reverse the influence of the US on the impression they form about the CS (i.e., evaluative conditioning, or EC). This may suggest that both controllable and uncontrollable processes are involved in attitude learning. Whereas these two processes would operate in a same direction under standard attitude formation conditions, they would oppose each other when participants attempt to exert control on (i.e., to reverse) their evaluative impressions about an attitude object. The examination of absolute evaluative rating scores and the use of a multinomial processing tree modelling approach have supported this view in past research. In two experiments, we aimed at extending this investigation using more direct, precise, parsimonious and phenomenologically comprehensive measures of conflicting evaluative processes assumed in earlier studies (i.e., ambivalent attitude measures; Experiment 1, N = 182), and testing the associative assumption that uncontrollable EC effects should not be observed when the CS-US pairings are not directly experienced (i.e., instruction-based paradigm; Experiment 2, N = 188). Overall, we observed convergent evidence for uncontrollable EC effects, that should however not be confidently interpreted as evidence for the operation of associative attitude learning.

The mnemonic time-travel effect: A preregistered failure to replicate despite high statistical power

Laura Mieth[1], Raoul Bell & Axel Buchner
[1] *Heinrich-Heine-Universität Düsseldorf, laura.mieth@hhu.de*

The present study was a preregistered replication of the so-called mnemonic time-travel effect. In a recent paper it was claimed that memory improves when people experience backward motion before a memory test in comparison to when they experience forward motion or no motion because the backward motion brings them back to the moment of encoding. In the original study this mnemonic time-travel effect was reported to be robust for different manipulations of backward motion—such as real, simulated, and imagined motion. To test the robustness of the effect, we performed a close replication of the experiment with the largest mnemonic time-travel effect. We found no significant differences among the different motion conditions despite sufficient statistical power to detect an even considerably smaller effect than the one reported before. The present results thus contradict the idea that experiencing backward motion improves memory for past events. Our findings also demonstrate the importance of close replications—especially of seemingly spectacular novel findings such as the one scrutinized here.

EEG insights into neural tracking of target and distractor streams in continuous, naturalistic auditory scenes

Bojana Mirkovic[1] & Stefan Debener
[1] *Neuropsychology Lab, University of Oldenburg, Germany, bojana.mirkovic@uni-oldenburg.de*

Listening to speech in adverse, noisy environments can be a difficult task for listeners with normal-hearing (NH), but significantly more so for hearing-impaired (HI) individuals. Here we investigate selective attention to speech and how different factors may influence it in normal-hearing and hearing-impaired individuals. In our investigation we use electroencephalography (EEG) and auditory attention decoding approach which relies on the fact that neural signals synchronize to continuous, running auditory stimulus, more so to attended than to ignored one. Our NH and aided HI participants listened to an audiobook presented in noise. We manipulated noise level (easy vs. hard listening), but also participants' motivation by providing a monetary reward. Both participant groups performed better in easier listening condition, which was reflected in faster EEG impulse responses to speech. NH participants behaviorally performed better than HI, but increase in motivation indeed improved performance of HI group. In a separate study we also showed on neural level that selective attention abilities of HI participants improve with help of visual cues, such as speaker's lip movements. On behavioral level we showed that this increase is related to the amount of hearing loss. We suggest that auditory selective attention should be investigated in context of cues and scenarios that are common in every-day life as we do observe their influence on cortical speech tracking. In HI individuals these effects are even stronger than in NH and ecological approaches are needed to fully explain stream segregation and selective attention mechanisms.

Beyond mean reaction times: Combining distributional analyses with processing stage manipulations in the Simon task

Victor Mittelstädt[1] & Jeff Miller
[1] *University of Tuebingen, victor.mittelstaedt@uni-tuebingen.de*

We combined analyses of reaction time (RT) distributions with experimental manipulations of different processing stages (perception, decision, motor execution) in a Simon task to investigate which changes in Simon effects could be explained entirely by fading irrelevant response activation. Consistent with fading activation accounts, the Simon effect on mean RT was usually smaller for conditions with slower responses (Expts. 1–3, though not Expt. 4), and delta plot analyses revealed that it was always smaller for the slower responses within each condition. Critically, however, these analyses also revealed that some experimental manipulations produced upward or downward shifts in the RT delta plots, thus altering the Simon effect on mean RT in ways that could not be explained by fading activation. Thus, combining experimental manipulations targeting specific stages with fine-grained distributional analyses is a powerful tool to reveal mechanisms contributing to the Simon effect that would not be revealed using only mean RT. We discuss the contribution of different cognitive stages in modulating Simon effects and the implications for formal perceptual decision-making models.

Gaze Allocation during Joint Decision-Making in Pairs of Uneven Competence

Nino Mix[1], Lucas Haraped, Armin Deutz, Gunther Gressmann, Christian Kolbitsch & Pierre Sachse
[1] *Universität Innsbruck, nino.mix@student.uibk.ac.at*

Mobile Eye Tracking is an emerging technology in the measurement of naturalistic gaze behavior in communicative situations. While there is much evidence, that superior expertise and competence in valued domains of a task-group grants the individual influence over the decision-making process, less is known about what role gaze behavior might have in the interplay of actual competence and the exertion of influence on joint decision processes. We propose a 3-step methodological design with preliminary findings, that enables the experimental manipulation and validation of actual competence as well as the measurement of social gaze behavior in competence-dependent interactions. Step A) is the competence manipulation of N = 40 naïve participants, receiving either a task-related or unrelated training through experts in their field (wildlife biology). Step B) is the highly controlled later measurement of the obtained competence through an externally validated stationary eye tracking task (judging ages of expert rated deer pictures) and step C) is the measurement of naturalistic gaze behavior through dual mobile eye tracking technology during joint decision processes (judging ages of deer together) in previously unacquainted pairs of participants with uneven competence. We analyzed, how actual and felt competence, power and influence during joint decision-making correspond with eye tracking parameters such as social attention. Results are discussed regarding their value for domains like leadership or negotiation.

Fatigue and Self-Control: An Emerging Analysis of Behavioral Restraint Intensity

Christopher Mlynski[1] & Rex Wright
[1] *Technische Universität Dresden, christophermlynski@gmail.com*

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

Binding of Body-related and Body-external Effect Features in Action Planning Depends on Task-Relevance

Viola Mocke[1], Lisa Weller, Wilfried Kunde, Christian Frings & Klaus Rothermund
[1] *University of Würzburg, viola.mocke@uni-wuerzburg.de*

Planning an action can be construed as the temporal binding of features of perceptual action effects. Previous research demonstrated such binding for task-relevant, body-related effect features. However, there is also evidence that binding does not encompass features of a task-irrelevant, body-external effect. In three experiments, we investigated whether it is task-relevance or body-relatedness that determines whether feature binding occurs. Participants prepared a certain action A, but before executing it, initiated an intermediate action B. Each action relied on a feature of a body-related effect (index vs. middle finger movement) and a feature of a body-external effect (cursor movement towards vs. away from a reference object). In Experiment 1 (n=34), both effects were equally task-relevant. Performance in action B suffered from partial feature overlap with action A, compared to full feature repetition/alternation, which indicates binding of both types of features in planning action A. Importantly, this partial overlap cost disappeared when both effects were available but only the body-related effect was task-relevant (Experiment 2, n=34). Moreover, when only the body-external effect of action A was known in advance (Experiment 3, n=36), performance in action B was better if it aimed at the same, rather than a different, distal effect. Consequently, task-relevance determines whether binding of body-related and body-external effect features takes place, while a lack of binding does not hinder the pre-activation of features of relevant body-external effects prior to action execution.

Integrating actions - Temporal restrictions for response-response binding effects

Birte Moeller[1] & Christian Frings
[1] *Trier University, moellerb@uni-trier.de*

Many accounts of human action control assume bindings between stimuli and responses of individual events (SR-binding, e.g., Hommel, Müsseler, Aschersleben, & Prinz, 2001; Logan, 1988; Schmidt, De Houwer, & Rothermund, 2016). Recently, we observed the same sort of bindings between individually planned and executed responses (RR-binding, Moeller & Frings, 2019). As compared to SR-bindings, RR-bindings are to a larger degree distributed over time. Here we investigated to what extent delays between to be bound responses and the presence of a continuously visible stimulus between individual responses influence RR-binding effects. The results indicate relative robust effects of binding between responses that do not rely on direct response succession or a strict visual continuity between responses. Implications for a possible role of bindings in a hierarchical representation of human actions are discussed.

Thinking while walking: A closer look at executive functions in human gait

Wenke Möhring[1], Stephanie Klupp, Robin Segerer, Sabine Schaefer & Alexander Grob
[1] *University of Basel, wenke.moehring@unibas.ch*

Walking is human's most important locomotion. Until recently, walking was seen as an automated motor task which requires only minimal cognitive resources. However, recent studies indicate that walking requires higher-level cognitive processes such as executive functions. A different line of research suggests that executive functions consist of three core components, i.e., inhibition, switching, and updating. Combining these findings, the present study clarified which executive-function component is most essential for human walking. Applying a dual-task methodology, adults (n = 37) and 8- to 13-year-old children (n = 134) walked repeatedly across an electronic pathway while solving three different concurrent tasks measuring inhibition, switching, and updating skills. Results showed the largest gait alterations when adults performed the updating and switching task as opposed to inhibition. Adults' cognitive performance revealed the largest performance reductions in updating. An identical pattern of effects was found on children's walking and cognitive performance. Overall, our results highlight remarkable similarities in children's and adults' performance with updating working memory representations and switching between rule sets being the most important cognitive processes for walking. These similarities across age groups point to a general gait-cognition process. Results have high theoretical value and hold practical implications for creating effective intervention programs.

Effects of distractor modality on the inhibition of irrelevant spatial information: Insights from movement trajectories in an accessory Simon task

Malte Möller[1] & Susanne Mayr
[1] *University of Passau, malte.moeller@uni-passau.de*

Lateralized responses to central targets are typically slowed-down when a distractor is presented contralaterally (incongruent trial) as compared with ipsilaterally (congruent trial) to the response side. This so-called accessory Simon effect decreases and even reverses when the time between distractor and target increases. This has been taken as evidence that spatial codes of distractors are inhibited and current findings propose that the strength of inhibition is affected by a modality match between target and distractor. The present study utilized mouse movements in an accessory Simon task to further investigate the impact of distractor modality on inhibition. To this end, a lateralized visual (Experiment 1) or auditory (Experiment 2) distractor either occurred prior to or simultaneously with a central visual target. Depending on the target shape, participants had to move the mouse cursor from a central starting position to the upper left or right corner of the screen. In addition to response times and error rates, movement trajectories were analyzed. In both experiments, the Simon effect in response times decreased with increasing intervals, but only reversed in Experiment 1. Moreover, movement directions also reversed across intervals in Experiment 1, but not in Experiment 2: With short intervals, movements generally veered towards the location of the distractor. However, movements in congruent (as compared with incongruent) trials veered away from the distractor location with longer intervals. Together the results indicate that irrelevant spatial codes affect response execution and are more strongly inhibited when distractors are presented in the target modality.

Optimization criteria of self-organized task switching: tradeoff between waiting costs and switch costs in multitasking

Irina Monno[1], Markus Spitzer, David Dignath & Andrea Kiesel
[1] *Albert-Ludwigs-Universität Freiburg, irina.monno@psychologie.uni-freiburg.de*

Cognitive abilities are limited when dealing with multiple cognitive tasks. This is indicated for example by longer response times for task switch compared to task repetition trials. Additionally, participants seems to prefer task repetitions over task switching in voluntary task switching experiments. Here we investigate the interplay of task choice and task performance. In each trial, participants freely decide whether to categorize a letter stimulus as vowel or consonant or a number stimulus as even or odd. The stimulus, needed for task switch occurs immediately, while the stimulus associated with just performed task appears delayed. This delay increases with each repetition until the participant decides to switch. Previous research has shown that this delayed presentation of the repetition stimulus leads to increased switch rates. Moreover, waiting time for repetition stimulus mostly corresponded well to switch costs. Therefore, individuals were sensitive to their switch costs and to the waiting time for the repetition stimulus and used this information to optimize their multitasking behavior. In the present study, we manipulated the switch costs by varying the inter-trial-interval and the delay increment per repetition. We conjecture that participants' might maximize their attempt to tradeoff waiting time and switch costs for specific relations of switch costs and delay increment. Correlational analyses indicate relations between individual switch costs and individual switch rates across participants. Importantly, we identified one specific relation of switch costs and delay increment where participants could trade their switch costs and waiting time for the repetition stimulus most efficiently.

The impact of errors on Backward Inhibition

Luca Moretti[1], Iring Koch & Stefanie Schuch
[1] *RWTH Aachen University, Institute of Psychology, Luca.Moretti@psych.rwth-aachen.de*

Switching among tasks leads to performance costs that are partly due to inhibition of the previously relevant task-set. Such "backward inhibition" is measured by having participants switching among three tasks: turning back to a recently performed task (e.g. ABA sequence) proves to be more difficult than performing a double switch (e.g. CBA), due to lingering inhibition of the relevant task-set in N-2 that became inhibited when switching from N-2 to N-1. In the present studies, we tested the hypothesis that task execution leads to strengthening of the corresponding task-set. We reasoned that if an alternative task is executed instead of the required task (task confusion error), N-2 repetition cost should be abolished; on the contrary, executing the right task, but picking the wrong response (response confusion error), should not affect N-2 repetition cost. Three experiments measured the impact of errors on N-2 repetition cost. The first two experiments used incongruent stimuli under the assumption that errors would mostly arise from task confusions. Results showed a decrease in N-2 repetition cost following an error, in line with our predictions. The third experiment employed univalent responses to clearly distinguish task and response confusions: even though not enough task confusions were generated for analysis, response confusions were found to still induce N-2 repetition cost. Our results add to the topic of associative learning in task switching, suggesting that task-set execution is a sufficient condition for task strengthening, irrespective of response accuracy.

Does intersection complexity matter? Investigating the prevalence of driver distraction when waiting at a red light in a Germany city

Tina Morgenstern[1], Sarah Anders, Julia Dostmann, Lisa Jahn, Rahel Zeschke & Franziska Bocklisch
[1] *Chemnitz University of Technology, tina.morgenstern@psychologie.tu-chemnitz.de*

Driver distraction is one of the main factors in causing accidents. There is evidence of different observational studies in the United States and Europe that drivers are especially willing to engage in secondary tasks in low demanding driving contexts, such as when stopped at a red light. However, so far, it is unclear if intersection complexity affects secondary task prevalence. In the present study, drivers' secondary task engagement when stopped at a low vs. high complex signalized intersection in a German city was observed (N = 217). The intersections differed in their number of lanes. Due to the increased driving task demand at a high complex intersection, we assumed that drivers engage more often in secondary tasks when stopped at the low compared to the high complex signalized intersection. This difference should become more obvious for demanding secondary tasks, such as texting. Results revealed that in 54% of all observations drivers engaged in at least one secondary task. We did not find a difference in the overall secondary task engagement with regard to intersection complexity. However, visual-manual cell phone interactions (e.g., texting) were observed significantly more often at the low compared to the high complex intersection. This indicates that drivers adapt their secondary task engagement depending on driving task demand at least to some degree.

Superior first, inferior second? Hunting for intention superiority and intention inhibition

Marcus Möschl[1] & Moritz Walser
[1] *Technische Universität Dresden, marcus.moeschl@tu-dresden.de*

Research on memory for intentions and goals suggests that not only cognitive representations of intended actions but also semantic concepts that are associated with them exhibit heightened memory activation prior to completing an intention or reaching a goal. This has been observed, for instance, in faster lexical decisions for intention-related compared to unrelated memory contents. After intention completion, however, this so-called intention-superiority effect is presumed to dissipate or even reverse into lower activation of intention-related compared to unrelated memory contents (i.e., intention inhibition). Aiming to replicate these effects, in the present study, we tested the activation status of verbal intention representations across five experiments that were designed to detect both high intention activation before completion (i.e., intention superiority effects) and strong intention inhibition after completion. To our surprise, the present experiments showed that activation levels of intention-related and unrelated memory contents did not differ reliably prior to or after intention completion. This was also mirrored by Bayesian analyses and a meta-analytic integration of our findings, suggesting that these effects might be rather fragile and require further research to identify variables that modulate their occurrence.

History effects in predicting somatosensory consequences during grasping

Marie Mosebach[1], Dimitris Voudouris & Katja Fiehler
[1] *Justus-Liebig-Universität Gießen, marie.mosebach@psychol.uni-giessen.de*

Tactile stimuli on a moving limb are rated as less intense compared to a resting state. This phenomenon, known as tactile suppression, is discussed in the context of an internal feed-forward model that establishes sensorimotor predictions: When planning a movement, an efference copy of the motor command is used to predict and, eventually, cancel the associated sensory consequences of the movement. Humans can establish accurate predictions, but when uncertainty about the sensory feedback increases they may use the most recently obtained information to plan the next movement. For instance, when grasping an object with uncertain task-relevant properties, humans grasp as if it had the properties experienced in the previous trial. Here, we examine whether such effects of predictive control do not only modulate the kinematic behavior but also the processing of the predicted somatosensory consequences of the movement indexed by tactile suppression. We asked participants to grasp and lift an object with its mass distribution changing in a pseudo-randomized order, unknown to the participant. In line with previous findings, our results show that when grasping an object with uncertain properties, humans utilize somatosensory feedback from the previous trial to plan their next movement. However, tactile suppression was not affected by the mass distribution of the previous trial. These suggest that, under uncertain sensory feedback, recent information is used to adjust the kinematics but not the prediction of the movement's sensory consequences. The question remains, how much evidence the brain needs to acquire to establish reliable sensorimotor predictions.

Neurophysiological Patterns associated with Individual Preferences in Task Switching

Marie Mueckstein[1], Jovita Brüning, Dietrich Manzey & Klaus Gramann
[1] *International Psychoanalytic University (IPU), marie.mueckstein@ipu-berlin.de*

The emergence and underlying mechanisms of individual differences in coping with multiple task demands remain elusive in contemporary psychology. We investigated whether individual preferences for serial or overlapping processing in a task switching with preview paradigm (TSWP) are correlated to different neurophysiological patterns. Specifically, we examined at which processing stage of task switches potential differences occur focusing on the visual-attentional stage and the response-selection stage. First, the individually preferred processing mode (serial vs. overlapping) was identified in a pre-classification session with the TSWP paradigm, in which the preview of the upcoming switch stimulus allows for serial or overlapping processing of both tasks. In a second session, 26 participants with a clear preference for serial or overlapping processing (n=13) repeated the TSWP paradigm and a task switching paradigm that forced all participants to process both tasks serially. Additional to reaction times and errors, event related potentials (ERPs) were analyzed. Regarding ERPs, we found no differences in the posterior-contralateral negativity in switch trials between the two different processing preferences in either paradigm indicating comparable attentional deployment strategies. Strikingly, overlapping processors showed a significantly earlier onset of the lateralized readiness potential in switch trials only during TSWP. This lends strong support to the assumption that overlapping processors already selected an upcoming switch response and prepared response execution while they were still completing the previous trial of the other task. These results contrast previous findings and may pave the way for a better understanding of individual differences in cognitive control.

Face Adaptation Effects in Non-configural Information

Ronja Mueller[1], Sandra Utz, Claus-Christian Carbon & Tilo Strobach
[1] *Medical School Hamburg, ronja.mueller@medicalschool-hamburg.de*

Previously inspected faces can affect the perception of faces seen subsequently. The underlying mechanisms of these face adaptation effects (FAEs) have been considered to be based on sensory adaptation processes. However, by employing famous faces, recent studies were able to demonstrate that FAEs are very reliable and robust over long periods of time. This suggests a high level processing and an adaptation on a rather representational memory basis. Although research on FAEs seems to be well-advanced, our knowledge is still quite limited in terms of which qualities of a face can be adapted, as most studies have focused only on configural information (i.e., mostly 2nd-order relations). By employing brightness and saturation alterations, we investigated whether non-configural face information also play a significant role in the processing and storage of faces. Our results provide clear evidence for robust non-configural color adaptation effects which seem to be very unique within the context of faces.

Motives and Incentives Interactively Predict Motor Performance in Darts

Florian Müller[1] & Rouwen Cañal-Bruland
[1] *Friedrich Schiller University Jena, florian.mueller@uni-jena.de*

Research in the implicit motive tradition is built on the notion that motivation depends on the interaction of individuals' motives with specific incentives. Corresponding research in the domain of motor performance has mostly focused on the achievement motive because a standard of excellence is characteristic of many performance contexts. However, these contexts also offer opportunity for cooperation and competition, i.e. incentives for the affiliation and power motive. We tested whether congruence between a) individuals' affiliation or power motive and b) competition and cooperation incentives benefits motor performance. After assessing participants' baseline performance in darts they took part in either a group performance scenario (affiliation incentive) or a one-on-one competition scenario (power incentive). In contrast to previous findings, affiliation did not predict performance in the team condition. In contrast - and in line with previous findings - the power motive was positively associated with performance in the one-on-one competition scenario. Results extend findings on the power motive and highlight the need for research on affiliation.

Decisions in modular plants: How people choose between options that are characterized by qualitatively different risks

Romy Müller[1] & Alexander Blunk
[1] *Technische Universität Dresden, Chair of Engineering Psychology and Applied Cognitive Research, romy.mueller@tu-dresden.de*

While psychological studies often try to create generic situations, real-world decision making requires choices between meaningful options with qualitatively different risks. To investigate the impact of domain content on decision making, participants chose between two risky options. Three groups received different instructions about the options and risks. The generic group was instructed to choose between options 1 and 2, considering risks A and B. Two other groups learned about modular plants and were instructed to choose between two problem solving strategies: adapt parameters or exchange modules. These options were characterized by a risk of damaging the plant (higher for exchange) and a risk of suboptimal product quality (higher for adapt). The modular-plant-different group was informed that the former risk was much more important, while the modular-plant-similar group was informed that both risks were equally important. We compared the three groups' frequency of choosing exchange/option2 and hypothesized that if domain content matters, the modular-plant-similar group should weight plant risk more than the generic group weights risk 2. Contrary to this hypothesis, while the overall percentage of exchange was lowest in the modular-plant-different group, it was comparable in the two other groups. However, choices in the modular-plant-similar group showed higher variation between trials than in the generic group, being highly contingent on current plant risk. Taken together, while the hypothesis that with domain content people consider particular risks more was refuted by overall choice frequencies, it was supported by choice specificity.

Effective information after digital identity theft: Testing the perception and effectiveness of leak-checkers

Silke Müller[1], Roja Hoff, Andreas Oelker, Jaro Pekal & Matthias Brand
[1] *Universität Duisburg-Essen, silke.m.mueller@uni-due.de*

Identity data are a common target of cyber-attacks aiming at selling the data or using it for criminal purposes. New services, so-called leak-checkers, offer users the possibility to inform themselves about whether their identities have been leaked. However, we know few about the users' perception and acceptance of such services and whether the provided information motivates the user to perform protective actions. The current laboratory study (N=88) used a cover-story to investigate the use and perception of leak-checkers as well as reactions on information about leaked identity data by using a simulated leak-checking service. The leak-checker report told all participants that their identity data had been leaked. The results show that this information caused less than 30% of the participants to directly change their passwords even if they previously reported to be highly concerned about their identity data being leaked. This tendency was independent of whether identity data of social networks or online banking services were leaked. Overall, the findings indicate that leak-checkers are perceived as very useful, however, the given information does not necessarily lead users to take effective action.

Risky decision making and cognitive functions in high versus low media multitaskers

Silke Müller[1], Johannes Schiebener, Matthias Brand & Magnus Liebherr
[1] *Universität Duisburg-Essen, silke.m.mueller@uni-due.de*

Cognitive functions are essential for making advantageous decisions. This has been shown experimentally by use of gambling tasks measuring decision making under different situational conditions. Studies on media-multitasking report differences in cognitive functions in individuals who highly frequently multitask with different media (HMMs), compared to those who do not (LMMs). The current study investigated whether HMMs and LMMs differ regarding their decision making performance in different situations. In an online pre-study (N=182) we identified HMMs and LMMs respectively, who were invited into the laboratory. Participants performed two decision-making tasks: the Game of Dice Task (GDT) and the Iowa Gambling Task (IGT). Furthermore, several tests of cognitive functions (Stroop, TMT, MCST, logical reasoning test) and scales assessing attention-related cognitive error, impulsivity, and risky Internet use were conducted. Controlling for impulsivity and age, HMMs did not differ from LMMs regarding performance in the GDT and that in later IGT trials. However, the groups differed regarding IGT performance in the earlier trials (HMMs < LMMs) as well as regarding cognitive functions and risky Internet use. More precisely, HMMs performed better in the Stroop and TMT but weaker in the MCST and logical reasoning test. HMMs reported more attention-related errors and higher tendencies towards risky Internet use. Results indicate that HMMs may have advantages in information processing but difficulties in logical thinking and decision making under ambiguous risk. Decision making under objective risk doesnot seem to be affected. The findings suggest associations between media multitasking and fast/impulsive information processing.

The influence of shared visual context on the successful emergence of novel conventions: From lab experiment to large-scale online smartphone application

Thomas Müller[1], James Winters & Olivier Morin
[1] *Max Planck Institute for the Science of Human History, tmueller@shh.mpg.de*

In human communication, interlocutors are creating and interpreting messages according to their context. We present the results of an artificial language task that investigates the importance of the shared context, i.e. the amount of knowledge two interlocutors have in common, for the successful emergence and use of novel conventions. In two laboratory communication experiments, we asked pairs of participants (in the role of either sender or receiver) to use black-and-white pictorial symbols to convey the target color in an array of four colors. We manipulated access to the shared visual context by removing all distractor colors from the arrays of senders. Both experiments demonstrate that access to the visual context promotes more successful communication. We then implemented the paradigm in a smartphone application that was distributed worldwide. This method has several advantages over classical experimental designs, for instance in scale and partner choice, but is limited in experimental control. A key difference in the design was that we varied the number of distractor colors exhaustively from 0 to 3. Our analyses of this dataset show that while the number of colors still replicates our known effect, it is modulated by the chromatic position of the target color in an array, and outperforms an alternative measure based on information theory that we expected to be more accurate. This provides further support for the influence of shared context on successful communication, but opens up the question about the nature of the information extracted from the context and used by interlocutors.

Retrieval Practice meets elements of Game-Based Learning: An experimental study on different practice test modalities

Daria Mundt[1], Johanna Mösta, Lina Margarita Sora Cabarique & Mirjam Ebersbach
[1] *University of Kassel, daria.mundt@uni-kassel.de*

Research on the testing effect revealed the effectiveness of practice tests for long-term learning. Usually, practice testing is implemented by test questions that need to be answered individually on worksheets, at the computer or by clicker-systems. By doing so, practice tests are similar to achievement tests. It is not surprising that practice tests are experienced as little enjoyable and entertaining. We investigate the effect of practice testing when combining the act of retrieval with elements of game-based learning (GBL) and physical activity. Our experiment based on a one-factorial between-subject design with a sample of N = 147. We compared the final test performance of participants who learned environmental knowledge facts with a quiz that was operationalized as 1) a worksheet quiz, 2) a response card quiz or 3) a jumping-based quiz. While students answered multiple-choice questions on worksheets in the first condition, students raised coloured cards for answering the questions in the response card condition. In the jumping-based quiz, different fields on the floor represented an answer option. Students had to position themselves by jumping from one field to the other. No difference in final test performance was found between the three conditions, suggesting that the positive effect of practice testing can be achieved by different kinds of practice test modalities. This result should encourage practitioners to apply retrieval practice according to their teaching situation.

Reducing p-value Misconceptions: A Latent Growth Model Approach to Estimating Individual Rates of Improvement

Arian Musliu[1] & Arianne Herrera-Bennett
[1] *Ludwig-Maximilians-Universität München (LMU), musliuarian@hotmail.com*

Prevalent rates of statistical misconceptions among researchers (e.g., Oakes, 1986) have raised concerns about the statistical rigour in psychology. Namely, widespread misunderstandings of null hypothesis significance testing (NHST) have led to a set of common p-value fallacies (Badenes-Ribera et al., 2015). While these misconceptions have been deemed "impervious to correction" (Haller & Krauss, 2002, p.1), such claims stem from single timepoint assessments, rather than evidence of ineffective instructional interventions. The current research investigates individual rates of improvement, and sustainability of learning gains, applying linear mixed model (LMM) and latent growth model (LGM) approaches. In the first wave of data collection (N = 2,320), we evaluated baseline p-value misconception rates (8 true/false items), with two follow-up assessments across an 8-week online course. In the second wave (N = 2,903), we randomly assigned learners to a control (n = 1,499) or experimental (n = 1,404) group. The experimental group completed an additional assignment in week 1, which explicitly clarified common p-value misconceptions. LMMs revealed statistically significant improvements, for both immediate (post-test1, weeks 1 & 4) and retained (post-test2, week 8) learning. Moreover, the second wave provided evidence that learners in the experimental group incurred more pronounced improvements as compared to controls. LGM analysis found effects to be conditional on self-rated statistical expertise at t1. Findings demonstrate that p-value misconceptions are flexible and can be reduced; LGM analysis suggests that statistical expertise-level may be an important consideration affecting the learning process.

Seeking (dis)order in visual patterns

Claudia Muth[1], Gesche Westphal-Fitch & Claus-Christian Carbon
[1] *University of Bamberg, claudia.muth@uni-bamberg.de*

We examined how the human drive to find and produce order is reflected in evaluations of liking, interest and beauty. Visual patterns were produced by one group of participants with different intentions (to be liked or interesting, etc.). They generated visual displays by rotating elements with the software Flextiles. Ratings of liking and beauty by an additional group of participants were predictable by the likelihood of order-detection. Interest was meanwhile predictable by a combination of the potential for order-detection and high complexity. Furthermore, patterns intended to be interesting were associated with less obvious order, more flaws of order and more time to decide whether the image contains an order. We might be drawn to perceptual order not because we aim at stability or simplicity but because it is the very process of ordering that is rewarding. Whereas liking and beauty reflect this pleasure, interest is associated with disorder and driven by perceptual challenge. We suggest that people like creating order but complex order and disorder can induce interest by the mere potential for creating (new) order.

Temporal Binding Past the Libet Clock: Testing Design Factors for an Auditory Timer

Felicitas Muth[1], Robert Wirth & Wilfried Kunde
[1] *Julius Maximilians University of Würzburg, felicitas.muth@stud-mail.uni-wuerzburg.de*

Voluntary actions and causally linked sensory stimuli are perceived to be shifted towards each other in time. This so-called temporal binding is commonly assessed in paradigms using the Libet Clock. In such experiments, participants have to estimate the timing of performed actions or ensuing sensory stimuli (usually tones) by means of a rotating clock hand presented on screen. The aforementioned task setup is however ill-suited for many conceivable setups, especially when they involve visual effects. To address this shortcoming, the line of research presented here establishes an alternative measure for temporal binding by using a sequence of timed sounds. This method uses an auditory timer, a sequence of letters presented during task execution, which serve as anchors for temporal judgements. In four experiments, we manipulated four design factors of this auditory timer, namely interval length, interval filling, sequence predictability, and sequence length, to determine the most effective and economic method for measuring temporal binding with an auditory timer. The auditory measure was in principal apt to measure both action as well as effect binding in all four experiments (N = 192). While interval length and sequence length had a particularly strong influence on temporal binding, interval filling and sequence predictability did not seem to be of utmost importance. Participants' task load gave additional information on the best configuration of an auditory timer.

Perceived truth of social media news: An experimental investigation of source reliability, repeated exposure, and presentation format

Lena Nadarevic[1], Rolf Reber, Anne Josephine Helmecke & Dilara Köse
[1] *Universität Mannheim, nadarevic@psychologie.uni-mannheim.de*

Different determinants of truth judgments have been identified by previous research such as the reliability of the information's source, repeated exposure of the information, or the information's presentation format. Although these variables typically concur in real-world settings, most studies examined them in isolation. To address this issue, we conducted two experiments that explored joint effects in a simulated social media news context. Experiment 1 investigated effects of news source (reliable source vs. unreliable source vs. no source information), repeated statement exposure (yes vs. no), and news presentation format (with vs. without a non-probative picture) on truth judgments. We found strong and independent effects of news source and statement repetition on perceived truth, but no significant effect of presentation format. Experiment 2 aimed at exploring the role of news source (reliable source vs. unreliable source) and statement exposure (verbatim repetition vs. incoherent repetition vs. no repetition) in further detail. Again, we found strong and additive effects of news source and statement exposure. That is, verbatim repetition increased perceived truth whereas incoherent repetition decreased perceived truth, irrespectively of whether the information was presented by reliable or unreliable sources. Our findings demonstrate that people do not rely on a single judgment cue but integrate source information and meta-cognitive feelings to evaluate a statement's truth.

Within and between subject variability in dual task performance

Christoph Naefgen[1], Christine Blech, Michael Kriechbaumer, Hilde Haider, Nilam Ram & Robert Gaschler

[1] *FernUniversität Hagen, christoph.naefgen@fernuni-hagen.de*

When psychological researchers investigate relationships between two variables, they often measure the two variables within one session per participant. This makes it impossible to distinguish between a relationship that exists between people and one that exists between (hypothetical) sessions. This, as past theoretical work shows, makes it impossible to use the regression slope found with such a snapshot measurement to infer to either the slope that would be found in a targeted within-person measurement or a targeted between-person measurement. For instance, the association between the percentage of typing errors and typing speed might be opposite in a within-person (when people type faster, they make more errors) vs. a between-person analysis (fast typers are better typists and commit fewer errors). Accordingly, empirically determining the direction of associations on either level separately for each domain is essential. We analyzed data of N=58 participants performing 20 short sessions consisting of single- and dual-tasking blocks throughout multiple days. We tested whether in predicting dual-tasking performance based on single-task performance there would (1) be contributions of between-person as well as within-person variability and (2) the direction of the association would be the same on both levels. Answering both questions affirmatively, we found that slower single-task performance was associated with slower dual-task performance both on the level of across-person comparisons (worse single-taskers are worse dual-taskers) as well as on the intraindividual level (worse single-tasking days are worse dual-tasking days).

Investigating the Affect Misattribution Procedure by Hand: Examining the Cognitive Processes in a Socially Sensitive versus Non-Socially Sensitive AMP by Means of Mouse-Tracking

Lea Nahon[1] & Sarah Teige-Mocigemba

[1] *Philipps University of Marburg, lea.nahon@uni-marburg.de*

Despite the widespread use of the Affect Misattribution Procedure (AMP) for measuring attitudes indirectly, recent research found only unreliable and surprisingly small effects with the AMP in the prejudice domain (Teige-Mocigemba et al., 2017). We argue that the diminished and unreliable AMP effect in the socially sensitive domain of prejudice may be due to qualitatively different cognitive processes compared to AMPs in non-socially sensitive domains. By means of mouse-tracking, we plan to investigate this assumption by comparing cognitive decision processes while working on an AMP comprised of Turks and Germans (prejudice, socially sensitive) versus an AMP comprised of attractive and unattractive faces (non-socially sensitive). Prior mouse-tracking research showed more complex, conflict-laden, qualitatively different processing dynamics for explicitly reported attitudes toward prejudice-striken compared to non-prejudice burdened groups (Wojnowicz et al., 2009). In a similar vein, we hypothesize a greater area under the curve and maximum deviation (as markers for cognitive conflict) and more X-flips (as a marker for uncertainty and complexity) for mouse trajectories in the prejudice AMP compared to the attractivity AMP. For the prejudice AMP, this would indicate a more complex decision process with multiple processes or attitudes activated in parallel, competing with each other over time. Such a finding might contradict the notion of a misattribution process—according to which a positive or negative feeling elicited by the prime is misattributed to the target—since a misattribution process should be reflected in a more clear-cut, simple cognitive decision process.

The impact of idiosyncratic encoding on metamemory judgments

Sofia Navarro-Báez[1], Monika Undorf & Arndt Bröder
[1] *University of Mannheim, snavarro@mail.uni-mannheim.de*

Judgments of learning (JOLs), people's predictions of remembering studied words on a future test, have been extensively used to investigate metacognition. While the cues that underlie JOLs have attracted a lot of attention, no research has addressed the role of idiosyncratic cues that is often out of the researcher's control. In this study, we experimentally induced idiosyncratic person-item interactions by asking participants to write a story about 10 words before studying a word list that included synonyms of the story words. A total of N=50 University Mannheim Undergraduates wrote a story, then completed a study phase with JOLs followed by a free recall test. JOLs and recall were higher for story word synonyms than for the remaining items. Analyzing both the JOLs and recall performance with Brunswik's lens model showed that including a dummy variable coding words as story synonyms vs. neutral words reduced the non-linear parameter C representing unexplained systematic variance. These findings indicate that person-item interactions play an important role in metamemory. In addition, this highlights that using the lens model to analyze metamemory judgments may allow researchers to assess idiosyncratic encoding strategies that cannot be investigated in traditional analyses of the accuracy and basis of metamemory.

On the lexical representation of noun-noun-compounds: A continuous picture-naming study

Anna-Lisa Ndao[1], Rasha Abdel Rahman, Pienie Zwitserlood & Antje Lorenz
[1] *Humboldt-Universität zu Berlin, ndaolisa@hu-berlin.de*

The lexical representation of compounds is still under debate, and research on the topic is inconsistent. Some studies suggest that compounds have a single entry at the lemma level (e.g., Lorenz et al., 2018), while others argue for separate lemma representations for the compound's constituents in addition to the compound lemma (Marelli et al., 2012). Our study exploits the cumulative semantic interference effect (CSIE) to investigate the lexical representation of compounds. We conducted a continuous picture naming experiment, in which participants were presented a seemingly random sequence of objects for spoken naming. Previous studies have shown that naming latencies increase with each additional member of the semantic category presented within this sequence. This CSIE is assumed to reflect semantic interference during lexical access (Howard et al., 2006). Category membership in our experiment was established through the compounds` first constituent (category animals: dog lead, zebra crossing, pony tail, mouse trap, cat litter), while the compounds themselves were not semantically related. Additionally, pictures depicting the compounds' first constituent (dog, zebra, pony, mouse, cat) were presented as a control condition. The results reveal a CSIE in the control and the compound condition, showing that the semantic relationship between the compounds' first constituents influenced compound production. This might be interpreted as evidence for separate lemma representations for the compounds' constituents as suggested by the multiple-lemma representation account of compounds (Marelli et al., 2012). This and alternative explanations will be discussed in light of the complexity of the paradigm.

Self-generated expectations: the influence of anticipated validity

Nadine Nett[1] & Robert Gaschler
[1] *FernUniversität in Hagen, nadine.nett@fernuni-hagen.de*

Participants respond faster, when they predict the upcoming stimulus and their prediction is correct. In addition, Hacker and Hinrichs (1979) showed that participants respond faster when they predict the least likely stimulus. Therefore, Hacker and Hinrichs (1979) assumed that the increased response speed can be explained by higher activation of the predicted stimulus in memory and rather than by the expectation of the upcoming stimulus. However, in their experiments all stimuli were equally likely in all trials. Thus, there was no reason for participants to expect their prediction to be correct at more than chance level. We conducted an experiment in which predictions do influence the upcoming stimulus. Depending on the color of a cue, participants either had to predict the stimulus that would appear with 75%, 50%, or with 25% probability. Predictions were either self-generated or cued in different trials. Because, there are only two stimuli to classify, a 25 % chance of match would suggest that the participant have to prepare for the stimulus they did not predict. In a control condition, we also attempt to conceptually replicate the original findings by Hacker and Hinrichs (1979). In this condition, participants are asked to predict which stimulus they find most likely , least likely or just select any of the two possible stimuli. In this control condition, the upcoming stimulus is then always selected with 50% probability and participants are made aware of this in the instructions.

Bayesian Analysis of Processed Information in Decision Making Experiments

Tillmann Nett[1], Nadine Nett & Andreas Glöckner
[1] *Fernuniversität in Hagen, Tillmann.nett@fernuni-hagen.de*

In research on decision making, experiments are often analysed in terms of decision strategies. These decision strategies define both which information is used as well as how it is used. However, often it is desirable to identify the used information without any further assumptions about how it is used. We provide a mathematical framework that allows analyzing which information is used by identifying consistent patterns on the choice probabilities. This framework makes it possible to generate the most general model consistent with an information usage hypothesis and then to test this model against others. We test our approach in a recovery simulation to show that the used information may be reliably identified (AUC> .90). In addition, to further verify the correctness we compare our approach with other approaches based on strategy fitting to show that both produce similar results.

Expectation of time and the individual alpha frequency influence table tennis performance

Christian Neumann[1], Christian Kaernbach, Manfred Wegner & Julian Keil
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, neumann@psychologie.uni-kiel.de*

Reaction-based tasks depend in laboratory as well as in real life on precise information about the time of occurrence of a task-relevant stimulus as well as on a good estimation of the adequate time period between that stimulus and the reaction. There is evidence that the accuracy of a timing process is inversely related to the participant's temporal uncertainty about the occurrence of a stimulus. Furthermore people with a lower individual alpha frequency (IAF) seem to be worse at integrating sensory stimuli, possibly due to the longer temporal integration windows provided by the lower oscillatory frequency. In this study, we test the influence of temporal expectations and neural oscillations on performance in a real-life situation. To this end, we use a ball machine to shoot table tennis balls, and the participants' task is to hit the ball into a target-area. In a within-subject design, we manipulate task-difficulty by varying block-wise between a constant and a varying foreperiod before the ball onset. In addition, the IAF will be estimated for every participant using EEG. We expect the accuracy in the varying condition to be worse than in the constant condition, because of reduced temporal expectations and higher uncertainty about the occurrence of the ball. Moreover, we expect a lower accuracy in participants with a lower IAF. Finally, we predict an interaction between task difficulty and IAF, in that the influence of IAF on accuracy takes a stronger effect in the more difficult condition.

The role of sampling decisions in evaluative conditioning

Zachary Niese[1] & Mandy Hütter
[1] *Eberhard Karls Universität Tübingen, zachary.niese@uni-tuebingen.de*

Paradigms demonstrating evaluative conditioning (EC) effects (whereby a conditioned stimulus (CS) acquires the positive or negative valence of the unconditioned stimulus (US) it is paired with) remove the autonomy people have in everyday life to sample a stimulus or not. In this line of research, we test the consequences of sampling decisions in EC by allowing participants to decide which CSs to view. For instance, in one study (n=189), participants selected one of several CSs to view with a paired US on each trial. Participants in a yoked condition simply viewed the same information as a participant from the sampling condition. Results show that the EC effect became stronger with more samples in the yoked condition, but in the sampling condition, sampling a CS more frequently led people to like it more, regardless of US valence. As this difference could be due to a lack of autonomy and to a lack of involvement, a second yoked condition held constant the procedure with the sampling condition while removing choice: participants had to actively select the CSs they viewed, but were told which CS to sample on each trial. Results from this condition mirrored the other yoked condition such that the EC effect strengthened with more samples, providing stronger evidence that the difference in the sampling condition is due to making sampling decisions. Thus, this study shows how incorporating sampling into traditional paradigms can offer new insight and highlights the role of autonomy in evaluative learning.

The role of selective attention for object integration - evidence from pupillometry

Leonie Nowack[1], Hermann Müller & Markus Conci
[1] *LMU Munich, leonie.nowack@psy.lmu.de*

The present study investigated whether the integration of separate parts into a whole-object representation requires attention to be allocated at the location of an object. To this end, an experiment was performed that required observers to maintain central fixation (which was controlled via eye tracking) while localizing a target configuration at varying eccentricities in peripheral vision among various distractor configurations. The target could either be a "grouped" whole-object Kanizsa figure, or an "ungrouped" configuration of identical figural parts, but which do not support object completion processes to the same extent. The results revealed that localization accuracy improved substantially for grouped targets as the target was presented closer to fixation (with target eccentricities ranging from 15° to 5°). By contrast, for the ungrouped target, accuracies were relatively low without any eccentricity-dependent variation. Moreover, an analysis of the pupillary dilation showed that for grouped targets, the pupil size was larger for more distant positions than for more proximal ones, while it remained constant, revealing a comparably large diameter for ungrouped targets. Pupil size can be considered to reflect the covert allocation of attention in the periphery. Our findings therefore indicate that the attentional demands required to integrate a given target object scale with the eccentricity-dependent increase in difficulty to process that item. This in turn shows that perceptual grouping requires attention to render a complete-object representation.

Complexity Aversion in Risk Preferences – Bias or Noise?

Yvonne Oberholzer[1], Sebastian Olschewski & Benjamin Scheibehenne
[1] *University of Geneva, yvonne.oberholzer@unige.ch*

Decision environments have become increasingly complex with an ever-increasing amount of information available to inform our decisions. However, it remains unclear how complexity influences risky choice or risk preferences in general. Previous research that investigated the relationship has revealed somewhat conflicting results, with some researchers finding complexity aversion and others finding complexity neutrality. We address these conflicting findings by investigating the effect of complexity on risk preferences in two experiments. In the first experiment, we use a dual approach involving perceptual and preferential judgements to investigate three possible effects of complexity on risk preferences: (i) direct influence of complexity on valuation (ii) indirect influence, with unsystematic errors causing inaccurate judgements and (iii) indirect influence, with systematic errors causing biased judgements. Bayesian multilevel model analyses support the second hypothesis, showing that complexity has an effect on valuation accuracy. Concerning the first and third hypothesis, we find no systematic influence of complexity on valuation. Taken together, this suggests that complexity increases the noise in the decision process, but has no systematic influence on risk preferences as would be expected according to the previous literature that found an effect of complexity aversion. Furthermore, our results suggest that previous findings of complexity aversion might have been due to the employment of asymmetric experiment designs, which were affected by an increase of unsystematic errors. Finally, we further extended our results in a second experiment, in which we investigated risky choices in a large, representative sample (n=300) of the US population.

Quantifying perceptual efficiency of data visualizations

Sven Ohl[1], Adu Matory & Martin Rolfs
[1] *Humboldt-Universität zu Berlin, sven.ohl@hu-berlin.de*

Data visualizations can be of enormous help in conveying patterns in the underlying data. What form of visualization is selected for communication is primarily based on tradition, aesthetics, or intuition. Here we propose an approach to quantify the perceptual efficiency of data visualizations, to provide empirical grounds for informed applications of visualizations. In two experiments, we asked observers to estimate the mean of a displayed sample drawn from a circular Gaussian (von Mises) distribution, varying the presentation duration in a range from 30–2000 ms. In Experiment 1, we found that estimation performance increased with increasing presentation duration and that circular histograms communicated means more effectively than circular line plots, or the combination of both plots. We modeled behavioral reports using Speed-Accuracy-Tradeoff (SAT) functions with parameters for onset-performance, slope, and asymptote. Circular histograms outperformed the other visualizations in terms of onset performance. Circular line plots showed worst performance at onset and in the asymptote. In Experiment 2, we then varied the signal-to-noise ratio of the data (SNR), and found that better performance for data with higher SNR was largely independent of presentation duration. SAT modeling corroborated this finding—performance was already better for high- than for low-SNR both at onset and in the asymptote. In summary, our approach allows us to quantify the effectiveness of different visualizations by decomposing behavioral performance into parameters characterizing information extraction. This approach can inform choices of visualizations given particular communication goals, as shown here for the estimation of circular means.

Emotional impact and cultural identity construction in the context of the music festivals

Jordi Oliva[1]
[1] *Open University of Catalonia*

Music festivals have become an important element of the cultural and turistic programme of the western cities. These events are the origin of several intangible impacts such as the socio-cultural or the emotional which are linked to the personal identity. Understanding the emotional impact as an indicator composed of the description of the emotions and their intensity, this impact may help to comprehend the intense experience of the attendant in the context of these events. In that perspective, we stablished two aims for the research. Firstly, propose a model of evaluation of the emotional impact in music events in relation with the cultural construction of the identity. Secondly, test the model in four different music festivals. This combination becomes the first attempt to combine different models of psychological identification of emotions with the cultural impact event evaluation. Moreover, allows the observing on attendees experiences in how emotion affects the participation in music festivals and serves to understand the role of emotions in the construction of the cultural identity of the participants. The findings confirmed the correlation between the existence of intense emotions and the creation of several items in the personal cultural identity, namely: the sense of community, the city pride, the consolidation of music preferences or the creation of new aesthetic interests.

Attentional dynamics of self-associated stimuli: A comparison of highly familiar vs. recently established self-representations

Gabriela Orellana Corrales[1], Christina Matschke & Ann-Katrin Wesslein
[1] *Eberhard Karls Universität Tübingen, gabriela.orellana-corrales@uni-tuebingen.de*

Familiar self-associated stimuli such as one's own name and face can enhance performance in cuing tasks when compared to other names or faces. However, it is unclear whether newly self-associated stimuli can capture attention as effectively as familiar self-associated stimuli. A sample of 30 participants associated geometric shapes to themselves and a stranger. They then performed a target-discrimination task ("Is the target a p or a q?"). Self- and stranger-associated stimuli were simultaneously presented preceding the target. The to-be-identified target either followed the self- or the stranger-related stimuli. Further, the type of representation varied: the self and the stranger were either represented by familiar labels, by the newly associated geometric shapes or by shape-label pairs. Significant effects were observed for target location ($p < .001$) as well as type of representation ($p < .001$), with faster reaction times towards targets following self-representations than stranger-representations. The interaction between target location and type of representation was also significant ($p < .001$). Specifically, a significant difference between responses cued by self- vs. stranger-representations was observed when the self and stranger were represented by a label ($p < .001$) or a shape-label pair ($p < .001$). The newly self-associated shape did not yield a significant difference in responses to targets cued by self vs. stranger ($p = .325$). Results are interpreted as an attentional prioritization effect yielded by familiar self- vs. stranger-representations in contrast to newly established representations.

Why we feel unhappy reading about our happy online friends - Three studies on social comparisons, depression and social media use

Phillip Ozimek[1] & Hans-Werner Bierhoff
[1] *Fachhochschule Münster, phillip.ozimek@fh-muenster.de*

The aim of our research was to assess short-term and long-term effects of social comparative social media use on self-esteem and depressive tendencies. For this, we conducted three different studies. First, we conducted an exposure experiment (N =75) including two experimental groups and one control group showing that social comparative internet use decreased participants' performance-oriented state self-esteem as a short-term effect. Second, we conducted two correlational studies (Study 2 &3, Ns = 809, 145) indicating that passive Facebook use is associated with higher depressive tendencies mediated by a higher ability-related social comparison orientation and lower self-esteem as long-term effect. Third, to obtain more generalizable findings, we transferred the serial multiple mediator model successfully from private (i.e., Facebook) to professional (i.e., XING) SNS use (Study 3).

How information integration costs shape strategy selection in decision making: A Bayesian multimethod approach

Thorsten Pachur[1]
[1] *Max Planck Institute for Human Development, pachur@mpib-berlin.mpg.de*

Decision makers have at their disposal both compensatory strategies, which integrate across all available attributes of an option, and noncompensatory strategies, which consider only part of the attributes. Compensatory and noncompensatory strategies make different prediction both for the resulting decisions and patterns in response time. I present a Bayesian latent mixture approach that seamlessly combines decision and response-time data to infer a person's strategy use. The approach also allows to compare different assumptions about the information processing in compensatory strategies (e.g., regarding how the amount of available evidence influences response error and response times), taking into account the model complexity inherent in the assumptions. I apply the approach to examine the influence of the cognitive costs of integrating attribute information on strategy selection in decision from givens (where all attribute information is openly provided). Participants were asked to decide between two alternatives and both the number of attributes shown for each alternative and how attribute information was coded were manipulated. The results show that participants predominantly selected a noncompensatory strategy when the number of attributes was high and the attribute coding scheme varied across attributes; otherwise, they mainly relied on a compensatory strategy. I suggest that the pattern of strategy selection reflects an adaptive response to the costs of information integration, a previously neglected factor for strategy selection. The findings suggest an explanation for a puzzling inconsistency in previous studies on strategy selection in decision from givens; they also reveal boundary conditions of automatic compensatory processing in decision making.

Emotion-modulated Semantic Recall: Bimodal Effects of Nonverbal Facial & Vocal Cues

Moutoshi Pal[1], Begüm Bektöre, Shermain Puah, Yan Wing Kong & Arianne Herrera-Bennett
[1] *Ludwig Maximilians Universität München, Fakultät für Psychologie und Pädagogik, moutoshi.pal@campus.lmu.de*

When emotional faces (EF) are presented with sentences spoken in the congruent emotional prosody (EP), identification of facial emotions is quicker and more accurate (Massaro & Egan, 1996; de Gelder & Vroomen, 2000). This automatic 'bimodal integration effect' for congruent emotional stimuli is well-documented, but effects on subsequent recall of spoken content have not been empirically addressed. Interestingly, the language processing literature provides a contrasting view: Semantic deviations (i.e. stimuli that violate one's expectations) are difficult to integrate, and lead to automatic greater semantic processing (Kutas & Hillyard, 1980). Therefore, there are grounds to expect greater processing, and in turn greater recall, under incongruent conditions. Our study explores whether subsequent retention for semantic content differs between congruent and incongruent bimodal trials, for different emotions. Methods: Within-subject fully-crossed design, manipulating EF (angry, neutral, happy) and EP (angry, neutral, happy). DVs included measures of emotion perception (accuracy, reaction time) and subsequent recall (for sentences and faces). 2-way repeated-measures ANOVA [Emotion (angry, neutral, happy) x Congruency (congruent, incongruent)] was administered. Pilot results (N=37) revealed no main effects, but a significant interaction, ($F(2,72)=4.176$, $p=.019$, $\eta p2=.10$): Incongruent-happy trials yielded significantly greater semantic recall rates ($M=.78$, $SE=.03$) than congruent-happy trials ($M=.58$, $SE=.06$, $p=.001$), whereas non-significant differences were observed for angry and neutral trials. Results may reflect prioritized processing of contextual semantic information during incongruent trials in light of conflicting information (Ding et al., 2014). This contributes to understanding the interaction between emotionality and contextual congruency on semantic processing.

Reorganization of Spatial Configurations in Visual Working Memory

Frank Papenmeier[1] & J. David Timm
[1] *University of Tübingen, frank.papenmeier@uni-tuebingen.de*

When memorizing the locations of multiple objects in visual working memory, these locations are not represented individually but based on the global spatial configuration formed by the memorized objects. We performed multiple experiments studying the reorganizing of spatial configurations in visual working memory based on an informative retro-cue within a location change detection task. We observed that participants could reorganize the global spatial configuration into a partial configuration containing the retro-cued objects during maintenance. Further, reorganization occurred across a wide range of different set sizes even up to 16 objects. Finally, our data suggests that the organization of visual working memory based on spatial configurations seems to depend on eye movements. That is, the influence of spatial configurations on change detection performance was stronger when participants were allowed to move their eyes than when we enforced fixation using an eye-tracker. We discuss our findings in the context of the potential memory representation underlying spatial configurations in visual working memory.

Mistakes were made: Episodic retrieval of erroneous responses

Juhi Jayesh Parmar[1], Lennart Kapinos, Maximilian Stock & Klaus Rothermund
[1] *Friedrich-Schiller-Universität Jena, Germany, juhi.jayesh.parmar@uni-jena.de*

In this study we investigated processes of stimulus-response binding and retrieval for erroneous responses. Are mistakes stored and retrieved from memory, like correct responses, leading to a perpetuation of erroneous behavior? Or do people take into account that an error was made, storing and retrieving only correct or corrected responses? Two experiments were designed to assess SR binding and retrieval effects in a sequential prime/probe design using a colour classification task, with an orthogonal variation of response relation (colour repetition vs. change) and stimulus relation (word repetition vs. change). Experiment 1 (n=83) measured SR binding and retrieval for errors that occurred under time pressure (chance errors), while Experiment 2 (n=81) required participants to deliberately respond erroneously (instructed errors) in some of the trials. We found standard SR binding effects following accurate responses in the prime in both experiments. However, no significant SR binding effects were obtained in trials following erroneous prime responses, indicating either that errors are not bound and/or retrieved from memory, or that retrieval of both erroneous and corrected responses might have neutralized each other.

Pay more to save less? Efficiency upgrades are more attractive when judged in joint vs. separate evaluation modes

Eyal Peer[1] & Eyal Gamliel
[1] *Hebrew University of Jerusalem, eyal.peer@mail.huji.ac.il*

Marketers often offer consumers options to upgrade their products and services to faster or more efficient ones. Consumers then need to judge the offered upgrade either in and of itself or in comparison to a larger upgrade. The evaluability theory suggests that separate evaluations of objects are often influenced by attributes which are easy to evaluate, and less by attributes that are hard to evaluate, even when the latter are more important. As a result, when given two options, where one is better than the other in joint evaluation, people show biased judgments when evaluating each option separately, and choose the inferior option instead. In this paper we show an opposite pattern in the context of efficiency or speed upgrades: When asked to judge between two upgrade offers for home Internet speed or cars' fuel-efficiency in a joint evaluation mode, people overestimated the savings of the larger upgrade, whereas in a separate mode their evaluations were less biased and more calibrated to the actual time or fuel savings. In three experiments, we found that these overestimations in joint evaluation mode caused people to be willing to pay or to accept upgrade offer for larger upgrades more than they should have, compared to their stated preferences when the upgrades were evaluated separately. These findings hold both theoretical implications for the evaluability theory, as well as the practical and policy implications about how efficiency upgrade options should be presented to decision-makers.

The Influence of Visual Perception on the Subjective Evaluation of Rotated Seating Positions and its Relevance for Automated Driving

Julia Pelzer[1], Viktoria Arling, Stefan Ladwig & Gudrun M. I. Voß
[1] *RWTH Aachen University, Institute for Automotive Engineering, julia.pelzer@rwth-aachen.de*

Establishing highly automated driving is a challenge in the automotive industry. An advantage of automation is the ability to use the travel time for non-driving-related activities. Therefore, it is discussed how to adapt in-vehicle seating positions to these activities by rotating seats along the horizontal axis. In this context, passenger psychology related topics like the acceptance of rotated seating positions were considered theoretically but rarely investigated experimentally. In an initial study evidence was found that left-turned positions are preferred in right-hand traffic, although an explanation for these effects has remained open. Based on this, the current study examines the influence of visual perception as one possible explanation for these findings. For this purpose, participants were initially screened for their motion sickness susceptibility to create a balanced sample. The included sample (N=31) experienced seven rotations in a vehicle on a test track both with and without view outside the vehicle. The results show that in both visual conditions the left-turned rotations were rated significantly better regarding their acceptance. Furthermore, the qualitative analysis of open reasoning shows strong relevance of visual perception for the evaluation of seat rotations. Summarizing, the results indicate existence of visual dominance. However, visual processes alone cannot explain the differences between sides. Both, ergonomic and individual factors also have an impact on subjective ratings. Due to current relevance, the results offer potential for further research as well as for the derivation of practical implications in the development of future vehicle interior concepts.

Learning of across- and within-task contingencies modulates partial repetition costs in dual-tasking

Lasse Pelzer[1], Hilde Haider, Christoph Naefgen & Robert Gaschler
[1] *Universität zu Köln, lasse.pelzer@uni-koeln.de*

Recently, Hazeltine and Schumacher (2016) proposed that dual-task costs might result from confusions on the task-set level as both tasks are not represented as distinct task-sets. A further assumption is that participants always predict upcoming events (Bröker et al., 2018). If they have no knowledge upon which they could base their prediction, they likely will base it on the task combination they had experienced in the preceding trial. These t1-based predictions should lead to partial repetition costs when only one of the task-stimuli is repeated. Here, we tested whether learning of built-in across- and within-task contingencies can substitute t1-based predictions, thereby reducing partial repetition costs. The study consisted of a dual-task with a visual-manual and an auditory-vocal task. Task contingencies were manipulated between-participants. In the Baseline condition, no contingency was realized. In the Across-task condition, two of three visual stimuli were consistently paired with one respective tone. In the Within-Task condition, the visual manual task followed a very simple sequence. All 25 subjects per condition, completed six dual-task blocks in one single session. In both experimental conditions, but not in the Baseline condition, partial repetition costs decreased with practice. This supports the assumption that across- as well as within-task contingencies substitute t1-based predictions. This is in accord with the assumption that one major problem in dual-tasking might be that participants can not represent the two tasks separately (Zhao et al. 2019).

Decomposing the Attentional Blink

Anders Petersen[1] & Signe Vangkilde
[1] *University of Copenhagen/Department of Psychology, anders.petersen@psy.ku.dk*

The Attentional Blink (AB) refers to a deficit reporting a second target (T2) presented 200-500 ms after a preceding target (T1) imbedded in a stream of distractors. Several theories about the origin of the AB have been proposed. Some theories claim that the AB is the result of a temporarily closing of an attentional gate, others that it is caused by a reduction in the capacity to process visual information. A third group of theories argue that it is an impairment in the ability to filter out the surrounding distractors which leads to the T2 deficit. In this talk, I will present the results of three experiments in which we systematically vary the exposure duration and composition of the T2 display allowing us to decompose the T2 deficit in terms of well-established parameters based on a Theory of Visual Attention (TVA). As the different AB theories make specific predictions in regard to which parameters should be affected during the AB, we are able to test their plausibility. All three experiments consistently show a lower processing speed of T2 during the AB, supporting theories of reduced capacity. No evidence supporting gating or filtering theories are found.

Separation of sequences within dual-task exercises

Christian Petry[1], Christoph Naefgen, Hilde Haider & Robert Gaschler
[1] *Fernuniversität in Hagen, Christian.Petry@fernuni-hagen.de*

Previous studies showed that separate chunks are being acquired when participants alternate between two sequences that start with the exact same responses in single-tasking (Perlman, Pothos, Edwards & Tzelgov, 2010). This raises the question if separate sequence representations are also acquired if the overlapping sequences are presented in dual-tasking. It was also tested if the sequences were learned implicitly. Subjects should do either a single task or a dual task exercise. In both conditions, the subjects should react to a stimulus in the form of an „X" by pressing certain keys on a keyboard. The stimuli were presented in two different sequences, which occurred with different frequencies. In a variant of the experiment, an eye tracker was added to track anticipatory fixations concerning overlapping vs. non-overlapping parts of the sequences as a further indicator of separation of sequence representations. The results show that the sequences were learned separately and in part implicitly in both conditions.

Neuro-cognitive dynamics of self-other distinction are involved in interference control during automatic imitation in a social context

Daniela Pfabigan[1], Birgit Rauchbauer, Corinna Lorenz & Claus Lamm
[1] *University of Oslo, d.m.pfabigan@medisin.uio.no*

Regulation of motor resonance processes in the social environment is indispensable. The automatic imitation task is a model of motor resonance, creating interference by (in) congruency of a target cue and task-irrelevant concurrent movement. In two studies we investigated interference control during automatic imitation in varying social contexts and its underlying neuro-cognitive dynamics, using event-related potentials. The first study examined interference control by different ethnicities (White and Black hands) on the stage of stimulus processing (late positive potential (LPP), N190,P3) and response execution (Pre-Motion Positivity (PMP), Reafferent Potential (RAP)). We observed that the N190 indexed purely visual self-other distinction, while the PMP predicted behavior. This suggests that PMP indexes motoric self-other distinction. The P3 and PMP together could reflect a dynamic process linking perception to action execution, incorporating motoric self-other distinction at movement initiation. The second study investigated whether self-other distinction processes (PMP) or cognitive conflict/action monitoring (N2, CRN) underlie interference control during automatic imitation in an extended social context (adding White and Black happy and angry faces). N2 and CRN components were modulated by social context, yet the PMP again predicted behavioral results. This suggests that while interference control via cognitive conflict/action monitoring provides information about the social context to motor resonance processes, motoric self-other distinction upon movement initiation may underlie interference control in the automatic imitation task. Overall, we suggest that the PMP may reflect motoric self-other distinction processes upon movement initiation during automatic imitation.

That will Catch my Attention!: Is the salience of an action´s future effect anticipated and proactively monitored?

Christina Pfeuffer[1] & Stephanie Stengele
[1] *University of Freiburg, christina.pfeuffer@psychologie.uni-freiburg.de*

When our actions contingently yield distal consequences, we bi-directionally associate action and effect. These action-effect associations allow us to select and plan our actions by anticipating their consequences. Crucially, effect anticipation also leads to anticipatory saccades towards the future location at which we expect an action´s effect to occur based on prior learning experiences. These anticipatory saccades are thought to reflect a proactive monitoring process that prepares a later comparison of expected and actual effect. Here, we examined how features of the anticipated future effect are proactively monitored based on the example of effect salience (luminance, colour contrast, and flicker frequency). Participants performed anticipatory saccades earlier for anticipated salient as compared to anticipated non-salient future effects of their actions. To draw inferences regarding the relation between the perception and anticipation of the same effect stimulus, we relate our findings regarding anticipatory saccades in anticipation of a future effect to exogenous and endogenous (antisaccade task) shifts of attention when presented with the same stimulus.

Modality-specific influences on language control

Andrea M. Philipp[1], Iring Koch & Simone Schaeffner
[1] *RWTH Aachen University, Institute of Psychology, Andrea.Philipp@psych.rwth-aachen.de*

Language control refers to the ability to correctly understand or to correctly produce a word (in the correct language) in a given situation. In a series of experiments, we demonstrate modality-specific influences on language processing and language control – specifically in settings in which the sensory modality (i.e., auditory vs. visual input) and/or the motor modality (i.e., verbal vs. manual output) could repeat or switch from one trial to the next. We will summarize our findings on modality-specific influences in two different lines of research. First, we focus on the compatibility between sensory modality and motor modality in language processing. Here, our data show higher switch costs (i.e., worse performance in switch trials compared to repetition trials) when switching between incompatible sensory-motor modality mappings (auditory/manual and visual/vocal) than when switching between compatible sensory-motor modality mappings (auditory/vocal and visual manual). Second, we discuss differences in modality-specific influences on language production and language perception tasks in language switching. In these experiments, bimodal language switching (switching between two languages in two different modalities) was compared to unimodal language switching (switching between two languages in the same modality). While bimodal compared to unimodal switching can, under specific conditions, lead to a decrease of switch costs in language production, it increases switch costs in language perception tasks.

Approaching optimality: functional adaptation and age-related changes in visual perception

Karin S. Pilz[1]
[1] *University of Groningen, k.s.pilz@rug.nl*

A major part of research dedicated to age-related changes concentrates on cognitive or sensory deficits. This is also the case in vision research. However, the majority of older adults ages without major cognitive or optical deficits. These are foremost good news, but even in the absence of neurodegenerative or eye diseases changes in visual perception occur. It has been suggested that these changes are due to general decline. However, more recent studies reveal large individual differences within the ageing population and whereas some functions show age-related deterioration, others are surprisingly unaffected. Overall, it becomes increasingly apparent that perceptual changes in healthy ageing cannot be attributed to one single underlying factor. I will present studies related to low-level motion, biological motion and orientation perception that challenge the view that age-related changes in healthy ageing are based on decline. Instead, our findings suggest an age-related specification based on visual experience across perceptual functions. The studies presented are not only of interest for ageing researchers, but will also lead to a more complete understanding of the processes underlying visual perception in general.

Temporal distance between head turn and pass modulates the head fake effect in basketball

Andrea Polzien[1], Iris Güldenpenning & Matthias Weigelt
[1] *University of Paderborn, andrea.polzien@upb.de*

Different studies showed that participants react slower and more error-prone to the pass direction of a basketball player, when a head fake is applied. The present experiment examined, how the head-fake effect is influenced by different temporal distances between head turn and pass execution. Twenty-three basketball novices (11 ♀, 3 left-handed, mean age = 24.3, SD = 2.7) were asked to indicate the pass direction of a basketball player presented on a monitor by pressing a left or right key. Each trial consisted of a fixation cross (500 ms), the basketball player in an initial position gazing straight ahead (1000 ms), head turn to the left/right (varying SOA between 100 and 800 ms, in steps of 100 ms), and pass execution with or without a head fake (until response). After 36 practice trials, four experimental blocks with 180 trials each were conducted. A one-way ANOVA on the reaction times revealed a significant main effect for the SOA [$F(4.63, 106.54) = 8.52$, $p < .001$, $\eta p2 = .27$]. The head-fake effect steadily increased from 2 ms at SOA 0 to 300 ms at SOA 300 and again decreased to 12 ms at SOA 700. Post-hoc t-tests revealed significant differences between the peak at SOA 300 compared to the lowest point on its left/right ($ps \leq .001$). Hence, the head fake in basketball is most effective when the head turn is initiated 300 ms before the pass execution.

Functional relevance of acoustic and motor representations for verbs: A behavioral interference study

Margot Popp[1], Alexander Berger & Markus Kiefer
[1] *Ulm University, margot.popp@uni-ulm.de*

Grounded Cognition approaches assume that modality-specific sensory-motor brain systems are substantially involved in conceptual processing. The significance of motor and auditory systems for the processing of word meaning has already been demonstrated for action- and sound- related nouns. The present study investigated the functional relevance of sensorimotor information for the processing of action- and sound-related verbs using a behavioral interference paradigm. Participants performed an explicit semantic context decision task, in which action-related verbs describing actions performed with the hands and sound-related verbs were presented with a semantically related context noun. During the semantic context decision task, participants performed a motor or an acoustic interference task, which included the execution of hand movements or the perception of sounds, respectively. We tested whether the simultaneous presentation of interfering motor or acoustic information specifically impairs the processing of action- or sound-related verbs. In the semantic context decision task, we found a specific impairment in the processing of less familiar sound-related verbs during the acoustic interference task. The motor interference task, however, did not incur processing costs for verbs of high action-related feature relevance. The results therefore indicate a functional relevance of the auditory system for less familiar verbs with high sound-related feature relevance, in which the semantic decision is presumably based on deep semantic processing and not on superficial verbal associations as in highly familiar verbs. The motor task might have been too easy to elicit interference effects for action verbs.

The interplay of phasic alertness and accessory stimulation in visual choice reaction

Christian H. Poth[1]
[1] *Bielefeld University, c.poth@uni-bielefeld.de*

Responses to visual stimuli are faster when the stimuli occur simultaneously with auditory accessory stimuli. This is despite the fact that accessory stimuli offer no information regarding the required response. Performance is also improved when auditory stimuli precede rather than accompany the visual targets. This effect is assumed to arise from phasic alertness, a short-lived increase in the brain's readiness for information processing. Here, we ask how phasic alertness and accessory stimulation work in concert. Specifically, we investigated how auditory alerting modulates the effects of subsequent accessory stimuli on a visual choice reaction task. Accessory stimuli supported performance in the absence of alerting cues, but impaired performance when alerting cues had been presented before (Experiment 1). This reversed accessory stimulus effect did not stem from expectations regarding stimulus combinations (Experiment 2). In sum, our findings reveal that phasic alerting changes the accessory stimulus effect from beneficial to detrimental for performance.

Electrocortical parameters underlying cognitive-motor interference in younger and older adults during walking

Janna Protzak[1] & Klaus Gramann
[1] *TU Berlin, janna.protzak@tu-berlin.de*

Parallel processing of diverse incoming information while executing concurrent tasks is an essential aspect of human behavior. Crossing the street, for example, requires cognitive integration of different kinds of visual information, such as traffic lights or approaching cars, while executing motor programs supporting stable and secure gait. With advancing years and associated declines in motor, sensory, and cognitive functions, each of these parallel processes demands increased cognitive control. Potential consequences are resource conflicts and a decline in performance, as demonstrated in cognitive-motor dual-task studies (for a review and meta-analysis see Al-Yahya et al., 2011) . The aim of our recent investigation was to identify specific perceptual and cognitive processing stages that account for age-related performance declines. To achieve this, we used Mobile Brain/Body-Imaging (MoBI, Makeig, Gramann, Jung, Sejnowski & Poizner, 2009; Gramann et al., 2011) which allowed us to record neurophysiological data including natural gait in realistic experimental scenarios and thus to study brain dynamics underlying cognitive-motor interference. More specifically, we were interested in the interdependence of motor performance measures (sitting, standing and walking) and visual information processing. In this talk, I will provide an overview of our work in the field of MoBI with older adults. I will present behavioral, electroencephalography (EEG), and motor performance data, and discuss selected results on age-related differences in cognitive, sensory, and motor coupling.

To touch or not to touch: Exploring the effects of touchscreen usage on psychological ownership and stimulus evaluation

Lisa Rabl[1] & Jürgen Buder
[1] *University of Tübingen, l.rabl@iwm-tuebingen.de*

The effect of touchscreen usage on the perception of contents we consume has rarely been addressed in research. Within a series of three experiments (total sample size of 247 participants) we tested how touchscreen usage compared to other input devices, e.g. mouse or keyboard, influences attitude change, as well as basic stimulus evaluation. Study 1 tested the effect of touchscreen usage on attitude change. Participants were asked to rank-order a set of arguments either using a touchscreen or a mouse. We expected touchscreen usage to increase the impact of the arguments leading to a higher attitude change. However, our results did not find any differences between the devices. Study 2 and 3 both focused on the effect of touchscreen usage on general stimulus evaluation, concerning perceived psychological ownership as well as valence ratings. Study 2 used a set of adjectives as material, whereas study 3 used pictures. We expected to find higher levels of psychological ownership as well as a more positive evaluation of the stimuli when a touchscreen was used compared to the other input devices (mouse and keyboard). The results of both studies indicated that the device used to carry out the task was not of importance. In conclusion, the usage of touch-interfaces does not seem to significantly affect the overall perception of stimuli compared to other input devices like a mouse or keyboard. All three experiments were pre-registered.

Effects of different cognitive demands of interruptions on the performance in a procedural task with sequential constraints

Tara Radovic[1] & Dietrich Manzey
[1] *Technische Universität Berlin, tara.radovic@tu-berlin.de*

Previous studies have shown detrimental effects of interruptions on the execution of interrupted (primary) tasks in laboratory settings and work environments. Aim of this study was to examine effects of different cognitive demands of interruptions on the post-interruption performance in a primary task. The primary task was a verbal procedural task with sequential constraints, simulating a typical procedural task like performing a checklist from memory. While performing this primary task, 44 participants were interrupted for 30s at different steps by an interruption task varying in memory demand (2-back vs. 1-back task) and processing code (verbal vs. spatial). Resumption times (how fast the primary task is resumed) and sequence errors (resuming the primary task at the wrong step) were analyzed. Assuming that interruptions demanding more memory resources and the same processing code as the primary task are more disruptive, worse post-interruption performance was expected for the 2-back interruption tasks compared to the 1-back tasks, and for verbal compared to spatial interruptions. As expected, high memory demand of interruption task lead to longer resumption times and more sequence errors at post-interruption step, compared to the interruptions posing low memory demand. Verbal interruptions lead to longer resumption times at post-interruption step than spatial ones, while no effect was found on sequence errors. The results reveal additive effects of the two factors in resumption times, and suggest that both memory and processing code demands are relevant properties of interruptions which can influence the post-interruption performance.

What Makes Attitudes Strong? Extremity, Confidence, Durability, and Resistance to Change in the Formation of Novel Attitudes

Kate Ratliff[1]
[1] *University of Florida, USA, ratliff@ufl.edu*

Participants in three high-powered studies (combined N > 4,000) read evaluative information about members of two fictitious social groups - Niffians and Laapians. One group was described positively, the other negatively. In the more information condition, participants read twice as many evaluative statements as did participants in the less information condition. Following the learning procedure, we measured participants' evaluations of the social groups with an Implicit Association Test (IAT; Greenwald et al., 1998; Studies 1 and 3) or Affective Misattribution Procedure (AMP; Payne et al., 2005; Studies 2 and 3), and self-report measures. Participants' implicit and explicit evaluations were consistent with the valence of the information they learned (i.e., were more positive in the positive-information condition than in the negative-information condition) but were no more extreme in the more information condition than in the less information condition. This effect is compatible with recent arguments that the strength of newly formed attitudes does not depend on the experience of learning evaluative associations; mere instructions can form attitudes that are as "strong" as those formed via an attitude induction paradigm. (Smith, Calanchini, Hughes, van Dessel, & DeHouwer, 2019). However, extremity is but one feature of attitude strength. The current research also explores whether the exposure to greater amounts of evaluative information influences other indicators of attitude strength: certainty, longevity, and resistance to change.

The number–weight illusion

Dennis Reike[1] & Wolf Schwarz
[1] *University of Potsdam, reike@uni-potsdam.de*

When objects are manually lifted to compare their weight, then smaller objects are judged to be heavier than larger objects of the same physical weights: the classical size–weight illusion (Gregory, 2004). It is also well established that increasing numerical magnitude is strongly associated with increasing physical size: the number–size congruency effect e.g., (Besner & Coltheart Neuropsychologia, 17, 467–472 1979; Henik & Tzelgov Memory & Cognition, 10, 389–395 1982). The present study investigates the question suggested by combining these two classical effects: if smaller numbers are associated with smaller size, and objects of smaller size appear heavier, then are numbered objects (balls) of equal weight and size also judged as heavier when they carry smaller numbers? We present two experiments testing this hypothesis for weight comparisons of numbered (1 to 9) balls of equal size and weight, and report results which largely conform to an interpretation in terms of a new "number–weight illusion".

Visual fit estimation in scatterplots: Influence of amount and decentering of noise

Daniel Reimann[1], Christine Blech, Nilam Ram & Robert Gaschler
[1] *University of Hagen, Institute for Psychology, Hagen, Germany, daniel.reimann@fernuni-hagen.de*

Recent work in science studies indicates that researchers often view the world through data graphs rather than by direct observation and that data graph perception are needed to better understand how we visually weigh evidence. Scatterplots are ubiquitous data graphs and can be used to depict how well data fit to a quantitative theory. In Experiment 1 (N = 119) we quantified the influence of the noise level on the perceived fit between the regression line and the data points. As to be expected based on work in psychophysics, the relationship between the error variance and the subjective deviation was negatively accelerated: More specifically, for lower error variance, increase of subjective deviation was three times as high as for higher error variance. In Experiment 2 (N = 62) we additionally manipulated how central or decentral the noise was. Quantitative theories are challenged by systematic biases between prediction line and data rather than by high amounts of noise. Results indicated that this expert-perspective is not reflected by judgments of the student sample, calling for special efforts in science communication and teaching: Strong decentering only mildly reduced fit ratings while noise level again had a strong impact.

Product labels: Asymmetric information integration and buying decision under more or less ambivalence

Ulf-Dietrich Reips[1] & Philipp Jahn
[1] *University of Konstanz, reips@uni-konstanz.de*

Information integration principles have an influence on how information about the presence or absence of an ingredient may lead to buying decisions. Based on the theory of perceived threat (Slovic, 1987) we propose that both form and content of conveying information about presence and absence have separate influence and present two experiments that test this assumption. In a 2 (label vs. no label - within) x2 (label information: presence, absence - between) x2 (healthiness of food product: healthy, not healthy - between) mixed design 142 participants saw a label that indicated either the absence or the presence of an unknown ingredient. Participants' task was to compare the product with the label to the same product without the label in terms of its tastiness and healthiness. Furthermore, we measured their tendency to buy the products. Ambivalence was assessed objectively with the Griffin scale and subjectively by asking directly. Participants indicated a preference to buy products without a label. Products without a label were also perceived as tastier than those with a label. Confirming our prediction that form and content interact asymmetrically, products without a label were rated as healthier than products without a label, if the label said "with" rather than "without". Objective ambivalence correlated highly with subjective ambivalence for products without a label, but not for products with a label. In a second experiment to be reported we varied label information verbally rather than visually. Meaning of results will be discussed in both a basic and an applied sense.

Increased motor load impairs resource allocation in the EEG during a task switch paradigm in an outdoors environment

Julian Elias Reiser[1], Edmund Wascher & Stefan Arnau
[1] *Leibniz Research Centre for Working Environment and Human Factors, Dortmund, reiser@ifado.de*

On a daily basis people perform concurrent motor and cognitive tasks such as going through their internal shopping list while walking to the station. Oftentimes we find the performance in the cognitive task to be impaired with increasing complexity of movements, though the underpinnings of this decrement are still under debate. To get a deeper insight into the underlying cognitive processes we used a mobile EEG approach to quantify interference from motor tasks on cognitive performance. In this study, we examined the effects of different levels of movement complexity (standing, walking, obstacle course) on the participants' cognitive resources during an auditory task switching paradigm in an ecologically valid outdoors setting. Besides subjective workload ratings and response times we used neurophysiological measures to quantify the effects of movement on cognition. In a sample of 20 participants first results showed that increasing movement complexity was subjectively rated more demanding. Also, response times were higher in the cognitive task under increased motor load. Neurophysiological measures showed decreased resource allocation to the cognitive task for higher motor complexity settings in Theta- and Alpha-band activity as well as a higher need for control in parietal ERP components. This study demonstrates a distinct detrimental effect of higher motor load on cognitive performance that is highlighted by neurophysiological measures of the mobile EEG. Also, this study delivers further arguments for the feasibility of applying mobile EEG in real-world settings to get a deeper insight on cognition outside the lab.

Predicting Acceptance with Cognitive-Affective-Maps

Lisa Reuter[1], Sabrina Livanec, Michael Stumpf & Andrea Kiesel
[1] *University of Freiburg, lisa.reuter@livmats.uni-freiburg.de*

Investigations on attitudes and behaviour of humans with respect to acceptance of novel technologies have yielded various competing models, each with different determinants. We want to extend already established psychological models of action control and technology acceptance, such as the Unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003) by affective factors. To this end, we adapt the method of Cognitive Affective Mapping (CAM, Thagard, 2010), with which complex concepts and their affective connotations can be represented. Subjects design their own cognitive-affective representation on a given topic in a kind of mind-map, which visualizes not only cognitive but also affective structures. This representation of coherent concepts reflects how the human brain functions and helps to better conceptualize mental processes, which are crucial to understand the determinants of acceptance and decision-making processes. Currently, the CAM method is used for data collection and analysed on an individual level. Extending this aim, we will discuss methods to aggregate the data to be able to make predictions for acceptance and decision-making processes.

Learning in anticipation of reward and punishment: Perspectives across the human lifespan

Anni Richter[1], Matthew J. Betts, Lieke De Boer, Björn Schott, Marc Guitart-Masip & Kerstin Krauel
[1] *Leibniz-Institut für Neurobiologie Magdeburg, arichter@lin-magdeburg.de*

Pavlovian biases influence the interaction between action and valence by coupling reward seeking to action invigoration and punishment avoidance to action suppression. In this study we used an orthogonalised go/no-go task to investigate learning in 247 individuals across the human lifespan (7-80 years) to demonstrate that all participants, independently of age, demonstrated an influence of Pavlovian control. Computational modeling revealed peak performance in young adults was attributable to greater sensitivity to both rewards and punishment. However in children and adolescents an increased bias towards action but not reward sensitivity was observed. In contrast, reduced learning in midlife and older adults was accompanied with decreased reward sensitivity and especially punishment sensitivity. These findings reveal distinct learning capabilities across the human lifespan that cannot be probed using conventional go/reward no-go/punishment style paradigms that have important implications in life-long education.

Evaluative conditioning of emotional content is independent of social identification with the unconditioned stimuli

Bruno Richter[1] & Mandy Hütter
[1] *Eberhard Karls Universität Tübingen, bruno.richter@uni-tuebingen.de*

Evaluative learning can occur via simple stimulus pairings. The contiguity between a conditioned stimulus (CS) and an unconditioned stimulus (US) leads to a transfer of valence onto the CS. As valence constitutes an inherent feature of emotions, we investigate whether expressions of emotions can serve as USs. Further, we ask whether social identification with the USs moderates this effect. In Study 1 (N=94, preregistered), a mono-cultural sample rated CSs before and after the conditioning phase, during which they were paired with neutral, sad, and happy USs representing ingroup and outgroup members. CSs that were paired with happy USs were evaluated more positively than CSs that were paired with sad USs. In Study 2 (N=133, preregistered), a cross-cultural sample rated CSs before and after conditioning. CSs were paired with angry and happy USs representing ingroup and outgroup members. CSs that were paired with happy (angry) USs became more positive (negative) after conditioning. We further assessed memory for the displayed emotion and participants' identification with the US groups. Memory was better for happy as opposed to angry USs. Although emotion memory was substantial, evaluative changes did not depend on it. Participants more strongly identified with ingroup versus outgroup USs. However, the obtained effects were not moderated by social category of the USs. We discuss theoretical implications for research into emotions and social groups as well as methodological caveats and possible refinements for follow-up studies.

No Evidence of Implicit Misattribution of Valence During Evaluative Conditioning

Jasmin Richter[1] & Anne Gast
[1] *University of Cologne, jasmin.richter@uni-koeln.de*

Evaluative conditioning describes a change in valence of a mostly neutral stimulus by pairing it with a valent stimulus. The mechanisms underlying this effect are subject to intense debate. According to the Implicit Misattribution Model (Jones, Fazio, & Olson, 2009), the affective reaction to the valent stimulus is implicitly misattributed to the co-occurring neutral stimulus and leads to a change in its valence. Yet, empirical evidence for this process is mixed. We present results from three pre-registered online experiments in which we tested whether implicit misattribution occurs during stimulus pairing. As predicted, Experiment 1 (N=90) showed that directly after a pairing, neutral stimuli were evaluated in line with the paired valence. Implicit misattribution presumably depends on close spatiotemporal presentation of both stimuli. Accordingly, Experiment 2 (N=224) revealed that the effect on stimulus evaluations during conditioning was larger when paired stimuli had simultaneous onsets compared to when onsets were asynchronous and the probability of misattribution therefore presumably reduced. Results from Experiment 3 (N=195), however, indicated that this finding was due to the amount of temporal overlap of both stimuli and not to the simultaneity of stimulus onset. Together, our results question the validity of implicit misattribution as a process underlying evaluative conditioning effects and add to evidence against implicit evaluative learning.

Lying once, lying twice: Flexible retrieval of repeated honest and dishonest behavior

Alice Rickert, Anna Foerster, Roland Pfister, Maxin Schmadlak & Christina Pfeuffer[1]
[1] *University of Freiburg, christina.pfeuffer@psychologie.uni-freiburg.de*

Telling a consistent lie across several occasions is associated with high cognitive effort. The human cognitive system comes with a mechanism to reduce this effort: Stimulus-response (S-R) associations can be acquired in a hierarchical and context-specific fashion, so that encountering a lying-related stimulus retrieves the associated (motor) responses if, and only if, the current intentional context (honest vs. dishonest responding) corresponds to the intentional context during encoding. These associative foundations of lying can be assessed in item-specific priming paradigms, in which stimuli appear once as a prime (association formation) and once as a probe (retrieval test), while the intentional context (honest vs. dishonest responding) either repeats or switches. Here, we examined the effects of repeated priming on the retrieval of honest and dishonest responses. In three experiments, in an ecologically-valid lying scenario, we show that context-specific retrieval persists after four priming instances for both lying and truth-telling. Additionally, during the prime trials of both contexts, we presented a subset of the stimuli with a no go instruction. Compared to no go stimuli primed in the honest context, no go stimuli primed in the dishonest context showed an inhibitory effect after one, but not after four prime instances. This is first evidence that the presentation of neutral, not-responded-to stimuli in a dishonest context initially binds them with an inhibitory tag. Repeated exposure then apparently allows for short-cuts to dishonest responding. These findings highlight the relevance of associative learning for lying.

Effects of Time Pressure on Automation-Aided Decision Making in a Luggage Screening Task

Tobias Rieger[1] & Dietrich Manzey
[1] *Technische Universität Berlin, tobias.rieger@tu-berlin.de*

When humans interact with an automated decision support system (DSS), this often results in worse performance than the isolated performance of either part of the dyad. Previous research has suggested that with time pressure humans rely more on the automated DSS than without. Thus, somewhat counterintuitively, time pressure might help to increase overall performance if the automation is highly reliable. The present experiments investigate the impact of time pressure and automation support on performance in a signal detection (luggage screening) task. In Experiment 1, participants were assigned to one of three automation support conditions (i.e., high automation reliability, low automation reliability, no support) and worked both under high and low time pressure. The results showed that (a) time pressure leads to worse overall performance, (b) this negative effect of time pressure was not attenuated (nor led to positive effects) when a highly reliable automation was available, and (c) that performance increased with a highly reliable automation but was still worse than the automation alone. Experiment 2 was conducted with a reversed order of decision making. That is, participants first made their choice and received automation aid after making their initial judgement, with the possibility to change their decision—possibly allowing for a more adequate automation use. Results of the second experiment suggest that having this possibility can reduce negative time pressure effects, with joint human-automation performance still not exceeding the automation performance—reinforcing earlier concerns whether the human should be kept in the loop with a highly reliable DSS available.

The dark property of time

Martin Riemer[1]
[1] *University of Groningen, m.riemer@rug.nl*

Psychophysics provided many insights into the perception of time and its integration with other stimulus properties. With other researchers I share the view that the psychophysical principles of time are equal to those of other perceptual quantities like space, loudness, and weight. However, in contrast to these other dimensions, the study of time perception is confronted with a very unique constraint: Perceived time always and inevitably runs in the same direction. This anisotropy violates a fundamental principle of the psychophysical method, because it restricts the controllability of experimental stimuli. In my talk I will outline some practical consequences of this limitation and argue for a "view from nowhen", a perspective change that offers new interpretations for well-known phenomena.

No evidence for a predictability benefit in language switching

Tanja Roembke[1], Andrea M. Philipp & Iring Koch
[1] *RWTH Aachen University, Institute of Psychology, tanja.roembke@psych.rwth-aachen.de*

Switching between two different tasks is facilitated by knowing which task needs to be performed next. However, we do not yet know how predictability of sequences affects language switching. Given that the costs of task switching and language switching are correlated in individuals (Declerck, Grainger, Koch & Philipp, 2017, JML), we hypothesized that language switching—like task switching—would benefit from predictability. To investigate this, unbalanced German-English bilinguals (L1 = German; L2 = English) were recruited in two independent experiments (N1 = 22, N2 = 35). In both, participants named images of frequent semantic concepts either in German or in English. In the majority of blocks, trials followed a predictable language sequence (L1, L1, L2, L2, L1, L1, etc.), while the language sequence was random in a negative-transfer block. In both experiments, we observed shorter reaction times in German than English naming trials. In addition, switch trials resulted in longer RTs than repetition ones. Importantly, however, we found no evidence for a predictability benefit in language switching; in contrast, there was a tendency for a predictability cost in Experiment 1. Together, our results suggest that predictable language sequences do not facilitate switching between languages, but that instead knowing which language comes up next increased cross-lingual competition, potentially due to larger parallel activation of L1 and L2.

A truth effect for irrelevant speech: Increased subjective truth ratings for previously ignored statements

Jan Philipp Röer[1], Raoul Bell, Laura Mieth & Axel Buchner
[1] *Witten/Herdecke University, jan.roeer@uni-wh.de*

In the present study, we investigated behavioral aftereffects of ignoring task-irrelevant speech. Specifically, we were interested in whether participants' subjective truth ratings would be higher for previously ignored statements than for new statements. To this end, participants performed a visual-verbal serial recall task either in silence or while task-irrelevant statements were presented over headphones. The truth status of these statements had been unknown to most participants in a pretest (e.g., "Singapore is the country with the highest population density."). After the serial recall task, participants rated the truth of previously ignored and new statements. Previously ignored statements obtained significantly higher subjective truth ratings than new statements, suggesting that ignoring task-irrelevant speech can have profound effects on subsequent behavior.

Behavioral and Magnetoencephalographic (MEG) Correlates of Fear Generalization predict responses to Virtual Reality Exposure Therapy in Spider Phobia

Katharina Roesmann[1], Christian Steinberg, Marielle Clerc, Hannah Casper, Tilman Coers, Julia Wandschura, Bettina Gathmann, Elisabeth Johanna Leehr, Joscha Böhnlein, Fabian Seeger, Hanna Schwarzmeier, Niklas Sminski, Martin J. Herrmann, Udo Dannlowski, Ulrike Lueken, Thomas Straube & Markus Junghöfer
[1] *University of Münster, k.keuper@uni-muenster.de*

Fear generalization - and its pathological form, fear overgeneralization - are considered crucial factors in the maintenance of anxiety disorders. Here, we investigated whether fear generalization in adult spider phobic patients might predict treatment response to an extinction-based treatment. 90 patients with spider phobia (SP) completed a One-Session Virtual Reality Exposure Therapy (VRET), a clinical and a MEG assessment before and a clinical assessment after therapy. Based on self-reported symptom reductions in the Spider Phobia Questionnaire, patients were categorized as either responders (>30% reduction) or non-responders. The MEG-assessment consisted of baseline, conditioning and subsequent generalization phases. In the conditioning phases aversive unconditioned stimuli (US) were either paired or never paired with differently tilted Gabor gratings (CS+, CS-). In the subsequent generalization phases fear ratings, US expectancy ratings and event-related fields to CS+, CS- and seven different generalization (GS) stimuli that ranged on a perceptual continuum from CS+ to CS- were measured. Non-responders compared to responders showed behavioral overgeneralization indicated by more linear generalization gradients in fear-ratings. Analyses of MEG source estimations revealed that linear generalization gradients in frontal clusters also dissociated (later) non-responders from responders. While stronger (inhibitory) frontal activations to safety-signaling CS- and GS compared to CS+ declined over time in non-responders, responders maintained these activations at early (< 300ms) and late processing stages. Overall, these preliminary findings suggest that behavioral overgeneralization and prefrontal inhibitory learning mechanisms during fear generalization may predict later responses to extinction-based treatments. The temporal dynamics of these mechanisms deserve further attention in future research.

Masked number priming with CRT and LCD monitors: A solid test for the use of LCD monitors in masked visual computer experiments

Michaela Rohr[1] & Alexander Wagner
[1] *Saarland University, m.rohr@mx.uni-saarland.de*

For decades, cathode ray tube (CRT) monitors have been the standard for visual stimulus presentation in experimental psychology. Nowadays, these monitors are replaced by liquid crystal displays (LCDs). Early generation LCDs were, however, often found to yield imprecise and unreliable stimulus presentation (e.g., Elze & Tanner, 2012; Wiens & Öhman, 2007) and the high variation of specific characteristics in current general models (Elze, 2010a) puts into question whether they can be used for experiments which require millisecond precise presentation times. The present study aimed at showing that LCDs can even be used for experiments requiring masked presentation conditions, if the differences in the technical characteristics of LCDs and CRTs are accounted for. Participants were administered a masked number priming task and a subsequent forced-choice prime discrimination task at a CRT as well as a LCD monitor. Using sequential Bayesian testing, we found no evidence for monitor differences. Specifically, we obtained evidence for masked number priming under conditions of zero awareness with both monitors.

Can conditioned attributes like valence and arousal influence an aesthetic judgment?

Bettina Rolke[1], Elisabeth Hein & Mandy Hütter
[1] *Eberhard Karls Universität Tübingen, bettina.rolke@uni-tuebingen.de*

Models of aesthetic experience (e.g., Redies, 2015) assume that the aesthetic judgment of visual stimuli is fundamentally influenced by emotions coming along with the perceptual and cognitive processing of these stimuli. Accordingly, positive or negative feelings as well as different levels of arousal associated with neutral stimuli should influence their aesthetic judgement. In a series of three studies, we tested this prediction using an evaluative conditioning procedure. We paired images of neutral chairs with pictures of the International Affective Picture System (IAPS). The IAPS pictures varied in valence (positive/negative) and arousal (high arousal/low arousal) (Experiment 1), solely arousal (Experiment 2), or solely valence (Experiment 3). In the conditioning phase, a single chair picture was simultaneously presented with an IAPS picture and participants were instructed to look at the pictures and memorize them. Subsequently, the chairs were judged concerning their aesthetic impression. To check for the effectiveness of evaluative conditioning, the chairs were rated regarding to either their valence and/or their arousal impression. We successfully conditioned valence (Experiment 1 and 3), but were not able to condition arousal (Experiment 1 and 2). Most importantly, positively conditioned chairs were judged to be more aesthetic than negatively conditioned chairs. Thus, we showed that conditioned positivity contributes to an aesthetic impression. This result supports the model assumption that the emotional state during processing of visual stimuli influences an aesthetic judgement.

Situational pressure moderates followers preferences for considerate versus initiating structure leaders

Johannes Rollwage[1] & Stefan Schulz-Hardt
[1] *Georg-August-Universität Göttingen, rollwage@psych.uni-goettingen.de*

The limited research on follower preferences has shown that followers often prefer relationship-oriented (considerate) leaders to task-oriented (initiating structure) leaders. However, little is known about potential moderators of followers' preferences. In this study, we investigated whether situational pressure moderates the preference of followers for a considerate over an initiating structure leadership style. In a laboratory experiment, we presented students (N = 319) with the situation of a fictive company, varying how high the pressure (high vs. low) in this situation was. Afterwards participants were shown the profiles of two department heads, including information about their leadership style. Based on these profiles, participants then chose in which of these (otherwise identical) departments they would rather want to work in the future. In addition, they also rated the qualification and their liking of the two department heads. Our results show that the department of the considerate leader was chosen significantly more often than the department of the initiating structure leader. More importantly, this effect was moderated by situational pressure, as only in the low pressure condition a significant preference for the considerate leader was found, while in the high-pressure situation the initiating structure leader was chosen as often as the consideration leader. In a currently running second study, we test bank employees instead of students, and the results, so far, confirm the findings from the student sample.

Tidying up the Anchoring Shelf: Failure to Replicate Subliminal Anchoring

Lukas Röseler[1], Astrid Schütz, Marieluisa Dück, Sabine Fels, Jana Kupfer & Johannes Langer
[1] *University of Bamberg, lukas.roeseler@uni-bamberg.de*

When people consider an arbitrary number prior to generating a numeric estimate, their estimate is biased towards that number. This is called anchoring and has been called one of the most robust phenomena. However, the literature on anchoring is plagued by blatant contradictions, one of which is characterized by opposite statements regarding the question when subliminal anchors work. We are resolving this conflict by replicating both studies, using high-powered direct replications and pre-registration based on the 'replication recipe' (Brandt et al., 2014). Preliminary results indicate that anchoring effects via numeric priming do not occur even if the primes can be recognized.

The detrimental impact of interruptions on working memory performance – evidence by frontal theta and posterior alpha oscillations in the EEG

Marlene Rösner[1], Bianca Zickerick, Edmund Wascher & Daniel Schneider
[1] *Leibniz Research Centre for Working Environment and Human Factors, Dortmund, roesner@ifado.de*

In everyday life, external events often demand one's attention and thereby disrupt working memory (WM) processes and performance. Here we investigated the reason for this effect of interruptions on WM and its underlying neurocognitive processes measured by means of the electroencephalogram (EEG). We presented a memory array containing two randomly oriented bars on either the left or right side of the fixation cross. A retroactive cue (retro-cue) indicated one bar and its orientation had to be reported at the end of the trial. Before the retro-cue, participants were either interrupted by a high- or low-demanding math task or had to keep fixation on a central cross (no interruption). Behavioral data revealed decreased WM performance in interruption trials, which was strongest for the high-demanding interruption task. On EEG level, a suppression of posterior alpha power contralateral to the side of the two bars indicated the re-orienting of attention to the primary task following an interruption. Importantly, this effect was only evident after high-demanding interruptions, indicating that more resources were required to bring the focus of attention 'back on track'. Furthermore, the power of frontal theta oscillations after the retro-cues was weaker following interruptions (compared to the no-interruption condition), indicating that interruptions depleted the cognitive resources available for the attentional selection of WM content. Taken together, we present behavioral and electrophysiological evidence for the detrimental impact of interruptions on WM processes, especially with regard to the selective retrieval of information from WM.

Who is coming? The development of expectations about person identity: an fMRI study of identity-specific predictions

Sophie-Marie Rostalski[1], Jonathan Edward Robinson, Géza Gergely Ambrus, Gyula Kovács & Patrick Johnston
[1] *FSU Jena, sophie-marie.rostalski@uni-jena.de*

The reduced neuronal signal to expected stimuli, termed expectation suppression, is a widely examined phenomenon. It is often explained under the predictive coding theory, in which expected sensory input can be predicted through inferential processes (feedback and feedforward loops) in the visual cortex whereas surprising events lead to a signal increase. This phenomenon has been observed with different methods and for a wide range of stimuli. In this fMRI study, we aimed to investigate the role of prediction error signals in identity processing using ambient exemplar images of famous identities. Within one trial we showed either eight images of different identities (alternation), eight images of one identity (adaptation) or violated the adaptation sequence by changing the identity in the last image (expectation violation). Preliminary results suggest that alternation trials elicit the highest response in visual face processing areas whereas we find a significantly reduced mean BOLD signal for adaptation trials. Crucially for trials with an unexpected change of identity in the last step the neural response is higher than in the adaptation condition. This suggests that higher order expectations about person identity are violated which leads to a release of adaptation.

Effects of domain-specific information on causal judgments across languages

Annelie Rothe-Wulf[1]
[1] *University of Freiburg, rothe@psychologie.uni-freiburg.de*

Causal explanations and causal concepts are often regarded as being domain-specific across languages and cultures. Accordingly, a large amount of psychological studies scrutinized causal inferences within the boundaries of predefined domains, such as biology, psychology or physics, and some studies even hint at the availability of meta-representations that include abstract knowledge about the structures of causal relationships in a specific domain. To what extent, however, are causal judgments influenced by domain-specific information in different languages and to what degree do assumptions on causal structures differ between domains? Several experimental studies will be presented that have investigated the impact of domain-specific information on causal judgments using different task in multiple cultural or linguistic contexts. Results indicate that causal knowledge and causal judgments vary between domains and that these variations seem to be roughly similar across the languages investigated. Thus, the results provide interesting implications for discussions on the cross-linguistic unity or diversity of causal cognition.

No reduction of between-task interference with a repeating sequence of SOAs

Eva Röttger[1], Markus Janczyk, Hilde Haider & Rico Fischer
[1] *University of Bremen, eva.roettger@uni-bremen.de*

A frequent observation in dual-tasking is that spatially or conceptually (in)compatible Task 2 response features can interfere with responses in Task 1 (backward crosstalk effect; BCE). Such between-task interference can be, at least to some degree, under strategic control. It has been shown that the size of the BCE can be modulated by instructions, contextual regularities, recent experience of conflict, and motivational factors. Especially large temporal task overlap (i.e., short stimulus-onset-asynchrony, SOA) represents a condition of high levels of between-task interference. Accordingly, Fischer and Dreisbach (2015) showed that specific stimuli, associated with mostly short SOAs, were able to reduce the size of the BCE. In the present study, we investigated whether a regular sequence of SOA levels can also be used for contextual regulation of the BCE. In a dual-task with spatially (in)compatible hand- and foot-responses, we implemented a repeating sequence of three SOA levels. If participants learned this sequence and used it strategically, the BCE should decrease over time in regular sequence blocks but should increase in a subsequent random sequence block. However, this prediction was not confirmed (N=32). Instead, the size of the BCE was constant across all blocks (BF = .002 for the interaction). This is a first important result, as it points at the necessity to further disentangle the type of contextual regularities that can serve the shielding against between-task interference.

Is this really true? – Comprehenders take into account the pragmatics of negation in a truth-value judgement task

Franziska Rück[1], Carolin Dudschig & Barbara Kaup
[1] *Eberhard Karls Universität Tübingen, franziska.rueck@uni-tuebingen.de*

Negation is typically hard to process, but it is nevertheless omnipresent in our everyday language. Models of language comprehension claim that pragmatically licensed negation use makes comprehending negation as easy as comprehending affirmation. One way of pragmatically licensing negation is to use it to refer to exceptions (e.g., This swan is not white). However, the experimental evidence supporting this claim is mixed. In the current study, we further investigated this question by creating visual world scenes that either involved an exceptional object or not. More specifically, we had biased displays where for example three children had an apple each (= majority object) and one child had a cloud (= exception), and unbiased displays where for example two children had an apple and two a cloud. In each trial participants read either an affirmative or a negative statement about a highlighted child in the display. Their task was to judge the truth of the statement. When looking at the judgement times for true sentences, we find an interaction between the polarity of the sentence and the child referred to in biased displays. Judging a negated sentence seems especially hard when it is about the child with the majority object in the biased display, where the negation is not pragmatically felicitous. Surprisingly however, the pragmatically felicitous negation referring to the exception in biased displays did not show the expected facilitation compared to the pragmatically infelicitous negation in unbiased displays. Implications for pragmatic theories of language comprehension will be discussed.

Measuring change processes that constitute goal disengagement in a concrete situation: Developing a paradigm based on cyberball

Farina Rühs[1], Cathleen Kappes & Werner Greve
[1] *Hildesheim University, ruehsfa@uni-hildesheim.de*

Although the functionality of individuals' goal disengagement capacity has been empirically demonstrated in various contexts, little is known about its process-related components. We therefore aim at investigating intra-individual change processes that constitute the disengagement from a concrete goal in an experimental study design. The goal of wanting to belong to a group is induced in the participants using the cyberball paradigm (a virtual ball tossing game). This goal is then blocked in the experimental group via exclusion from the group (ostracism). Goal disengagement processes are a possible (functional) reaction to this disruption. To examine how these processes are implemented at the cognitive (e.g. attention focus), affective (e.g. goal value) and behavioral level (e.g. invested effort), intra-individual changes are recorded in both explicit and implicit situation-related measures in the course of the study. Goal disengagement would be indicated by an opening of the attention focus, devaluation of the goal and reduction of effort after being ostracized. Moreover, the expected cognitive, affective and behavioral changes should be associated with lower stress levels after experiencing ostracism in the experimental group. We hope that the planned studies will provide indications of the adequacy and fruitfulness of this approach for measuring goal disengagement processes at a micro-level.

Embodied perspective-taking and being in two places (and nowhere) at the same time

Steven Samuel[1], Geoff Cole & Madeline Eacott
[1] *University of Essex, ssamuea@essex.ac.uk*

In order to understand how a scene appears from an alternative point of view (Level 2 perspective-taking) adults usually engage an embodied process by which we integrate our motor representations with the imagined perspective, essentially imagining our physical selves in a new location relative to the scene. An interesting question that follows concerns the consequences of this process for our sense of where we actually are. How can we be in two places at once? In this talk, I will present the results of research showing that when we take another visual perspective we sometimes erroneously perform manual actions consistent with that perspective rather than our own. If we are instructed to act according to an imagined perspective instead, we make more accurate responses from that perspective than our own, effectively 'reversing' egocentricity. Additionally, we find no evidence that embodied perspective-taking is disrupted by real physical barriers between the participant and the desired perspective location, suggesting participants represent themselves and the scene in imaginary rather than real space. The ramifications for our understanding of embodied perspective-taking and egocentricity more broadly are discussed.

Influence of the BDNF Val66Met polymorphism on unmasked semantic priming: A descriptive comparison between repeated measures ANOVA and event history analysis

Simon Sanwald[1], Sven Panis, Christian Montag & Markus Kiefer
[1] *Ulm University, simon.sanwald@uni-ulm.de*

Semantic priming paradigms can be used to assess automatic semantic processing. Individual differences in semantic priming paradigms are associated with differences in executive functions. The BDNF Val66Met polymorphism is associated with executive functions and has been shown modulating masked but not unmasked semantic priming. The results of this earlier study are based on average reaction times (RTs) across correct trials. We wanted to examine whether and when the BDNF Val66Met polymorphism affects response occurrence in an unmasked semantic priming paradigm. To this end we applied a longitudinal technique known as discrete-time event history analysis (EHA). We reanalyzed data of N = 158 participants. RT data was collected using an unmasked semantic priming paradigm with a lexical decision task. The EHA revealed a significant interaction of time, semantic relatedness and BDNF Val66Met. In trials with non-related prime target pairings Met carriers had a higher conditional probability of giving a response from 420-700 ms after target onset and a lower probability of giving a response after 700 ms after target onset as compared to Val/Val homozygotes. In trials with related prime-target pairings Met carriers had a higher conditional probabitlity of giving a response from 400-800 ms after target onset. We conclude that the BDNF Val66Met polymorphism is associated with more frequent responding in earlier time bins pointing to a more impulsive response style during the lexical decision task. This effect is only visible using EHA, but cannot be observed examining average RTs using a repeated-measures ANOVA.

Emotions matter! The moderating role of empathized emotions when responding to others in need

Claudia Sassenrath[1]
[1] *Ulm University, claudia.sassenrath@uni-ulm.de*

The present research aims at establishing a differentiated picture with regard to processes elicited in the empathizing individual when feeling with targets in need and with regard to empathy-induced prosocial behavior. To that effect, the role of empathized emotions is scrutinized in this context. Regarding processes elicited in the empathizing individual, one study focused on parasympathetic activity in the context of empathizing with others and yielded that inducing empathy with target persons in need results - irrespective of their emotional reaction - in increases of vagally mediated heart rate variability, which represents parasympathetic activity associated with social bonding and engagement. However, when scrutinizing sympathetic activity, findings from another experiment suggest that empathizing with a sad (versus an angry) target results in sympathetic activity consistent with relative challenge - an energy-mobilizing state associated with relatively high resources. Hence, although empathy in general prepares for social bonding and engagement as to parasympathetic activity, the emotional reaction of a target in need actually determines sympathetic activity in the empathizing individual. Beyond that, two further studies tested whether empathy-induced prosocial behavior is also impacted by the emotional reaction of the target in need. Results of two experiments suggest that empathizing with a sad (but not an angry or disgusted) target in need increases helping behavior, because only then empathic concern, based on perceptions of target neediness, is increased. Overall, the present research contributes to an ongoing debate regarding the underlying processes and the affective-motivational outcomes of empathy.

Learning prosocial motives

Anne Saulin[1], Kathrin Delius, Chih-Chung Ting, Jan B Engelmann & Grit Hein
[1] *University Hospital Wuerzburg, saulin_a@ukw.de*

Empathy, i.e., sharing another's feelings, and reciprocity, i.e., reciprocating kindness, are two strong motives for prosocial behaviours. However, so far it is unclear which of the two motives is more sustainable, i.e., more likely to elicit prosocial behaviour over a longer period of time, even in the absence of receiving further reinforcement. Here we use a learning theoretical approach to investigate how the empathy and the reciprocity motive develop and decay over time. In a first experimental phase (corresponding to acquisition), we reinforced the respective motive (empathy/reciprocity) with high probability (80%) and in a second phase (corresponding to extinction) with low probability (20%). In a parallel control condition, the motive was randomly reinforced (50%) in both phases. When modelling motive strength over time using a variant of the Rescorla-Wagner model, we observed that the strength of the reciprocity motive closely mirrors the frequencies of reinforcement in the respective phase, i.e., increased in the first phase and decreased in the second phase. In contrast, the strength of the empathy motive increased in the first phase and persevered in the second phase, indicating that the empathy motive might be more sustainable than the reciprocity motive. Together, these preliminary results suggest that (i) motives driving the same observable behaviour can differ decisively in their development over time and perseverance, and (ii) these differences can be well captured and described in terms of a learning model.

Smart but slow: How (not) to predict success in gamified complex skill learning

Marian Sauter[1], Maximilian Stefani & Wolfgang Mack
[1] *Bundeswehr University Munich, marian.sauter@unibw.de*

Investigations into how humans learn complex skills (like playing tennis) typically resort to using so-called extremely simple paradigms: Participants press computer keys in response to simple visual or auditory stimuli. While providing valuable information on cognitive processes, those paradigms are quite disconnected from real-world tasks. In the present studies, we investigated how people learn to coordinate four concurrent tasks in a complex cockpit simulation (Multi-Attribute Task Battery) and a real-time strategy game (StarCraft 2). In particular, we were interested in how their learning success (measured in penalty points for subtasks and, in Starcraft 2, the overall time needed to achieve a goal) could be predicted by higher-order cognitive markers, such as IQ and cognitive speed as well as lower-order markers, in particular the count of and latencies in perception-action-cycles (in-game camera fixations with at least one action). We found that IQ could not predict learning success, but cognitive speed and perception-action-latencies were significant and partly surprisingly large predictors of overall learning success. We are certain that such game-like environments can be truly beneficial to research cognitive resources and strategies in complex skill learning and bridge the gap between extremely simple paradigms and real-world task settings. In addition, games provide an engaging environment that can lead to highly motivated participants.

Beyond contingency awareness: The role of influence awareness and default option in resisting conditioned attitudes

Florin Alin Sava[1], B. Keith Payne & Andrei Rusu
[1] *West University of Timisoara, florin.sava@e-uvt.ro*

Evaluative conditioning procedures change people's evaluations of stimuli that are paired with pleasant or unpleasant items. To test whether influence awareness allows people to resist such persuasive attempts, we conducted three experiments. In the first two experiments featuring low levels of influence awareness (N1 = 96, N2 = 93) we manipulated the degree of control people have in expressing their attitudes, by providing participants in one condition with the option to "pass" rather than respond, when they felt influenced in their evaluations of conditioned stimuli. In the third experiment (N3 = 240) we manipulated the level of influence awareness by using a warning instruction similar to the one found in prior controllability studies, while giving everyone the option to pass the evaluation when they felt influenced. All studies found that participants often failed to use the skip option to exert control over conditioned preferences. In some cases, this may be because participants failed to notice the pairings, but in most cases because participants lacked awareness that the pairings could influence them. Even when explicitly warned that the pairings could influence them, participants seemed to believe that they were not vulnerable to such effects. Post hoc analyses also revealed default effects. The decision whether to use the pass option or not was also influenced by how the evaluation task was framed. This suggests that people ability to resist conditioned attitudes is dependent both on their influence awareness and on the way the choice task is set.

Exploring Cortical Haemodynamic Responses During the Maastricht Acute Stress Test: a fNIRS study

Nora K. Schaal[1]
[1] *Heinrich-Heine-Universität Düsseldorf, nora.schaal@hhu.de*

In order to better understand stress responses, neuroimaging studies have investigated the underlying neural correlates of stress. Amongst other brain regions, they highlight the involvement of the prefrontal cortex. Here we investigate haemodynamic changes in the prefrontal cortex during the Maastricht Acute Stress Test (MAST) using mobile functional Near-Infrared Spectroscopy (fNIRS), examining the stress response in an ecological environment. The MAST includes a challenging mental arithmic task and a physically stressful ice-water task. In a between-subject design, participants either performed the MAST or a non-stress control condition. FNIRS data were recorded throughout the task. Additionally, subjective stress ratings, heart rate and salivary cortisol were evaluated, confirming a successful stress induction. The fNIRS data indicated significantly increased neural activity of brain regions of the dorsolateral prefrontal cortex (dlPFC) and the orbitofrontal cortex (OFC) in response to the MAST, compared to the control condition. Furthermore, the mental arithmetic task indicated an increase in neural activity in brain regions of the dlPFC and OFC; whereas the physically stressful hand immersion task indicated a lateral decrease of neural activity in the left dlPFC. The study highlights the potential use of mobile fNIRS in clinical and applied stress research.

Where does the self end: Integration of others into the self-concept

Sarah Schäfer[1], Dirk Wentura, Marcel Pauly & Christian Frings
[1] *Trier, schaefers@uni-trier.de*

As we are constantly influenced by content, which is in any form related to our self, a clear definition of our ‚self' is of great importance. Clearly distinguishable from the explicit, social-psychological self-concept, a so-called 'minimal self' is conceptualized as a network of features, comparable to the representation of a simple object. Up to now, investigations of the minimal self revealed a flexible integration of content into the minimal self, which includes complex concepts, is specific for particular content, and is modality-independent – in sum indicating a high functionality of the integration of stimuli into the self. In order to understand the mechanisms of these self-integrations, we investigated the integration of another person into the minimal self by means of the so-called self-prioritization effect (SPE). Besides the typical SPE, indicating a prioritization of self-relevant associations in a simple matching task, we tested for the prioritization of a teammate (i.e., a second participant working on the same task). N = 50 participants showed a significant prioritization of the teammate indicating that the integration of stimuli into the minimal self is comparable to basic feature bindings. Additionally, this prioritization was modulated by the spatial distance to the teammate suggesting either high or low relevance of the teammate. The results reveal insights about how our minimal self is generated by demonstrating the comparability with simple feature bindings and that self-integration follows particular rules.

The Metamemory Expectancy Illusion in Source Monitoring Affects Metamemory Control and Memory

Marie Luisa Schaper[1] & Ute J. Bayen
[1] *Heinrich-Heine-Universität Düsseldorf, marie.schaper@hhu.de*

In source monitoring, schematic expectations affect both memory and metamemory. In metamemory judgments, people predict better source memory for items that originated from an expected source (e.g., oven in the kitchen) than for items that originated from an unexpected source (e.g., hairdryer in the kitchen; expectancy effect; Schaper, Kuhlmann, & Bayen, 2019). By contrast, actual source memory is either unaffected by expectations or better for unexpected sources (inconsistency effect; Kuhlmann & Bayen, 2016). Thus, the metamemory expectancy effect is illusory. This research tests the hypotheses that such metamemory monitoring of source memory affects metamemory control (i.e., measures taken to achieve a desired level of memory; Nelson & Narens, 1990) and memory. Due to their expectancy illusion, people should choose to re-study unexpected source–item pairs more often. Three participant groups (n = 36 each) studied expected and unexpected source–item pairs. One group rendered metamemory judgments and chose pairs for re-study. A second group made re-study choices only. These two groups then re-studied the chosen pairs. A third group did not make re-study choices and re-studied a random half of the pairs. All participants completed a source-monitoring test. As predicted, participants chose unexpected pairs more often for re-study based on their illusory conviction that they would remember unexpected sources more poorly. These re-study choices resulted in an inconsistency effect on source memory not shown in the group without re-study choices. Thus, the metamemory illusion affected control and memory in source monitoring.

The Attraction Search Effect in Older and Younger Adults

Sophie Scharf[1]
[1] *University of Mannheim, soscharf@mail.uni-mannheim.de*

Before making decisions, it is important to search for information in order to choose the best possible option. Research has shown that how information is searched for changes across the life span. For example, older adults show a positivity effect such that they focus more on positive information during information search. The Attraction Search Effect as predicted by the iCodes model states that people have a tendency to search for information on the currently more attractive option. We posit that age is a moderator of the strength of the Attraction Search Effect as we assume that older adults focus more on the attractive option due to the positivity effect and, thus, show a higher tendency to search for information on the attractive option. In our experiment, older (> 60 years) and younger (18-30 years) adults worked on a decision task for which they had to search for information. Using the sequential probability ratio t test, we collected data from in total 142 subjects (78 older adults). The results showed that older adults indeed show a stronger tendency to search for information on the attractive option, Cohen's d = 0.44. This project not only underlines the importance to consider sample characteristics such as age as moderators of cognitive processes but also highlights the benefits of using sequential analyses methods compared to classical power calculations.

The effects of decorative pictures on text reading and working memory performance as revealed by EEG alpha frequency band power and pupil dilation data

Christian Scharinger[1]
[1] *Leibniz-Institut für Wissensmedien Tübingen, c.scharinger@iwm-tuebingen.de*

Pictures are often used as decorative elements in textual learning materials. They may be interesting and attention capturing, yet not necessarily needed for the understanding of the core learning content and thus are thought to function as so-called pictorial seductive details. Whether and why the use of decorative pictures in learning materials results in beneficial or detrimental effects on learning outcomes is still a matter of debate. The current study addressed the potential effect of decorative pictures on working memory load. Subjects (N=32) performed text reading tasks followed by n-back working memory tasks. In both task series the presence of decorative pictures (present/absent) as well as the working memory load (low/high) was manipulated. EEG and eye-tracking data was recorded during task performance. It was hypothesized that if the presence of decorative pictures would increase working memory load, this would be indicated by a decreased parietal alpha frequency band power and an increased pupil dilation. Furthermore, the effect might be modulated by the general working memory load induced by the tasks. The EEG alpha frequency band power and the pupil dilation showed a highly consistent pattern of results. Only for the n-back task the presence of decorative pictures led to a decrease in alpha frequency band power and an increase in pupil dilation. This effect did not interact with the general working memory load of the task. Behavioral performance measures showed no effects of added decorative pictures. I will discuss these results and planned follow-up studies.

A short-term reduction of the number of candidate tasks diminishes n – 2 repetition costs

Juliane Scheil[1] & Thomas Kleinsorge
[1] *IfADo – Leibniz Research Centre for Working Environment and Human Factors, scheil@ifado.de*

One of the most straightforward indications for the involvement of inhibitory processes in task switching are n – 2 repetition costs. In the present study, we used a modified task switching paradigm with three tasks and two kinds of cues. One type of cue consisted of a standard task cue indicating which task to perform in the upcoming trial, while in half of the trials, this cue was preceded by another cue (Pre-Cue) that reduced the set of candidate tasks from three to two. In the other half of trials, the Pre-Cue was non-informative. Results revealed a significant four-way interaction of Task Sequence and Pre-Cue in trials n, n – 1, and n – 2: n – 2 repetition costs were visible if the pre-cue was non-informative in all three trials of the sequence, while they were reduced to zero if the set of candidate tasks was reduced to two in at least one of the trials. This result is interpreted in terms of an establishment of antagonistic constraints among the two remaining tasks, thereby facilitating task set activation and reducing inhibition.

What two heads do different from one: Tracing non-verbal interaction processes in joint value-based decision making

Stefan Scherbaum[1], Maja Dshemuchadse & Diana Schwenke
[1] *Technische Universität Dresden, stefan.scherbaum@tu-dresden.de*

Making decisions together is common in our everyday life. However, the process of this joint decision-making is situated on different levels, i.e., language, intonation, no-verbal behaviour, which are difficult to disentangle and hence difficult to study. I will present studies in which we focussed on non-verbal interaction dynamics among two participants in delay and probability discounting, which is the tendency to prefer smaller rewards that are available sooner or saver over larger rewards that are available later or riskier. We used gamified decision tasks in which participants perform series of choices between the two types of options in an individual and a dyadic decision-making condition. While differences in decision outcomes between conditions are interesting in their own right, the talk will look at what the interaction patterns in the dyadic condition can tell us about how differences come about, looking at different interaction patterns and analysing how they affected the decision outcome in terms of discounting and efficiency.

Ecological Interface Design und kognitive Arbeitsbelastung

Frederik Schewe[1] & Mark Vollrath
[1] *Technische Universität Braunschweig, f.schewe@tu-braunschweig.de*

Im Rahmen der vorgestellten Studie wurde untersucht, ob eine ökologische Mensch-Maschine-Schnittstelle bzw. ein sogenanntes Ecological Interface, so wie in der Theorie beschrieben, weniger kognitiv belastend ist als eine konventionelle Mensch-Maschine-Schnittstelle. Die visuelle Darstellung von Grenzen akzeptablen Verhaltens und die damit einhergehende Unterstützung von automatisiertem Verhalten (skill-based behaviour) sollte der Theorie nach die kognitive Belastung der FahrerInnen reduzieren. Um dies zu untersuchen wurde ein herkömmliches Tachometer mit einem Distanztachometer, also einem Ecological Interface, in einem statischen Fahrsimulator verglichen und evaluiert. Hierzu wurden vier Szenarien dargestellt, um einen kontrollierten Vergleich unter verschiedenen Bedingungen zu ermöglichen. Beide Mensch-Maschine-Schnittstellen wurden im Head-up-Display angezeigt und die Fahraufgabe wurde konstant gehalten. Das Experiment wurde als Messwiederholung mit 49 TeilnehmerInnen durchgeführt. Zur Messung der kognitiven Belastung wurde eine taktile Version der Detection Response Task genutzt. In Einklang mit den Hypothesen konnte gezeigt werden, dass das Ecological Interface tatsächlich eine geringere kognitive Belastung erzeugt und zudem eine bessere Fahrleistung ermöglicht.

Binding and Retrieval of control states

Moritz Schiltenwolf[1], Andrea Kiesel, Christian Frings & David Dignath
[1] *Universität Freiburg, schiltenwolf@psychologie.uni-freiburg.de*

How do we adapt to shield ourselves against distractors so that these do not prevent us from achieving our goals? This question is usually investigated through conflict tasks as e. g. the Stroop task. In particular, researchers are interested in the sequential congruency effect (SCE), which is characterized by a modulated influence of task irrelevant information after different levels of conflict. Theoretically, there have been two opposing explanations for this effect. While control accounts explain the SCE as top-down attentional adaptation process, binding accounts attribute this effect to the bottom-up binding of stimulus-response (S-R) associations. Recently, the idea was raised that not only S-R associations could be bound (and later retrieved) but also the state of cognitive control itself, i. e. an attentional configuration that is independent of a specific S-R combination. In a first experiment we used a Stroop task in which we provided task-irrelevant context information. Based on previous research, we predict that in sequential trials the repetition of this context information enhances the retrieval of previously bound cognitive control and, therefore, leads to a stronger SCE. Going beyond these results, we wanted to replicate the rapid decay of S-R bindings for the binding of cognitive control. For this reason, we manipulated the retrieval delay speculating that longer delays impair the retrieval of cognitive control, i. e. the context-specific SCE. We will discuss the implications of the results for the integration and extension of control and binding accounts.

The Interaction between Abstraction and Reward Magnitude in Category Learning

René Schlegelmilch[1], Andy Wills & Bettina Von Helversen
[1] *University of Bremen, r.schlegelmilch@uni-bremen.de*

When people make decisions, this often involves thinking in concepts or categories that may separate good from bad, liberal from conservative, or healthy from unhealthy food. We recently provided reliable evidence for the hypothesis that variations in reward magnitude between category instances negatively affect learning accurately about such categories. Specifically, participants learned to sort ten food items into two groups based on three attributes (repeated presentation), and they received a reward for each correct decision. Crucially, the reward was ten-fold higher for selected food items, one in each category, which harmed learning about low-reward items, compared to an equal-rewards control condition. However, there was no benefit for high-reward items. The current presentation highlights our most recent advances to explain this effect on a cognitive level. For this, we combine insights from classic studies on reward learning with our novel formal approach of category abstraction learning (CAL), which outperforms other leading category learning models. On that basis, we propose that reward magnitude affects the cognitive processes of category generalization (similarity) and abstraction (hypothesis generation via dissimilarity). We provide an overview of the formal approach and the core mechanism affected by reward magnitude. We present model simulations that support our hypothesis and discuss how the explanation generalizes to other categorization tasks or manipulations within the scope of CAL's predictions (e.g., different category structures, or task instructions).

Raiders of the Lost Effects: How Robust Is the Emotional Oddball Effect in Memory?

Helge Schlüter[1], Ryan P. M. Hackländer & Christina Bermeitinger
[1] *University of Hildesheim, helge.schlueter@uni-hildesheim.de*

How do emotional stimuli influence perception, attention, and ultimately memory? This debate at the cross-section of emotion and cognition research has a long tradition. The Emotional Oddball Paradigm has been used to investigate the detection and processing of (emotional) change detection (for a review, see Schlüter & Bermeitinger, 2017). It has also been repeatedly applied to inquire how emotional deviant stimuli in a series of neutral standard stimuli influence the memory for neighboring information (for a review, see Schlüter, Hackländer, & Bermeitinger, 2019). While there is a relatively large body of evidence that negative deviants lead to retrograde amnesia (i.e., a decreased recall probability for standards that are presented directly before a deviant), one group of researchers has reported hypermnesic effects of emotionally positive deviant stimuli (leading to an enhanced recall of standards presented prior to the deviants; e.g., Hurlemann et al., 2005). We report results of two replication studies investigating retrograde amnesic/hypermnesic effects in the EOP. We discuss theoretical implications along with methodological issues regarding the presented replication attempts.

Weight-of-Evidence Strategies to Counter Science Denialism

Philipp Schmid[1], Marius Schwarzer & Cornelia Betsch
[1] *University of Erfurt, philipp.schmid@uni-erfurt.de*

Science deniers and scientific-consensus advocates' positions repeatedly are presented in a balanced fashion in mass media. This false balance increases the spread of misinformation under the guise of objectivity. Weight-of-evidence strategies are an alternative to this, in which journalists lend weight to each position equivalent to the amount of evidence that supports it. In public discussions, journalists can do this by inviting more advocates of scientific consensuses than science deniers (i.e., outnumbering) or they can use warnings about the false-balance effect prior to the discussion (i.e., forewarning). In three preregistered laboratory experiments, we tested the efficacy of outnumbering and forewarning as weight-of-evidence strategies to mitigate science deniers' influence. We further explored whether advocates' responses to science deniers (rebuttal) and the audience's issue involvement moderate these strategies' efficacy. A total of N = 887 individuals indicated their attitudes towards vaccination and their intention to vaccinate before and after watching a TV discussion. The presence and absence of forewarning, outnumbering and rebuttal were manipulated between subjects; participants also indicated their individual issue involvement. We found no evidence that outnumbering mitigated damage from denialism, not even when advocates served as multiple sources. However, forewarning about the false-balance effect mitigated deniers' negative effect. Moreover, the protective effect was independent of rebuttal and issue involvement. Thus, forewarnings can serve as an effective, economic and theory-driven strategy to counter science denialism.

The Influence of Continuous, Lateralized Auditory Stimulation on Visuospatial Attention

Rebecca Rosa Schmid[1], Ulrich Pomper & Ulrich Ansorge
[1] *Universität Wien, Institut für Psychologische Grundlagenforschung und Forschungsmethoden, rebecca.rosa.schmid@univie.ac.at*

Sounds in our environment can easily capture human visual attention. Previous studies have investigated the impact of spatially localized, brief sounds on concurrent visuospatial attention. However, little is known on how the presence of a continuous, lateralized auditory stimulus (e.g., a person talking next to you while driving a car) impacts visual spatial attention (e.g., detection of critical events). Here, we investigated whether a continuous auditory stream presented from one side biases visual spatial attention toward that side. Participants had to either passively or actively listen to sounds of various semantic complexity (tone-pips, spoken digits, a spoken story) while performing a visual target discrimination task. During both passive and active listening, we observed faster response times to visual targets presented spatially close to the relevant auditory stream. Additionally, we found that higher levels of semantic complexity in the presented sounds led to reduced visual discrimination sensitivity, but only during active listening to the sounds. We provide important novel results, by showing that the presence of a continuous, ongoing auditory stimulus can impact visual processing, even when the sounds are not endogenously attended to. Furthermore, when continuous streams of sound are endogenously attended to, the amount of cross-modal bias depends on the level of semantic complexity of the sounds. Together, our findings demonstrate the implications of ongoing sounds on visual processing in everyday scenarios such as moving about in traffic.

Context-dependent memory of motor sequences

Markus Schmidt[1] & Tobias Tempel
[1] *PH Ludwigsburg, University of Education, markus.schmidt@ph-ludwigsburg.de*

To examine influences of context changes between encoding and retrieval of motor sequences, we varied a number of encoding and retrieval features. Participants learned two sets of three-finger movements at two different PCs, all enacted with fingers of the right hand. We varied keyboard and display orientation, stimuli, background color, response keys, position of the hand, and the used PC between the two set. A final free recall test comprised either the same context features as present during study of the first item set or the ones present during study of the second item set or novel test context features. Results showed significant differences in overall recall performance between test conditions, indicating that context features of study episodes guided retrieval of motor sequences. In addition, the number of recalled items varied as a function of output position. Context features of the set-1 study episode were associated with initially lower but subsequently increasing recall performance, whereas features of the set-2 study episode were associated with initially higher and subsequently decreasing recall performance. This implies that a context reinstatement for list-1 items during the test phase does not immediately enhance accessibility of those items. However, access is subsequently facilitated over the course of retrieval attempts.

Response inhibition in the Negative Compatibility Effect in the absence of inhibitory stimulus features

Thomas Schmidt[1], Dirk Vorberg, Maximilian Wolkersdorfer, Sven Panis & Lena Krahl
[1] *TU Kaiserslautern, thomas.schmidt@sowi.uni-kl.de*

The NCE is a reversal in priming effects that can occur when a masked arrow prime is followed by an arrow target at a long stimulus-onset asynchrony (SOA). To counter the explanation that the NCE is actually a positive priming effect elicited by mask features associated with the prime-opposed response, we devise masks that always point in the same direction as the prime, eliminating all antiprime features. We find large positive priming effects for arrow primes without masks and for arrow masks without primes. When a neutral mask is introduced, priming effects turn negative at long SOAs. In the critical case where the mask is an arrow in the same direction as the prime, the prime does not add to the positive priming effect from the mask, but instead strongly diminishes it. This feature-free inhibition is accompanied by a drop in response accuracy 280 ms after the target. No feature-free inhibition is seen when arrows are replaced by color stimuli. We conclude that even though response activation by stimulus features plays a major role in the NCE, there is a strong inhibitory component (though perhaps not in all feature domains) that is not based on visual features.

Is processing of presuppositions triggered by determiners an automatic or capacity-limited process?

Cosima Schneider[1] & Markus Janczyk
[1] *University of Tübingen, cosima.schneider@uni-tuebingen.de*

Definite determiners trigger existence- and uniqueness-presuppositions, that is, the speaker assumes that it is taken for granted that there exists exactly one of the mentioned objects in the relevant discourse. Indefinite determiners are associated with anti-uniqueness, that is, that there are several of the mentioned object. According to the Maximize Presupposition principle, this additional meaning component arises as an "anti-presupposition" and involves first considering the definite determiner's uniqueness-presupposition and then negating it. Building on previous work by Schneider et al. (2019, Cognition) we investigate processing of the two determiners in more detail and ask whether this processing is automatic or requires limited central capacities. We employed the Psychological Refractory Period (PRP) approach and the locus of slack-logic and combined a tone discrimination with a sentence evaluation task. We observed more difficult processing for the indefinite compared to the definite determiner as would be expected if the anti-uniqueness inference arises from a negation of the uniqueness-presupposition of the definite determiner. Further, the data revealed more difficult processing with infelicitous compared to felicitous sentences. The whole pattern is in line with the idea of immediate, but capacity-limited processing of presuppositions. These results support the Maximize Processing principle and are an important step forward toward understanding cognitive processing in presupposition processing.

In- and outgroup effects on visual perspective taking for the social category of ethnicity

Dana Schneider[1], Laura Anne Grigutsch & Thomas Kessler
[1] *Friedrich-Schiller-Universität Jena, Germany, msdanaschneider@gmail.com*

It has been hypothesized that visual perspective-taking, a basic "Theory of Mind" mechanism, might operate quite automatically particularly in terms of "what" someone else sees. As such we were interested in whether the social category ethnicity can influence this mental state ascription mechanism. We tested this assumption by investigating the Samson level-1 visual perspective-taking paradigm using agents with different ethnic appearances (i.e., German, Turkish, Asian and African) in a German context. Participants were asked to make visual perspective judgments from their own perspective (self-judgment) as well as from the perspective of a prototypical ethnic agent (other-judgment). The respective related interference effects – altercentric and egocentric interferences - were measured. In Study 1 – where we altered Turkish and German ethnicities – we found expected in-group preferences and out-group aversions for egocentric interferences. However, this was only the case for German, but not Turkish participants. For altercentric interferences no group effects were found. In Study 2 - where we altered Asian and German agent ethnicities we found no group effects – neither for egocentric nor for altercentric interferences. In Study 3 – we altered African and German agent ethnicities. All data will be discussed in terms of a perceptual versus social judgement bias and the automaticity claims for the Samson level-1 visual perspective-taking paradigm.

Posterior alpha power lateralization reflects the selection and inhibition of spatial context information in working memory

Daniel Schneider[1] & Marlene Rösner
[1] *Leibniz Research Centre for Working Environment and Human Factors, Dortmund, schneiderd@ifado.de*

Retroactive cuing of information after encoding improves working memory performance. However, there is an ongoing debate on the contribution of target enhancement vs. distractor inhibition attentional sub-processes to this behavioral benefit. We investigated the electrophysiological correlates of retroactive attentional orienting by means of oscillatory EEG parameters. In order to disentangle excitatory and inhibitory attentional processes, the to-be-memorized information was presented in a way that posterior hemispheric asymmetries in oscillatory power could be unambiguously linked to lateral target vs. distractor processing. We found an increase of posterior alpha power (8-14 Hz) contralateral to the position of non-cued working memory content and a decrease of alpha power contralateral to cued positions. These effects were insensitive to the number of cued or non-cued items, supporting their relation to the spatial orienting of attention. Importantly, only the alpha power increase contralateral to non-cued positions differed reliably from the asymmetry in a neutral control condition, highlighting the importance of an inhibitory mechanism for the retroactive focusing of attention. Furthermore, the alpha power asymmetries relative to the positions of cued and non-cued items predicted the individual susceptibility to interference by irrelevant information during working memory retrieval. These findings suggest that spatially specific modulations of posterior alpha power are related to enhancing vs. inhibiting the spatial context of information stored in working memory, thereby guaranteeing a target-oriented retrieval process.

Validation of the Visual Sensory Memory Test (VSMT) on the human behavioral and neuronal level

Isabel Schneider[1], Thorsten Bartsch & Christian Kaernbach
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, i.schneider@neurologie.uni-kiel.de*

Classical memory tasks often require distinguishing between old and new stimuli. Recent studies also use tasks in which stimuli similar but not identical to the targets appear, so-called lures. These tasks were designed to investigate two postulated subfunctions of memory: pattern separation and pattern completion. Typically, the stimuli are images of everyday objects in which prior knowledge can influence memory performance and the degree of similarity between two images cannot be objectively determined (Mnemonic Similarity Task, MST, Stark et al., 2019). The Visual Sensory Memory Test (VSMT) developed by Kaernbach and colleagues (2016) is a task based on visual pink noise that can be used to construct lure stimuli at exactly quantifiable similarity levels. In this study, test subjects were presented with three different learning images (targets) during learning phase and were confronted with targets, with lures (25%, 50% and 75% similarity) and completely new stimuli during testing. Participants had to decide after each image whether it was "old", "similar" or "new". This was performed with 30 participants at two times. At both, the subjects showed high recognition performance and the data corresponded to the multi-response Gaussian signal detection model postulated by Kaernbach and colleagues. Also, as predicted, there was no learning effect: the performance at the second appointment with new targets did not differ significantly from the performance shown at the first appointment. This allows multiple performance of the test. Furthermore, the data of 20 right-handed subjects of the sample were collected in the fMRI scanner.

How decorative pictures in learning videos both foster and hinder learning and information retrieval in subsequent learning tests

Sascha Schneider[1], Steve Nebel, Maik Beege & Günter Daniel Rey
[1] *Technische Universität Chemnitz, sascha.schneider@phil.tu-chemnitz.de*

Learning materials often consist of pictures which do not pursue a learning goal but an aesthetics function. Such decorative pictures were found to hinder learning by an increase of learning-irrelevant cognitive load (i.e., the seductive detail effect). Studies also showed that various details within a learning setting could have retrieval-enhancing function, when shown again in a retrieval phase (i.e., the memory cues effect). This talks is aimed to present results from an experimental series with four experiments (with more than 100 participants in each experiment) testing decorative pictures in a learning video on marketing concepts as memory cues. In order to reach this effect, one group achieved these decorative pictures again in their learning tests. All experiments showed that the seductive detail effect occurs when pictures were only shown in the learning videos. In addition, when decorative pictures are also used in the learning tests, learning results increased in comparison to a group without decorative pictures. Across the experiments, significant moderators (e.g., salience of the cues, the associative connection between the cues and the learning information, and the modality of the cues) were found. Results can be partially explained by differences in additional measures on mental load, mental effort and intrinsic motivation.

User Experience and Usability in the Development of a Textile-integrated Sensor System for Feedback-assisted Rehabilitation after Surgery of the Anterior Cruciate Ligament

Eva Scholten[1], Dunja Storch, Julius Haupt, Jarek Krajewski & Sebastian Schnieder
[1] *Institut für Experimentelle Psychophysiologie, e.scholten@ixp-duesseldorf.de*

Patients with surgically treated anterior cruciate ligament rupture often suffer from a phenomenon called "giving way", a perceived loss of stability in the knee, for a long time after an accident and the subsequent surgery. Long-term effects of an insufficient rehabilitation are frequent acute and chronic secondary injuries, such as the renewed rupture of the operated cruciate ligament in 5-10% of cases or the contralateral knee in approximately 15 - 30% of cases (Failla et al., 2015). Between 12 and 24 months after surgery, the sports-related injury rate increases dramatically by about 30% (Grindem et al. 2016). The present study aims at significantly reducing the recurrence and complication rate in this group of patients. Textile-integrated sensors, worn by the patient in the form of a smart knee bandage, are used to detect harmful events which are signalled by a suitable actuator to avoid misalignments. To implement this innovative approach, various technologies from the fields of textile technology, sensor technology and embedded IT are combined with corresponding analytical methods and actuators. Considering aspects of user acceptance and usability, this study examines and compares different approaches to feedback actuators such as heat and vibration in a preliminary sample of N = 11 healthy participants. Further, feedback modalities like pressure, frequency, rhythmicity and intensity of feedback expositions are examined and discussed. In the future, this feedback could enable patients to recognize and correct maladaptive movement behavior during their everyday activities and therapeutic exercises.

Virtual Reality-based Support of Acute Therapy and Relapse Prevention in the Deep-Psychological Treatment of unipolar Depression

Eva Scholten[1], Steffen Holsteg, Sonja Dana Roelen, Andre Karger, Jarek Krajewski & Sebastian Schnieder
[1] *Institut für Experimentelle Psychophysiologie, e.scholten@ixp-duesseldorf.de*

Virtual Reality (VR) has already been successfully implemented in cognitive behavioral therapy of anxiety-related disorders, such as specific phobias, social anxiety, posttraumatic stress disorder, and panic disorder (Carl et al., 2019). Little preliminary work incorporating VR has been conducted in the fields of deep psychological or psychoanalytic therapy. The current research project DeepVR thus investigates the potential of psychotherapeutic use of VR for deep psychological treatment of unipolar depression. Immersed in the VR environment, patients are confronted with their central core conflict relationship theme within the framework of a social role play according to the psychodynamic interpersonal disorder model and therapy manuals for short-term psychotherapy in depression (Beutel et al., 2015; Schramm, 2019). By employing VR, the role plays are supervised by therapists while avoiding the potentially negative effects of role plays on the relationship between therapist and patient. It is expected that patients will be enabled to explore new behaviors and evaluate their self-perception by repeating the role plays in VR. Depression markers extracted from speech data offer a means for relapse prevention via a built-in speech corpus. Additional depression markers are extracted from eye-tracking data recorded during the VR sessions. A feasibility study will address the system's usability, user experience, and user acceptance in a sample of patients with unipolar depression.

Influence of to-be-forgotten information on future decision-making

Sebastian Scholz[1] & Stephan Dutke
[1] *University of Münster, sebastian.scholz@wwu.de*

Following the paradigm of list-method directed forgetting, people are generally able to forget information when instructed to do so. However, this does not always imply that the information is not used for future decision-making or judgements. The current experiment investigated the influence of to-be-forgotten information on decision-making in an educational context by examining the influence of to-be-forgotten information on school career recommendations in the fourth grade in the German school system. Participants (N = 60) were presented with a set of information about a student consistent with the lowest tier school career (Hauptschule) and a set of information consistent with a highest tier school career (Gymnasium) in the German school system and were instructed to either forget one of these sets of information or remember both sets. We predicted that participants, who were predicted to forget one set of information, could do so indicated by a later recall test but would not completely disregard the to-be-forgotten set of information for the school career recommendation. To increase the external validity of the experimental task, we tested participants twice, directly following the presentation of information and one week later and predicted that the influence of the to-be-forgotten information would increase with time. Preliminary analyses support both of our hypotheses. In the talk, theoretical implications for the list-method directed forgetting paradigm and possible limitations of the method will be discussed.

Taking a closer look: Distractor-response binding in a saccadic discrimination task

Lars-Michael Schöpper[1], Markus Lappe & Christian Frings
[1] *Universität Trier, schoepper@uni-trier.de*

According to action control theories, responding to a stimulus leads to the integration of stimulus features and the accompanying response. When stimulus features and the response fully repeat in a subsequent trial, the previous information gets retrieved, leading to faster reaction times and lower error rates. However, partial repetitions cause interference, resulting in increased reaction times and error rates. Even distractors irrelevant for task execution can be bound to a response. Although assumed to occur in most intentional actions, it is unclear how eye movements are affected by such distractor-response bindings. In an eye-tracking study, participants had to discriminate appearing target letters by looking at one of two locations on the right side of the screen. Crucially, a shape irrelevant for task execution, that is, a distractor, framed the letter. Whereas reaction times were unaffected, we observed a distractor-response binding effect in saccadic landing positions: Initiated saccades landed closer to the correct location, if response and distractor fully repeated. Partial repetitions caused saccades to land further away, that is, in the direction towards the incorrect location. This is the first study to observe distractor-response binding in eye-movements, showing that eye movements underlie the same action control processes as manual movements do.

Electrophysiological correlates of distance-to-norm and familiarity in face perception in high and low performers in face recognition

Anna Schroeger[1], Stella J. Wuttke, Jürgen M. Kaufmann & Stefan R. Schweinberger
[1] *Friedrich Schiller University, Jena, Germany, anna.schroeger@uni-jena.de*

Valentine's norm-based multidimensional facespace (nMDFS) model has been highly influential on face perception research for years. In a recent study, brain correlates (event-related potentials, ERPs) of distance-to-norm ('DTN', P200) and familiarity (N250) processing were found and dissociated, supporting the hypothesis that faces are represented in MDFS corresponding to their DTN (Wuttke & Schweinberger, 2019). As yet, it is unclear whether individual differences in face recognition skills are related to these electrophysiological components of face perception. In the present study, we aimed to replicate P200 DTN and N250 familiarity effects in a sample of high vs. low performers in face recognition and, in addition, we hypothesized that the size of these two effects would be associated with face recognition skills. We further investigated differences in visual processes between these two groups with respect to face processing, object recognition, visual acuity, contrast sensitivity and autism scores (AQ). Results replicated the P200 DTN and the N250 familiarity effect. Crucially, the P200 DTN effect was significantly reduced in low (vs. high) performers in face recognition, and there was a statistically not significant reduction of the N250 familiarity effect in low performers. At the behavioral level, low performers differed from high performers not only in their face processing skills: They also scored lower in object recognition and contrast sensitivity. Overall, the results suggest that norm-based face coding contributes to individual differences in face recognition skills. Moreover, future research should refine possible contributions of other visual processes to facial processing impairments.

The influence of visual blur on temporal and spatial precision in a manual interception task

Anna Schroeger[1], J. Walter Tolentino-Castro, Markus Raab & Rouwen Cañal-Bruland
[1] *Friedrich Schiller University, Jena, Germany, anna.schroeger@uni-jena.de*

Blurring visual stimuli is known to affect both perception (decreased visual acuity) and performance (e.g. golf putting). It is also known that the human visual system is more sensitive to spatial than to temporal information. Bringing these two phenomena together, this study aimed at examining whether systematic manipulations of blur would impact the spatial more than the temporal precision in a manual interception task. To this end, we presented participants with a ball (white circle) that moved in a parabola flight curve across a large touchscreen, starting on one side and (invisibly) landing at the other side of a white ground line. The participants were asked to indicate when and where exactly the ball would cross the ground line by tapping the location at the anticipated time. The ball and its trajectories differed between trials in several ways: the ball travelled along three different trajectories (times two, i.e. from left and right) with three different speeds, it was occluded at three different times, and was manipulated by five different degrees of Gaussian blur. Multilevel model analyses on the spatial and temporal precision (calculated as root mean square errors) showed that increased levels of blur led to a significant decrease in the spatial but not the temporal precision. This finding seems to indicate that visual manipulations (in our case blur) systematically modulate spatial but not temporal precision.

Encoding of deterministic and stochastic auditory rules in the human brain: The mismatch negativity does not know basic probability

Erich Schröger[1] & Urte Roeber
[1] *Leipzig University, schroger@uni-leipzig.de*

Regularities in a sequence of sounds can be automatically encoded in a predictive model by the brain. When a sound deviates from the one predicted by the model, mismatch negativity (MMN) is elicited, a brain response reflecting a prediction error. Many studies investigated deterministic regularities, only few the brain's ability to encode non-deterministic regularities. We applied a simple stochastic regularity, namely two different pitches X and Z each of them occurring with a probability of 0.45, which was occasionally violated by a sound with pitch Y (p=0.10). If X, Y, and Z were cards, a gambler would bet on X or Z rather than on Y, because he/she would rightly expect one of these two cards to be more likely to be drawn. How will the MMN system behave? We found MMN when the deviant was outside the pitches of the standards, but not when it was between them. Importantly, when we alternated the occurrence of the same two standards, making them deterministic, the deviant elicited MMN, even when its pitch was between those of the standards. Moreover, when deviant detection was task-relevant, MMN was not elicited. Thus, although the MMN system is extremely powerful in establishing quite complex deterministic regularities, it fails with a simple stochastic regularity. This failure of the MMN mechanism to use what every gambler knows is a constraint of the regularity encoding reflected by MMN level. We conclude that the MMN system does not know basic probability, it rather relies on transitional probabilities.

Selection history, top-down control and the attention bias

Anna Schubö[1], Hanna Kadel & Dion Henare
[1] *Philipps-Universität Marburg, anna.schuboe@uni-marburg.de*

In addition to top-down and bottom-up control, an observer's selection history can have a substantial impact on attentional selection. In a series of experiments, we examined to what extent goal-oriented top-down control prevents selection history effects in guiding attention. In our paradigm, we induce selection history with a categorization task in which either color or shape is the response-relevant dimension. This task alternates with an additional singleton task in which participants search for a shape target and ignore an irrelevant color distractor. Both tasks alternate in a consistent, predictable manner to allow observers optimal volitional task preparation. In a variant of this paradigm, participants can voluntarily decide which task they want to perform in the upcoming trial. Our results show a strong bias induced by the observer's history of selections: attention continues to be biased towards the dimension that is predictive in categorization learning despite the possibility to prepare for an upcoming trial. The bias, although detrimental to performance, persists even when participants voluntarily choose the task in an upcoming trial. Thus, even when observers can exert maximal top-down control and fully adjust their attentional control settings to the upcoming task, selection history shapes attentional selection considerably.

Multisensory integration in and out of the lab

Merle Marie Schuckart[1] & Julian Keil
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, schuckart@psychologie.uni-kiel.de*

To navigate in our environment and accomplish complex tasks like driving a car or operating machinery, we have to constantly integrate information from different modalities - most of the time using limited attentional resources due to high cognitive load. Recently it could be shown that cognitive load affects multisensory integration and thus how we perceive our surroundings (Michail & Keil, 2019, Scientific Reports). But does this effect hold for more natural, uncontrolled testing situations? To answer this question, and to replicate and extend previous findings, we examined the effect of limited cognitive resources on multisensory integration with the same participants in the lab and outside the lab in an online experiment. This way, it was possible to test the robustness of the effect in an uncontrolled, natural environment in comparison with a controlled lab environment. Multisensory integration was assessed using the sound-induced flash illusion, in which a pair of short auditory beeps presented simultaneously with a short visual flash can induce the illusory perception of two flashes. Cognitive load was gradually increased using an orthogonal n-back task (0-back, 1-back, and 2-back). The testing situation was compared between lab and online condition. We hypothesized that - independent of the testing situation - illusion perception increases with increasing cognitive load. Our data show that the influence of cognitive load on multisensory integration is robust, even in an uncontrolled setting outside the laboratory.

Inducing mind wandering when reading hypertexts

Teresa Schurer[1], Bertram Opitz & Torsten Schubert
[1] *Martin-Luther-Universität Halle-Wittenberg, teresa.schurer@llz.uni-halle.de*

Prior studies have shown that mind wandering affects executive control and that the activation of a relevant goal led to more mind wandering episodes. This study aims to induce mind wandering by maximising the level of demand in cognitively demanding tasks like reading. We hypothesized that participants with a second task still in mind (unfinished condition), engage more in off tasks thoughts (TUTs) and achieve a better result in the second task compared to participants who think a second task is finished (finished condition). 60 participants were presented with a scenario in which they had to study 24 items of a to-do list for a recall test. After cued recall of 10 items, participants were either told that the recall task was finished or that the retrieval of the to-do list tasks was interrupted and continued later. All participants then started reading a coherent or incoherent version of the same unfamiliar hypertext and were presented with task-embedded thought probes. Text comprehension measures followed. As expected, participants in the unfinished condition showed significantly more TUTs than participants in the finished condition. Furthermore, participants showed significantly more TUTs while reading difficult rather than easy texts. On the other hand, cued recall of the remaining items was not better in the unfinished than in the finished condition and the manipulation of to-do-list-task goals did not affect text comprehension. These findings provide insights into processing attention during reading hypertexts.

Shifts of the point-of-change can be attributed to a lower cost of motor execution

Christoph Schütz[1] & Thomas Schack
[1] *Bielefeld University, christoph.schuetz@uni-bielefeld.de*

In a previous study on hand-selection in a sequential reaching task, the authors found a shift of the point-of-change (POC) to the left of the midline in right-handed dominant participants. This implies that participants conducted a number of contra lateral reaches with their dominant hand. Contra lateral reaches have longer planning and execution times and a lower precision. In the current study, we asked whether lower mechanical costs of motor execution or lower cognitive costs of motor planning compensated for these disadvantages. Theories on hemispheric differences postulate lower mechanical costs in the dominant hemisphere and lower cognitive costs in the left hemisphere (independent of handedness). In right-handed participants, both factors act agonistically to reduce the total cost of right-handed reaches. To distinguish between the cost factors, we had left- and right-handed dominant participants execute a sequential reaching task. Results showed a significant left-shift of the POC in the right-handed, $Z = 4.517$, $p < .001$, $r = .615$, and a significant right-shift in the left-handed group, $Z = -3.495$, $p < .001$, $r = .476$. Both shifts were similar in magnitude, $Z = 1.990$, $p = .093$, $r = .271$. These findings indicate that only the lower mechanical cost of motor execution in the dominant limb compensates for the disadvantages of the contra lateral reaches, while the cognitive cost of motor planning is irrelevant for the POC shift.

Parameter-specific face and voice morphing: Perspectives for investigating emotional and identity processing

Stefan R. Schweinberger[1], Celina Von Eiff, Jürgen M. Kaufmann & Verena G. Skuk
[1] *Friedrich Schiller University, Jena, Germany, stefan.schweinberger@uni-jena.de*

The aim of this talk is to demonstrate how parameter-specific morphing techniques can enhance our understanding of the role of sensory information for the processing of social and affective signals from faces and voices. Following the inventions of visual (image) morphing technology by Benson and Perrett around 1990, and of auditory morphing ~ten years later by Kawahara, these techniques can be used beyond classical morphing, averaging, or caricaturing. Specifically, we use them to selectively manipulate independent parameters (e.g., 3D-shape and texture/colouration of faces, or fundamental frequency, timbre, and temporal aspects of voices). This allows us to determine the relative importance of these image (or sound) characteristics for social perceptions of age, gender, identity or affect in neurotypical participants, but also in individuals with sensory or central impairments. For example, experiments with faces consistently reveal a dominant role of texture information over shape in most individuals, whereas individuals with poor face recognition skills appear to rely disproportionately on shape -at variance with traditional claims that spatial configural information is crucial to familiar face recognition. For voices, we present current results that provide relevant information about how hearing-impaired cochlear implant users, compared to normal hearing listeners, use acoustic information for perceiving emotions and other social signals in voices. Overall, we demonstrate how parameter-specific morphing is a promising novel approach to objectively assess profiles of face and voice perception abilities.

Phasic alertness facilitates processing of salient stimuli in the flanker task

Verena C. Seibold[1]
[1] *Eberhard Karls University of Tübingen, verena.seibold@uni-tuebingen.de*

Phasic alertness influences performance in response-conflict tasks in two seemingly opposing ways: it reduces overall reaction time (RT), but increases the congruency effect as an index of response conflict. According to one recent explanation, this alertness-congruency interaction arises because phasic alertness facilitates processing of salient stimuli. In two experiments, I tested this assumption in different variants of the flanker task. In Experiment 1 (hybrid flanker-search task), participants searched for a target in a circular array, which was flanked by a neutral, a response-congruent, or a response-incongruent distractor. The distractor was always larger (more salient) than the target. In Experiment 2 (standard flanker task), participants responded to a central target, which was flanked by a response-congruent or response-incongruent distractor. The distractor was smaller (less salient), equal to, or larger (more salient) than the target. To manipulate phasic alertness in both experiments, I presented a sine tone before the array in half of the trials. In Experiment 1, I observed that phasic alertness increased the impact of the salient flanker on the response to the target, as indexed by longer RT and a larger congruency effect. In Experiment 2, I observed that phasic alertness either increased or decreased the impact of the flanker on the response to the target, depending on whether it was more or less salient than the target. These findings support the idea that phasic alertness facilitates processing of salient stimuli, which may then lead to an increase in response conflict.

Perceived Contingency Affects ERP Amplitude Reductions for Self-Generated Sounds

Alexander Seidel[1], Marta Ghio, Bettina Studer & Christian Bellebaum
[1] *Heinrich-Heine-Universität Düsseldorf, Alexander.Seidel@hhu.de*

The processing of self-initiated stimuli has been associated with attenuated sensory intensity and neural activity. In the auditory domain, the ERP components N1 and P2 are reduced for self- compared to externally-generated sounds. One interpretation suggests that the attenuation of both components reflects a matching of action-based sensory predictions and sensory reafferences, which helps to identify stimuli as self-generated, thus contributing to the sense of agency. Agency has been found to vary as a function of the perceived contingency between actions and action outcomes. To explore the effect of perceived contingencies on the N1 and P2 for self-generated tones, participants first engaged in a paradigm where they tried to elicit a desired tone with button presses. The perceived contingency was manipulated by changing the outcome probability. Following high and low outcome probability versions of this paradigm, participants performed a task in which ERPs were recorded for self- and externally-generated sounds. A mixed linear effects analysis including individual control ratings as predictors revealed that N1 amplitudes were unaffected by the contingency manipulation, while the P2 amplitude for self-generated sounds was significantly lower in the high- compared to the low-probability condition, but only for participants with large differences in their control ratings. This study adds further evidence to reports on a dissociation of the N1 and P2 components, with the P2 reduction reflecting top down processes like the perceived control, and the N1 reduction reflecting bottom-up processes that depend on action-related information.

Top-down control of probabilistic attentional distraction in children and adults: An ERP and pupillometry study

Elena Selezneva[1], Andreas Widmann & Nicole Wetzel
[1] *Leibniz-Institut für Neurobiologie Magdeburg, Elena.Selezneva@lin-magdeburg.de*

Involuntary distraction of attention by infrequent and unexpected sensory events can be prevented when these events are predictable. The present auditory-visual oddball study investigates this top-down cognitive control of distraction from a developmental perspective. The P3a event-related potential (ERP) is assumed to reflect involuntary attention shift and the enhanced processing of novel events at the neurophysiological level. Also, the pupil dilation response (PDR) was reported to be enhanced in response to unexpected events. In the present study, we presented an oddball sequence consisting of 80 % repeated standard and 20 % novel sounds. To improve the ecological validity of the study, different environmental sounds were used as novel sounds. Visual cues correctly predicted the sound type (standard or novel) in 80% and incorrectly in 20% of trials. We measured participants' reaction times, ERPs, and pupil size. The type of sound was irrelevant for the task that required the discrimination of the direction of sounds' movements. In both children (7-8 years) and adults, correctly predicted sounds (especially novels) caused shorter reaction times, smaller amplitudes of P3a and decreased PDRs compared to the incorrectly predicted sounds. These differences were less pronounced in children than in adults suggesting that voluntary control of attention is not yet fully matured in this age group.

Risky Business: Risk-Taking and Cosmopolitan Cities

Timur Sevincer[1]
[1] *University of Hamburg, timur.sevincer@uni-hamburg.de*

Cosmopolitan cities are cities that provide opportunities for personal success and value diversity, creativity, and equality (e.g., Berlin, Boston). These cities attract people who are motivated toward personal goal pursuit (those with an independent self-concept), people open to experience, and extraverted people (Sevincer, Varnum, & Kitayama, 2017). Because cosmopolitan cities offer favorable conditions for high-risk/high-return enterprises, they may also attract people who are willing to take risks. Indeed, high risk-takers were more inclined to choose cosmopolitan cities as the destination of a potential residential move (Sevincer, Kwon, Varnum, & Kitayama, 2019). I present an experiment that investigated whether risk-taking is causally linked to a preference for cosmopolitan cities. To manipulate risk aversion (vs. seeking), participants were induced with a prevention-focus, known to be associated with lower risk-taking (vs. promotion-focus and control). To measure preference for cosmopolitan cities, they were asked to name the three cities they would most prefer to move to if they had out of their current city. Two independent raters coded the cosmopolitanism of participants' preferred cities. Participants who were induced with a prevention-focus named cities that were less cosmopolitan on average than those with a promotion-focus and those in the control condition, indicating that situationally induced risk aversion led participant to prefer less cosmopolitan cities. Because economic development relies on a willingness to take risks, the ability of cosmopolitan cities to attract people willing to take risks may be one factor that fuels their economic development.

Using expectations to regulate arousal during continuous performance tasks

Nir Shalev[1] & Anna Christina Nobre
[1] *University of Oxford, nir.shalev@psy.ox.ac.uk*

To perform continuous tasks requiring sustained attention over extended periods of time, it is necessary to maintain an adequate level of arousal. Arousal – the energetic state of the cognitive system – influences the capacity to engage with task-relevant events. Although a strong connection between sustained attention and arousal is widely recognised, little is known about whether or how arousal levels are adjusted to support performance. Visual performance is known to benefit from the temporal anticipation of task-relevant events. However, it is not clear whether anticipation also alters the ongoing state of arousal. In the current study, we addressed this question by using a continuous task design to measure the ongoing state of arousal while attending occasional targets. Throughout the experiment, participants reported visual targets which appeared briefly at the centre of the screen. Crucially, the targets either appeared at fixed intervals, rendering them temporally predictable, or at random times. We estimated arousal using pupil dilation and used psychophysics and computational modelling (TVA) to measure how temporal predictability influences perceptual parameters. We demonstrate that temporal regularity embedded within a continuous-performance task improves performance and shifts the levels of arousal to anticipate predictable targets. Predictable targets led to phasic increases in arousal before their onsets in a background of otherwise low tonic arousal. In contrast, temporally unpredictable targets led to an increase in tonic arousal overall. Accordingly, we argue that arousal is sensitive to varying levels of temporal predictability, and dynamically adapts to task demands.

Open Lab: a web application for conducting and sharing online-experiments

Yury Shevchenko[1] & Felix Henninger
[1] *University of Konstanz, yury.shevchenko@uni-konstanz.de*

Online experiments have become a popular way of collection data in social sciences. However, high technical hurdles in setting up a server prevent a researcher from starting an online study. On the other hand, proprietary software restricts the researcher's freedom to customize or share the code. We present Open Lab – the server-side application that makes online data collection simple and flexible. Available online at https://open-lab.online, the application offers a fast, secure and transparent way to deploy the study. It takes care of uploading experiment scripts, changing test parameters, managing the participants' database and aggregating the study results. Open Lab is integrated with the lab.js experiment builder (https://lab.js.org/), which enables the creation of new studies from scratch or the use of templates. The lab.js study can be directly uploaded to Open Lab and is ready to run. Integration with the Open Science Framework allows researchers to automatically store the collected data in an OSF project. At the conference, we will present the main features of the web application together with results of empirical studies conducted with Open Lab.

Samply: A user-friendly web and smartphone application for conducting experience sampling studies

Yury Shevchenko[1], Tim Kuhlmann & Ulf-Dietrich Reips
[1] *University of Konstanz, yury.shevchenko@uni-konstanz.de*

Running an experience sampling study via smartphones is a complex undertaking. Scheduling and sending mobile notifications to participants is a tricky task because it requires the use of native mobile applications. In addition, the existing software solutions often restrict the number of possible question types. To solve these two problems, we have developed a web application that runs in any browser and can be installed on mobile phones. The app leverages the power of progressive web applications that can send push notifications to a user. These notifications on Android mobile devices look similar to native app notifications. To use the app, participants navigate to the website, install the app, and subscribe to a specific study. For researchers, the entire interface is accessible via a browser and requires no programming skills. Researchers can create their studies, schedule notifications, and monitor users' reactions. The app offers different types of scheduled notifications and allows randomization across participants. The content of notifications is fully customizable and may include links to studies created with other survey services. At the same time, the application preserves anonymity: web push notifications do not require a personal email or phone number - they are directly connected to the user's mobile device and can be removed at any time. We have conducted several empirical studies to test the application and its features, such as creating different types of notifications schedules and logging participants' interactions with notifications. The results will be presented and discussed at the conference.

Feature-response binding under cognitive load

Tarini Singh[1] & Torsten Schubert
[1] *Martin-Luther-Universität Halle-Wittenberg, tarini.singh@psych.uni-halle.de*

Binding theories postulate an automatic integration of stimulus and response features into temporary episodic traces (or event files). A repetition of any of the features from the previous episodic trace results in the retrieval of the entire trace. Along with relevant stimuli, even irrelevant stimuli or features are integrated into these episodic traces, and repeating irrelevant stimuli can also retrieve the previous episodic trace including the previous response – distractor-response binding. This binding is generally thought to be largely automatic in nature, occurring without any great requirement of attentional resources. However, some studies have shown that specific types of attention, e.g. spatial attention or feature-based attention can influence binding effects. In the present study, the role of central attention on distractor-response bindings was examined. To this end, participants carried out a primary letter identification task and a secondary updating task in parallel. Binding effects were tested under conditions of high cognitive load, low cognitive load and a control condition with no cognitive load. The results indicate smaller binding effects under conditions of high working memory load compared to a control condition, thus suggesting that although such bindings are automatic, they are not completely independent of central attentional resources.

The contribution of finger counting gestures and number words to number comprehension

Elena Sixtus[1], Karsten Werner & Jan Lonnemann
[1] *University of Potsdam, esixtus@uni-potsdam.de*

Finger counting gestures are assumed to play a supportive role in numerical development. It is argued that their non-arbitrary and self-experienceable sensory-motor representations are easier to learn for children than other numerical representations, and that they contribute to number word comprehension. However, Nicoladis et al. (2010) report better performance of children in a give-N task with number words than with manual number gestures. In our study we compare the comprehensibility of different number formats in more detail. We are specifically interested in whether finger counting gestures allow better processing efficacy than other numerical representations and whether they facilitate the understanding of number words in simultaneous presentation. Pre-school and school children absolve a computerized version of a give-N task on a tablet PC, allowing analyses of reaction time data in addition to conventional accuracy data. Participants are presented with finger counting gestures, auditory number words, dice patterns, or bimodal conditions, namely number words paired with gestures or dice patterns. Dice patterns serve as control conditions, containing transparent but not self-experienceable numerical representations. After the target stimulus, ten dots are visually presented; children respond by touching the corresponding number of dots and subsequently touching a depicted basket. Overall, preliminary results replicate the previous finding of higher performance with auditory than gesture stimuli and question the expected advantage of bi-modal conditions. We discuss the role of transparent and self-experienceable number symbols and the predominance of the number word sequence in number comprehension.

Using realistic visualizations to highlight information in a learning task

Alexander Skulmowski[1] & Günter Daniel Rey
[1] *Chemnitz University of Technology, alexander.skulmowski@phil.tu-chemnitz.de*

Differences in the cognitive processing of schematic and realistic visualizations are surrounded by a long-standing controversy. While some research results suggest that schematic visualizations can facilitate understanding and therefore promote learning, other studies found positive effects of realism. However, it is generally argued that the visual details found in realistic visualizations are sources of unnecessary cognitive load and should, therefore, be avoided. We conducted an experiment (N = 50) to assess the use of realism as a signaling method in an anatomy learning task using a combined presentation of realistic and schematic visualizations. Participants viewed the side view and top view of the knee, with one of these views being presented as realistic and the other as schematic. As a between-subjects factor, the degree of realism between these two views was inverted. Participants were tested regarding retention and the two tests for the views were used as a within-subjects factor. In line with our hypothesis, participants achieved higher scores on the test that assessed their knowledge of the view they had learned using a realistic rendering, resulting in an interaction effect. Moreover, participants rated the cognitive load for each visualization. We found that cognitive load ratings were higher for the group who had learned with a view featuring a particularly high amount of details. These results are in line with the disfluency perspective that claims that slight difficulties in the perception of learning materials can enhance learning and have important implications for the design of visualizations.

Investigating instruction- versus experience-based evaluative learning to understand processes underlying implicit measures

Colin Smith[1]
[1] *University of Florida, USA, colinsmith@ufl.edu*

In contrast to previous arguments that direct experience with an attitude object was necessary to form implicit evaluations, recent evidence suggests that information about that experience (e.g., instructions) is sufficient. Indeed, in some cases mere instructions may even be more effective than actual experience at forming an evaluation measurable by implicit measures (Smith, Calanchini, Hughes, Van Dessel, & De Houwer, 2019). I review evidence comparing learning procedures of mere exposure, evaluative conditioning, and approach/avoidance training in establishing evaluative responses as measured by the Implicit Association Test (IAT). In this work, participants either experience a learning procedure (e.g., they view one product once and a second product ten times) or only read about it (e.g., they are told that they will later see one product often and a second product rarely). A comparison of IAT D-scores and Quad model estimates of the Activation of evaluative information in IAT responses indicates that 1) each of these learning procedures is sufficient to impact IAT responses and 2) there is rarely any difference in the effectiveness of experience versus instructed versions of the procedure. These findings have implications for our understanding of the processes that mediate evaluative learning effects and for the conditions under which those processes operate. On the whole, they continue to challenge the view that the processes associated with implicit measures are themselves associative in nature.

Several languages in the mind - On the architecture of the multilingual mental lexicon

Laura Sperl[1], Jürgen M. Kaufmann & Helene Kreysa
[1] *Friedrich-Schiller-Universität Jena, laura.sperl@uni-jena.de*

The question how words of multiple languages are stored in our mind has been of central research interest in the past. One prominent model addressing late bilingualism is the Revised Hierarchical Model (Kroll & Stewart, 1994) which postulates bidirectional but asymmetrical connections between separate lexical stores for L1 (native language) and L2 (second/foreign language). Additionally, these lexicons share a language-independent conceptual store, which is assumed to be involved when translating into the foreign language, but not (or at least less) when translating into the native language. This asymmetry can be, for example, observed in different translation times in dependence of translation direction (translation asymmetry) or semantic order of words (category effect). Using a sample of German native speakers with advanced English proficiency, the study strongly confirmed the model predictions regarding different processing times and preferred mental routes. In a second experiment, the same experimental paradigm was applied to a set of non-native speakers. Surprisingly, these non-native language speakers also showed the same translation asymmetry and category effect as the German native speakers, even though no native language was involved in the experiment.These findings suggest that the model not only holds true for L1 and L2, but that the mental architecture of two or more foreign languages might be similar when one of the foreign languages is currently highlighted by the experimental and general language context.

Changing automatized motor skills: On the role of proactive interference and interindividual differences

Laura Sperl[1] & Rouwen Cañal-Bruland
[1] *Friedrich-Schiller-Universität Jena, laura.sperl@uni-jena.de*

Changing automatized movement skills can be a particularly problematic process as proactive interference often impedes the change process. As a consequence, and often contrary to the actual purpose of the change intention, the performance level often initially decreases. Interestingly, individuals seem to vary quite largely with respect to their individual susceptibility to interference and experience the amount of performance decrements to a different extent. To scrutinize these interindividual differences, we confronted skilled touch-typists with a rule change which forced them to temporarily change their highly automatized motor skill. After typing a short text passage in the habitual manner, they were not allowed to use the left index finger which immediately disrupted their automatized motor behavior by inducing proactive interference (observable in highly increased typing times, errors and visual control). Regarding the interindividual differences, results revealed the amount of proactive interference to be positively correlated with age and baseline performance. Moreover, there was a trend towards less interference when the movement of the left index finger was physically restrained. Finally, prepotent response inhibition (a subdimension of inhibition) tended to predict the amount of proactive interference, whereas other executive functions (including working memory, cognitive flexibility and resistance to proactive interference) did not. These results not only provide first insights to explain individual interference susceptibility, but also suggest a particular relevance of response inhibition in overcoming proactive interference when aiming to change automatized motor skills.

Voluntary task choices as a function of task difficulty and error commission

Markus Spitzer[1], Andrea Kiesel & David Dignath
[1] *Albert-Ludwigs-University Freiburg, markus.spitzer@psychologie.uni-freiburg.de*

One of the most remarkable abilities of humans is their cognitive flexibility to switch between tasks. However, few studies investigated whether the anticipated performance on the subsequent trial influence task choices. Here, we examined how differences in anticipated costs of cognitive control influence the decision to repeat or switch tasks. More specifically, we examined whether the two factors task difficulty and error commission and their associated costs in cognitive control influence participants' voluntary choice. We increased the difficulty of the current task but not the other task. With this design, participants switched between the two tasks without any instructions provided to switch tasks. In 3 experiments, we show that voluntary task switches depend on the relative difficulty between tasks and error commission. More precisely, with increasing task difficulty, participants were more likely to switch to the alternative task after error commission, but not after accurate responses. This effect increased with larger differences in relative difficulty (Experiment 2), and independent of response contingent feedback (Experiment 3).

Is the interdependence of context-specific Proportion Congruency Effects due to the reciprocal influence between context-specific selectivity adjustments or to the binding of task and stimulus representations?

Michael Sprengel[1], Mike Wendt & Thomas Jacobsen
[1] *Helmut-Schmidt-University/University of the Federal Armed Forces Hamburg, sprengem@hsu-hh.de*

Responses to bivalent stimuli are slower and more error-prone when the respective stimulus is associated with two different responses (i.e. incongruent) than when it is associated with only one response (i.e. congruent). This congruency effect decreases as the proportion of congruent trials (PC) decreases (i.e., Proportion Congruency Effect, PCE). Transfer of the PCE between task contexts has been attributed to the reciprocal influence between context-specific selectivity adjustments. Here, we tested this notion by asking participants to switch, frequently and unpredictably, between categorizing the magnitude and categorizing the parity of a single digit, whose color indicated the task. These task-switches required the reversal of the 'target' and 'distractor' tasks. Due to this reversal, we expected that the selectivity adjustments induced by our variation of the PC in trials associated with one particular task would have an opposite effect in trials associated with the respective other task – in which we varied the PC either in an opposing (Experiment1) or in a matching way (Experiment 2). Therefore, we expected the task-specific selectivity adjustments in Experiment 1 to reinforce each other, and the task-specific selectivity adjustments in Experiment 2 to interfere with each other. Indeed, we observed stronger task-specific PCEs in Experiment 1 than in Experiment 2. As this difference was confined to induction trials which involved the same digits in both tasks, it is, however, also conceivable that the difference was caused by different patterns of partial repetitions of digit-task-combinations in task switches.

Ok Google: Using virtual assistants in psychological research

Philipp Sprengholz[1] & Cornelia Betsch
[1] *University of Erfurt, philipp.sprengholz@uni-jena.de*

Because of their increasing popularity, voice-controlled virtual assistants like Amazon Alexa or Google Assistant should be considered a new medium for psychological research. We developed the Survey Mate app, an extension for the Google Assistant being available to billions of mobile and home devices including most smartphones and tablets as well as smartwatches, smart speakers and TVs. The app performs surveys using both voice synthesis and AI powered speech recognition. In a first experimental study it was used to assess a set of psychological traits. A comparison with results from similar online-questionnaires revealed comparable reliability and validity of the assessment. While applicability of the app for psychological research could be confirmed, further experimental analysis indicated that engaging in a conversation with the assistant could be enjoyed more than filling out online questionnaires, thus making it an alternative able to attract more people from a wider background. After an introduction to the principles of voice assistant based surveys, results of the aforementioned experimental study will be presented showing the main advantages of the medium. Challenges and ideas for future use will be discussed as well. Since Survey Mate should be made available for other researchers, basic instructions on how to use this new medium will be given.

Attentional deficits in patients with aMCI – New insights from a TVA-based task

Annie Srowig[1], Otto W. Witte & Kathrin Finke
[1] *Universitätsklinikum Jena, annie.srowig@med.uni-jena.de*

Patients with amnestic Mild Cognitive Impairment (aMCI) are at risk for further cognitive decline and development of Alzheimer's dementia. Recent evidence suggests that, in addition to episodic memory deficits, aMCI patients show impairments in visual attention. In particular, studies using psychophysical paradigms of whole and partial report based on the theory of visual attention (TVA; Bundesen, 1990) demonstrated significant impairments in top-down control of attentional selection. The present study aims to evaluate whether and how such top-down control impairment is related to impairments in cognitive functions, as assessed with established neuropsychological test batteries (e.g. ACE-III, CERAD+) and daily life impairments, as assessed in structured interviews and questionnaires (CDR, BAYER-ADL, BADS-DEX). Patients with aMCI are recruited at the Jena University Hospital Memory Center. Following diagnosis of aMCI, based on comprehensive neuropsychological and neurological examination, they undergo a TVA-based task in order to derive parameter top-down control, i.e. the efficiency in task-related attentional prioritization of targets over distractors.

Toward an item-level assessment of subjective memory states in EC

Christoph Stahl[1], Olivier Corneille, Adrien Mierop & Frederik Aust
[1] *Universität zu Köln, christoph.stahl@uni-koeln.de*

Prominent dual-process theories of attitude assume that evaluations can be acquired unconsciously. Research on Evaluative Conditioning that relied on a Process Dissociation (PD) procedure appears to support this unconscious attitude learning view. In the present research, however, we argue that basic assumptions inherent to the PD procedure are both theoretically and empirically unjustified. Here we introduce and empirically validate an alternative item-level assessment of subjective memory states. The data of the validation study (i) are inconsistent with central assumptions of the PD procedure and (ii) fail to support prominent dual-process models of attitude learning. We discuss the implications of the present findings for research on attitude learning

Wie reagieren menschliche Fahrer auf hochautomatisierte Fahrzeuge im Mischverkehr?

Vanessa Stange[1], Matthias Kühn & Mark Vollrath
[1] *TU Braunschweig, v.stange@tu-braunschweig.de*

In naher Zukunft werden menschliche Fahrer hochautomatisierte Fahrzeugen (SAE Level 3) zunehmend häufiger auf der Autobahn begegnen. Unklar ist bislang jedoch, ob menschliche Fahrer diese Fahrzeuge im Mischverkehr erkennen und wie menschliche Fahrer auf diese Fahrzeuge reagieren. Dazu wurde eine Fahrsimulatorstudie durchgeführt, bei der menschliche Fahrer in vier ausgewählten Fahrszenarien entweder einem hochautomatisierten Fahrzeug oder einem anderen menschlichen Fahrer begegneten. Zusätzlich wurde die Wirkung der Kennzeichnung des hochautomatisierten Fahrmodus mittels Statusanzeige nach außen untersucht (keine Kennzeichnung, richtige Kennzeichnung, falsche Kennzeichnung). An der Studie nahmen N = 51 Fahrer im Alter von 20 bis 71 Jahren (22 weiblich) teil. Die Auswahl der Fahrszenarien erfolgte basierend auf Experteninterviews. Die Fahrer bewerteten jede Begegnung mit einem Zielfahrzeug hinsichtlich subjektiver Sicherheit. Bei den erhobenen Fahrdaten wurden insbesondere (minimale) Abstände zu den Zielfahrzeugen ausgewertet. Die Ergebnisse zeigen, dass es aus der Außenperspektive menschlicher Fahrer im Mischverkehr möglich ist, hochautomatisierte Fahrzeuge anhand ihres Fahrverhaltens von anderen menschlichen Fahrern zu unterscheiden. Eine Kennzeichnung beeinflusste diese Unterscheidung nur, wenn diese nicht mit dem aktuellen Fahrmodus des Fahrzeugs übereinstimmte, d.h. diese nichtzutreffend war. Insgesamt bewerteten Probanden die Begegnungen mit hochautomatisierten Fahrzeugen nicht wesentlich risikoreicher und unangenehmer als Begegnungen mit anderen menschlichen Fahrern. Dennoch zeigt die Fahrdatenanalyse, dass situationsspezifisch ein Gefährdungspotenzial des automatisierten Fahrverhaltens vorhanden ist, das durch das streng regelkonforme Verhalten ausgelöst wird.

The Ambiguous Face of Ecstatic Delight: Understanding the Role of Faces and Bodies in Real Life Videos

Kirsten Stark[1], Hillel Aviezer & Ran R. Hassin
[1] *Humboldt-Universität zu Berlin, kirsten.stark@hu-berlin.de*

The widespread assumption that emotions are "written on the face" is deeply engrained in our social beliefs. By contrast, a growing body of research suggests that intense facial expressions may not convey reliable affective valence information. Instead, the body and other types of context have been shown to play a crucial role in emotion recognition. We present results of four online experiments (Ntotal = 641; 271 female) investigating the role of face and body in emotion recognition, using a novel set of dynamic video clips taken in natural real-life situations. In each experiment, participants viewed videos of ecstatic sports fans and rated the valence and arousal of the fans' reactions. They viewed either only the fans' faces, bodies, or the corresponding faces and bodies (face+body). On average, people easily identified the body reactions as highly positive, while they had difficulties to do so when viewing isolated faces. Intriguingly, faces+bodies received more appropriate valence and arousal ratings than isolated bodies - even if the isolated faces were incorrectly rated as negative. The more appropriate face+body ratings came along with higher confidence in the respective rating. Evidence from two experiments shows that these results could not be explained by an increase of empathy or from a consciously controlled process. Rather, participants integrated information from face and body automatically. We suggest that, while only intense body expressions may communicate affective valence, intense facial expressions may increase the amplitude of valence and arousal read from the body during the consideration of the entire gestalt.

Suppressing signals: the competition of top-down and bottom-up attentional control in the presence of threatening stimuli

Diana Stecina[1], Rebecca Cseh, Julia Basler & Andras Zsido
[1] *Institute of Psychology, University of Pecs, stecina.diana@pte.hu*

There are contradictory findings about the prioritizing of threatening objects in tasks that use multiple stimuli competing for attentional resources. Theories of attention suggest that orientation is the result of goal-driven and stimulus-driven perception. The stimulus-driven bottom-up and goal-driven top-down neural mechanisms interact, biasing this competition. This bias can be modulated by different stimulus attributes, like affective valence. The signal suppression hypothesis of controlled attention capture claims that the signal of a salient stimulus can be suppressed by top-down control before the bottom-up processing could start. That is, the top-down control actively suppresses the stimulus-driven processing in favor of the goal-driven processing for better performance. In the present study, participants had to find an exemplar of a neural category (eg. butterflies or locks, ie. target) among several other neutral objects of different category. In half of the tasks, there was either a threatening object (snake or gun) or a non-threatening but visually similar object (hairdryer or worm) in different distances to the target. Our findings suggest that bottom-up mechanisms can be suppressed by top-down mechanism for better task-performance and the prioritizing of threatening stimulus can somewhat be repressed.

Bonding under pressure! The strength of stimulus-response pairings in triple-tasks

Maximilian Stefani[1], Franziska Eichert, Marian Sauter & Wolfgang Mack
[1] *Bundeswehr University Munich, maximilian.stefani@unibw.de*

In typical dual-task paradigms, the stimulus-response (S/R) pairings typically chosen are visual/manual and auditory/vocal pairings. In the visual/manual pairings, manual responses are exclusively implemented by pushing a button with the dominant hand. These specific S/R pairings are chosen in order to allow for optimal reaction times with minimal dual task costs. But are these S/R-pairings generalizable to other sources of response-input as well? In our study, the participants performed three 2-AFC tasks at the same time. Crucially, the visual/manual S/R pairings were switched in a block-wise fashion. Participants had to respond to a color discrimination task with their foot (condition A) or their hand (condition B), to a cued direction task with their hand (condition A) or their foot (condition B) and to a tone pitch task with their voice. Half of the participants started with condition A, the other half started with condition B. We found that there was a significant difference in re-learning after all switches: the group starting with condition A had significantly bigger problems in recombining the new S/R pairings after the switch compared to the group starting with condition B. This implies that when responding to a visual direction cue with the hand, a stronger S/R bond is formed, compared to responding to a color with the hand. This means that careful consideration is needed in order to select the ideal stimulus-response mappings in basic psychophysical experiments because the strength of the S/R bond directly affects performance.

The decline of great expectations with preparation: Sequential action biases decease with foreperiod duration

Michael Steinborn[1], Robert Langner, Liyu Cao & Lynn Huestegge
[1] *Julius Maximilians University of Würzburg, michael.steinborn@uni-wuerzburg.de*

The constant-foreperiod effect refers to an increase of reaction time (RT) with increasing foreperiod (FP) length. Proceeding from a pioneering study (Holender & Bertelson, 1975), we examined whether or not sequential action biases in choice-RT tasks remain stable over time (during the FP interval). In three experiments, we examined performance as a function of constant-FP length (1000 vs. 5000 ms) and the sequential effects of event repetitions versus alternations. As a result, sequential action biases occurred predominantly in short-FP trials and decreased in long-FP trials. Crucially, this interactive effect of FP length and action bias on performance was completely abolished when the intertrial interval was further increased. These results challenge the popular belief that event-specific contributions to performance are a stable part of the mental representation that guides temporal expectations in FP situations. Rather, they indicate that transient activation merely superimpose on performance effects.

E pluribus unum: merging subtask-specific error signals in dual-tasking

Robert Steinhauser[1], Stefanie Ochsenkühn & Marco Steinhauser
[1] *Catholic University of Eichstätt-Ingolstadt, robert.steinhauser@ku.de*

In dual-tasking, two subtasks have to be executed in close temporal succession, which leads to challenges for stimulus processing as well as response monitoring. Performance errors in such scenarios can emerge from inaccurate responses in either subtask. Hence, the error monitoring system has to account for these distinct error sources to some degree while also providing a general evaluation of current performance. Our goal was to explore whether subtask-specific error signals are processed distinctly or subsumed as one subtask-independent error representation. To this end, we designed a paradigm in which we could compare errors in one of the subtasks with errors that occurred in both subtasks concurrently. Participants were instructed to respond to the two subtasks, a four-choice color flanker task and a four-choice pitch discrimination task, at exactly the same time. We found early aspects of the error-related negativity (Ne/ERN) with a doubled amplitude in double errors compared to single-subtask errors, whereas later on, Ne/ERN amplitudes were equal in all error conditions. These results hint at an early source-specific error representation that is subsequently merged into a more general, task-independent one. Interestingly, the error positivity (Pe), a correlate of conscious error detection, showed an entirely different pattern. Single errors in the pitch task elicited a larger Pe than single errors in the flanker task. Double errors, however, featured a Pe just as small as that of single flanker errors, indicating a minimal threshold of evidence required for conscious error detection.

Associative Learning Contributes to Performance on the Wisconsin Card Sorting Test

Alexander Steinke[1], Bilal Al-Hafez & Bruno Kopp
[1] *Hannover Medical School, steinke.alexander@mh-hannover.de*

The Wisconsin Card Sorting Test (WCST) is a gold standard for the neuropsychological assessment of cognitive flexibility. Perseveration errors (repeating a sorting category following negative feedback), are typically treated as indicating reduced cognitive flexibility. Findings from recent research suggested that perseveration propensity is reduced when perseverative responding implies repeating responses. This finding led to the hypothesis that associative learning between cards and responses contribute to behavioral WCST performance. In our first study, we tested the associative learning hypothesis against non-associative accounts such as the avoidance of cards or responses due to negative feedback on the previous trial. We examined 40 participants on a computerized WCST, and we trial-wise manipulated the spatial arrangement of cards (they occurred at fixed or at variable spatial positions). Perseveration propensity was unaffected by pure card repetitions (when punished cards were associated with altered responses) and by pure response repetitions (when punished responses were associated with altered cards). Perseveration propensity was exclusively reduced when the punished cards and their previously associated responses co-occurred, revealing that reduced perseveration propensity does only occur when cards and responses remain bound together. A second study investigated to what degree these card-response associations are effector-specific by manipulating effector sequence (effector switching vs. repetition). Overall, we show that associative learning contributes to behavioral WCST performance, and that the formed associations should be described as stimulus-response bindings. The interpretation of behavioral performance on the WCST as indicating cognitive flexibility should be expanded toward instrumental learning.

Orienting attention to temporal and spatial locations in visual working memory

David Sebastian Steins, Martin Rolfs & Anna Heuer[1]
[1] *Humboldt-Universität zu Berlin, anna.heuer@hu-berlin.de*

Focusing on the most relevant pieces of information in visual working memory (VWM) allows us to make efficient use of this limited system, and several visual attributes have been shown to effectively guide attention to specific representations. Given that the world we live in is not static, temporal properties of visual events can be assumed to contribute to an optimal utilization of VWM by tuning attention to representations related to relevant points in time. However, the role of temporal attention for prioritization in VWM has been largely neglected. Here, we directly compared attentional orienting based on temporal position with orienting based on spatial location, which is typically considered the most powerful selection mechanism. In a colour change detection task, in which items were presented sequentially and at different locations, symbolic number cues validly indicated the upcoming temporal or spatial location of the test item either before encoding (precues) or during maintenance (retrocues). In separate sessions, the number cues mapped onto either the spatial or the temporal item locations. Thus, temporal and spatial cues were physically identical and only differed in their mapping onto time or space. All valid cues yielded cueing benefits as compared to uninformative cues, with larger benefits for precues than for retrocues. Importantly, benefits did not differ between spatial and temporal (pre- or retro-)cues – neither in size nor in their development across the experiment. These findings show that spatial and temporal properties can be used equally well to flexibly prioritize representations during maintenance in VWM.

Individuating outgroup faces: Investigating the cognitive processes underlying individuation versus categorization

Marleen Stelter[1] & Juliane Degner
[1] *Universität Hamburg, marleen.stelter@uni-hamburg.de*

People use different processing styles when perceiving ingroup and outgroup faces: Ingroup faces are individuated, whereas outgroup faces are processed categorically. However, the specific cognitive processes underlying individuation vs. categorization are still poorly understood. The present eye-tracking study investigated how individuation instructions alter visual attention while White participants completed a recognition task with White (i.e., ingroup) and Middle Eastern (i.e., outgroup) faces. One group of participants (n = 58) was instructed to attend to individuating features of outgroup faces; a control group (n = 46) received no such instructions. Overall, recognition was better for ingroup compared to outgroup faces (i.e., an other-race effect), but outgroup individuation instructions diminished this effect. Further, individuation instructions lead to more fixations for outgroup faces. Different from previous research, individuation instructions did not affect attention to the eyes. In the control group, pupil dilations were larger for outgroup compared to ingroup faces, which is usually explained by greater cognitive effort directed to outgroup faces. However, individuation instructions did not affect pupil dilations for ingroup and outgroup faces, contradicting the cognitive-effort account. We conclude that individuation instructions alter visual attention and recognition, and we discuss potential avenues for future research.

Cognitive and motor control: Impact of postural control on congruency effects

Denise Stephan[1], Erik Friedgen & Iring Koch
[1] *RWTH Aachen University, stephan@psych.rwth-aachen.de*

In the current study we investigated the effects of postural control on cognitive control processes in task switching. The study was conducted using cued auditory-manual task switching under different postural control demands (sitting vs. standing and sitting vs. standing vs. lying). This design allowed us to explore the effect of postural control on switch costs, mixing costs and the between-task congruency effects. We replicated these standard effects in task switching in all experiments. Importantly, we demonstrated a selective effect of postural control demands in task switching in terms of an increased congruency effect when standing as compared to sitting and lying. Our findings suggest that particularly in situations that require keeping two tasks active in parallel, the postural control demands have an influence on the degree to which cognitive control enforces a more serial (shielded) mode. Our results will also be discussed considering event-related analyses of postural control performance in terms of biomechanical characteristics.

Effects of cognitive load on simple motor cognitive behavior in patients with multiple sclerosis and healthy controls: a pilot study

Sarah Stoll[1], Daniel Watolla, Sabina Schwarz, Christian Dettmers, Michael Jöbges & Jennifer Randerath
[1] *University of Konstanz, sarah.stoll@uni-konstanz.de*

Background. Motor and cognitive performance in multiple sclerosis patients appear particularly susceptible to heightened workload. These patients often deal with burdening symptoms of cognitive or motor fatigue. Thus far it is unknown how cognitive load and fatigue may affect seemingly simple motor cognitive performance such as grip-selection. Grip-selection studies in healthy young adults found that fixed stimulus-response mappings (prescribed grip-type: rule-based) lead to more efficient grip-selection than flexible stimulus-response mappings (planning a comfortable grip: plan-based) especially when task complexity was enhanced. Methods. Here we investigated effects of strain versus relaxation on rule- and plan-based grip selection in 9 MS-patients and 9 healthy controls. The grip-selection experiment was performed after a straining 3.5-hours test of cognitive functioning ("Hirnleistungstest according to Poser", HLT) as well as after a relaxation-session. We measured state (alertness) and trait (FSMC-questionnaire) fatigue. Results. After the relaxation session, the control but not the MS patient group demonstrated the previously described rule-based efficiency effect. No task effects were found for either group after the HLT-session that induced cognitive load. Here patients performed much more variable. In the MS group, both an increased state, as well as trait fatigue went along with a decreased overall grip selection performance. Discussion. Interindividual differences in fatigue are discussed as variables modulating the susceptibility to effects of cognitive load.

Smart or active? – Odors Influences on Cognitive Performance and Physiological State

Dunja Storch[1], Maike Lindhaus, Jarek Krajewski & Sebastian Schnieder
[1] *Institute of experimental psychophysiology, d.storch@ixp-duesseldorf.de*

Odor perception is closely linked to emotion processing, influencing the physiological state of the receiver. Certain odors such as mint have additionally been shown to affect cognitive performance (CP). The current study investigates whether this modulation of CP is attributable to reduced sleepiness and increased vigilance and whether it also occurs for lemon odor. We tested 48 participants (37 women, M = 22.3, SD = 3.2 years) in a between subjects design (mint: n = 17, lemon: n = 17, control: n = 14). Participants typed a given text on a computer. Error rate and typing speed were analyzed to assess CP. As a measure of vigilance, the Mackworth Clock Test was applied. Participants' sleepiness was assessed via the Karolinska Sleepiness Scale. Heart rate variability (HRV) and facial emotional responses were recorded. In the context of mint odor, participants showed increased CP and fewer negative facial emotional responses compared to the control group. No significant effects of mint odor were found on sleepiness, vigilance, and HRV. In contrast, HRV was increased in the context of lemon odor compared to the control group. Results also indicate an activating effect of lemon odor regarding sleepiness and vigilance. Lemon induced more positive facial emotional responses compared to the mint but not the control group. No significant effects of lemon odor on CP was found. Results are in line with prior research, showing mint odor to increase CP. This effect does not rest on reduced sleepiness or increased vigilance. Lemon leads to reverse effects.

Conjoint effects of decision making and stimulus probability (oddball-effect) on pupil dilation

Christoph Strauch[1], Ina Koniakowsky & Anke Huckauf
[1] *Ulm University, christoph.strauch@uni-ulm.de*

In the physical environment as well as in many experiments, we need to decide whether an incoming stimulus is relevant to us. Especially outside laboratories, stimuli have uneven probabilities to occur. Both decision making and stimulus probability are reflected in pupil size, with stronger dilation for targets than distractors (decision making) and for rare than frequent stimuli (oddball-effect). However, conjoint investigations into both factors are still scarce. In two experiments, we sequentially presented letters that either matched (target) or mismatched (distractor) a given word. Moreover, the ratio of target to distractor letters was varied blockwise from 25:75 over 50:50 to 75:25. Experiment 1 suggested that the effect of decision making was much larger than the effect of stimulus probability. Further, decision making and stimulus probability interacted in a way that only target letters were affected by differential stimulus probability. In Experiment 2, we tested whether stimulus probability alone would affect pupil dilation by adding a condition during which only letters of differential probability but no target word were given. In this condition without goal relevance, no oddball effect was found; further, results showed that only goal relevant letters (not irrelevant or only task relevant letters) were affected by differential probabilities. On this basis, we propose a framework integrating theories on decision making and stimulus probability, suggesting that incoming stimuli are first checked for their goal-relevance. Second and only if relevant, stimuli are evaluated regarding their relative value in a temporarily subsequent step.

Why us, why now? Contextual mediators of spontaneous perspective-taking

Andrew Surtees[1], Anna Lewis-Keen & Jing An
[1] *University of Birmingham, A.Surtees@Bham.ac.uk*

Over the last ten years, a significant amount of research attention has been given to the question of whether perspective-taking occurs automatically and/ or spontaneously. In our work, we've been particularly interested in level-2 perspective-taking - the ability to understand how other people see something. We have presented evidence against this process occurring automatically. Conversely, in a cooperative context, we have shown that people do take others' level-2 perspectives spontaneously. In this series of studies, we try to identify the factors that are necessary for this to occur. I will present studies looking at how spontaneous perspective-taking is impacted by: (I) Cooperative vs. competitive contexts, (ii) Individual differences in social communication and (iii) Completing dual tasks taxing executive function. We suggest that arguments over the automaticity/ spontaneity of perspective-taking have neglected the context in which perspective-taking judgements are made and the nature of the individuals who make them.

On the human inability to process inverse variables in intuitive judgments: Different cognitive processes leading to the time loss bias

Ola Svenson[1]
[1] *Stockholm University, osn@psychology.su.se*

We investigated the time loss bias: overestimation of time lost after a speed decrease from high speeds and underestimations after decrease from low production or driving speeds. The bias depends to a great extent on the human inability to use correctly inverse variables in intuitive judgments. Participants judged the speed decrease from one speed (e.g., 130 kmph) that would give the same time loss as a decrease from another speed (e.g., from 40 to 30 kmph). We carried out descriptive analyses of distributions of judgments for each problem. Each distribution peak was associated with a judgment rule. The first study found two different judgment processes both leading to the time loss bias: a difference process rule used for 20% and a ratio rule used for 31% of the judgments. The correct rule applied to 10% of the judgments. The second study replicated the first study and added verbal protocols. The results showed that the ratio rule was most common (48%) followed by the difference (12%) and correct (8%) rules. Verbal reports supported these results.

Emotional content = better memory!? Source memory deficit for negative high-arousing sources

Nikoletta Symeonidou[1] & Beatrice G. Kuhlmann
[1] *University of Mannheim, nsymeoni@mail.uni-mannheim.de*

Emotion-enhanced memory (EEM) describes the robust memory advantage of emotional over non-emotional stimuli. While extensively investigated with emotional items (e.g., pictures or words), EEM has been largely ignored with regard to emotional source information. Filling this gap, we tested if there is a source memory advantage for emotional over neutral source information by systematically manipulating source valance (positive vs. negative) between participants and source arousal (high vs. low) within participants. Specifically, we presented neutral scenery and object pictures as items together with high-arousing or low-arousing sounds of either positive or negative valence (dependent on the experimental group) as sources. We used a neutral low-arousing sound as baseline in both experimental groups (Group Negative: n = 40; Group Positive: n = 40). Multinomial model-based analysis indicated that—contrary to the EEM typically observed in item memory—source memory was substantially reduced for the negative high-arousing source compared to all other sources. There were no other effects of source emotionality on source memory. That is, positive valence did not influence source memory, not even under high arousal. Source emotionality further did not influence memory for the (neutral) items. We propose reduced binding of negative high-arousing sources as a potential explanatory account for the found source memory deficit and discuss possibilities to test this account in future studies.

Connecting EEG signal decomposition and response selection processes using the Theory of Event Coding framework

Adam Takacs[1]
[1] *TU Dresden, adam.takacs@ukdd.de*

The neurophysiological mechanisms underlying the integration of perception and action are an important topic in cognitive neuroscience. Yet, connections between neurophysiology and cognitive theoretical frameworks have rarely been established. The Theory of Event Coding (TEC) details how perceptions and actions are associated (bound) in a common representational domain (the "event file"), but the neurophysiological mechanisms underlying these processes are hardly understood. We used complementary neurophysiological methods to examine the neurophysiology of event file processing (i.e. event-related potentials (ERPs), temporal EEG signal decomposition, EEG source localization, time-frequency decomposition, EEG network analysis). We show that the P3 ERP-component and activity modulations in inferior parietal regions (BA40) reflect event file binding processes. The relevance of this parietal region is corroborated by source localization of temporally decomposed EEG data. We also show that temporal EEG signal decomposition reveals a pattern of results suggesting that event file processes can be dissociated from pure stimulus and response-related processes in the EEG signal. Importantly, it is also documented that event file binding processes are reflected by modulations in the network architecture of theta frequency band activity. That is, when stimulus-response bindings in event files hamper response selection this was associated with a less efficient theta network organization. A more efficient organization was evident when stimulus-response binding in event files facilitated response selection. Small-world network measures seem to reflect event file processing. The results show how cognitive-theoretical assumptions of TEC can directly be mapped to the neurophysiology of response selection.

Sequential effect in reaction time and oculomotor inhibition

Noam Tal-Perry[1] & Shlomit Yuval-Greenberg
[1] *Tel-Aviv University, noamtalperry@gmail.com*

Temporal expectations are predictions regarding events' timing, based on previously-experienced temporal regularities. In the absence of regularities, we can form predictions based on recent encounters with similar circumstances. Such predictions create the "sequential effect" – the effect of previous trial's timing on prediction regarding current target's timing. Studies shown that reaction-time (RT), a marker that is modulated by response preparation, is enhanced when timing matched previous trial's, compared to a mismatch. However, it is not clear whether this effect stems from response preparation, or from perceptual enhancement due to temporal expectations. In this experiment we examined this question using pre-target oculomotor inhibition (OI) – a novel temporal expectation marker that is task independent and therefore is unaffected by response preparation. Twenty participants underwent a spatial-cueing task. In each trial, a cue (left/right) indicated in which hemifield target was more likely to appear. Following a varying interval (500-2100ms), target appeared briefly (33ms) at the cued (75% of trials) or opposite location. Upon stimulus detection, participants were instructed to quickly report the stimulus hemifield. RT and OI were analyzed using mixed-effect modeling to account for the n-1 trial's interval. Results indicated that both RT and OI showed a sequential effect: shorter n-1 trial interval lead to slower RT and more saccades compared to matched n-1 trial interval. This pattern indicates that sequential effect is not solely the result of response preparation but is also a consequence of perceptual preparation for the future target.

Hazard-rate influence on performance is independent of spatial locus of attention

Noam Tal-Perry[1], Danielle Allon & Shlomit Yuval-Greenberg
[1] *Tel-Aviv University, noamtalperry@gmail.com*

Temporal expectations can be induced experimentally by creating temporal-regularities, for instance by presenting cues which are associated with specific time-intervals preceding targets (cue-based expectations). Even without these, expectations for an upcoming event increase with time according to the hazard-rate function – the conditional probability of an event to occur, given it has not occurred yet. Previous studies showed that cue-based temporal expectations depend on spatial attention: to benefit from information regarding stimulus onset, observers need to attend to its location. Here we examined whether hazard-rate expectations effects also depend on spatial attention. In two experiments, we used two variations of a spatial-cueing task, with cue-target interval length varying in order to create an increasing hazard-rate. A spatial-cue appeared at the beginning of each trial in order to manipulate spatial attention (valid/invalid/neutral). After a random interval (500-2100ms) sampled from a uniform distribution, a target (asterisk) appeared briefly (33ms) and participants were instructed to indicate its location side as fast as possible (Exp. 1) or perform a single-button speeded-response (Exp. 2). Using mixed-effects modelling, we show in both experiments a validity effect on reaction-time (valid < invalid), along an overall effect of hazard-rate, such that reaction-time decreased with increasing intervals. These findings indicate that unlike cue-based temporal expectations, hazard-rate predictions affect performance both within and outside spatial locus of attention.

Attentional bias to emotional faces is contingent on top-down influences

Swantje Tannert[1] & Klaus Rothermund
[1] *FSU Jena, swantje.tannert@uni-jena.de*

Emotional faces convey important information on social chances as well as danger. Therefore, automatic attention allocation to emotional facial expressions is a frequently investigated phenomenon. Processing advantages of emotional over neutral stimuli have been shown using various experimental paradigms like Dot-Probe (Bocanegra, Huijding, & Zeelenberg, 2012), Eriksen-Flanker-Task (Fenske & Easwood, 2003) and Visual Search (Fox et al., 2000). Nevertheless, more and more evidence appears showing that these effects are not unconditional (i.e. Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). Person characteristics, like anxiety, as well as task characteristics (Wirth & Wentura, 2017) modulate attentional effects. The talk includes own data from dot-probe studies (Puls & Rothermund, 2017), showing no attentional capture of emotional faces at all, as well as data from the Eriksen-Flanker-Task (Tannert & Rothermund, 2018) showing attentional effects of emotional faces being conditional on relevance of the affect dimension and necessity of flanker processing. One explanation for these and other results, reviewed in this talk, is a certain amount of top-down influences on attention even at this early stage of processing. Theories considering this possibility (e.g. contingent capture account¸ Folk & Remington, 1998) will be outlined and discussed in light of the present as well as previous findings.

The effects of source presentation and test format on recognition memory for item and source

Hilal Tanyaş[1] & Mine Misirlisoy
[1] *University of Mannheim, htanyas@mail.uni-mannheim.de*

Source monitoring is an attribution process of memory records to their original sources. Source monitoring tasks are extensively used to examine both item recognition and source discrimination. However, there are no standard agreed-upon methods for presenting and testing sources in an experiment yet. This could potentially lead to the confounds during source attributions. The main objective of the current study was to investigate the measurement of source monitoring processes by focusing on test formats and source presentation within the same experimental design. We hypothesized more false alarms for new items and fewer source misattributions for the simultaneous source monitoring test format relative to the sequential source monitoring test format. Moreover, we expected fewer source misattributions and better item recognition in the blocked source presentation condition compared to the mixed source presentation condition. Although our planned analyses were not in support of the hypothesized differences, when we analyzed the data in blocks, we observed more false alarms for new items in the simultaneous source monitoring test format compared to the sequential source monitoring test format in the second block. We further investigated data with multinomial source monitoring modeling and discussed our findings in relation to encoding strategies and criterion shifts.

Investigating attentional guidance in visual search with real-life scenes

Felice Tavera[1] & Hilde Haider
[1] *University of Cologne, felice.tavera@uni-koeln.de*

How is attention guided to relevant objects when looking at real-life scenes? Three sources of attentional guidance from the initial glimpse of a scene have been proposed: target template, episodic, and semantic guidance. It has been shown that template guidance (e.g. object color) dominates early search processes, and can override episodic and semantic guidance. Our present work aims at dissociating object-based and episodic attentional guidance, and, moreover, at investigating the possibility of search process adaptation. The first study (n=5) was a replication of the contextual cueing experiment by Brockmole and Henderson (2006) with real-life scenes and target letters. Our findings show that the effects of decreasing search time, explicit knowledge about the repetition, and memory of the target location generalize across different scenes. In a subsequent study (n=15), within the same paradigm, we manipulated the efficiency of object-based and episodically guided search. Therefore, we selected repeated scenes in which the target was placed either on one object or at a fixed location within the scene. In each of the last four of ten blocks, four of these repeated scenes were presented horizontally mirrored. We hypothesized that object-based attentional guidance should be efficient in normal and mirror trials. However, search times for the not-object-based targets should be prolonged in mirror trials if episodic guidance (i.e. direction-specific information) dominated and misguided search. Our preliminary findings support a dissociation of the two sources of guidance and search process adaptation according to scene type.

Multiple-Cue Judgment in Groups: The Role of Learning Environment and Social Interaction

Anna Thoma[1], Christin Schulze, Dries Trippas, Ralf Kurvers & Thorsten Pachur
[1] *Max-Planck-Institute for Human Development, thoma@mpib-berlin.mpg.de*

Which restaurant will be the best one to go to after a long conference day in a new city? In a fundamentally social world, many decisions are made in a group rather than in social isolation. Strategies and cognitive processes in multiple-cue judgment have mainly been studied with individual decision makers while comparatively little is known about these processes in groups and several questions remain open. How does the learning environment impact cognitive processes and performance in groups? What is the role of social interaction (e.g. verbal communication) in shaping strategy selection? Drawing on qualitative and quantitative data from two multiple-cue judgment experiments (N = 80; N = 240) we examine the influence of three factors on strategy selection and performance: a) group setting (dyads vs. individuals), b) type of learning task (direct criterion learning vs. learning by comparison), and c) verbal communication (discussion vs. no discussion). Computational modelling results indicate a shift towards a rule-based strategy in the group setting as compared to individuals. This finding is further supported by a qualitative content analysis of discussions. Moreover, we replicate results from individual decision makers with regard to the type of learning task and find that groups trained with learning by comparison seem to generalize better. Our research suggests that combining behavioral analysis of judgment data, qualitative analysis of group discussions, and computational modelling of strategy selection, can provide novel insights into how learning environment and social interaction impact multiple-cue judgment in groups.

Taking a closer look at potential evidence for unconscious evaluative conditioning

Philine Thomasius[1] & Christoph Stahl
[1] *University of Cologne, philine.thomasius@uni-koeln.de*

Potential evidence for unconscious evaluative conditioning was reported by Greenwald and De Houwer (2017) from a speeded response-window learning procedure in which pattern-masked meaningless letter strings (CSs, 75 ms) were presented as primes before either pleasant or unpleasant target words (USs), whose valence had to be categorized. During the learning phase, some CSs always predicted positive targets (CSpos), and some always predicted negative targets (CSneg). In the test phase, the CSpos and CSneg primes preceded both pleasant and unpleasant USs (50 % contingency). USs were more often categorized correctly if preceded by a CS with which they had been paired in the learning phase (conditioning / priming effect). Greenwald and De Houwer regressed the conditioning effect onto objective visibility and found that the conditioning effect was observed in the absence of objective visibility (positive intercept) and that it was independent of objective visibility (zero slope). This pattern was interpreted as evidence for the independence of learning from awareness. The present study investigated whether the learning effect is evaluative, by assessing whether it generalizes to typical evaluative measures. First, we largely replicated the overall conditioning effect and the regression results. However, the conditioning effect did not reflect evaluative learning: Null effects were obtained on explicit evaluative ratings and an implicit measure (Affective Misattribution Procedure). This finding is consistent with recent research suggesting that evaluative learning depends on awareness.

Background processing and selective attention in complex auditory scenes

Sabine Thomassen[1] & Alexandra Bendixen
[1] *Chemnitz University of Technology, sabine.thomassen@physik.tu-chemnitz.de*

Natural listening often comes with the challenge of attending one auditory foreground source in the presence of distracting background sources that need to be suppressed. Such scenarios can be experimentally simulated by presenting different sound sources and asking listeners to perform a task that requires selective attention on one of these sources. For a balanced investigation, the attended sound source is changed throughout the experiment. It turns out that some sources are easier to attend than others. For instance, when using sequences of three repeatedly presented tones (e.g. low, middle and high frequency tone: 'ABC' pattern), the middle tones ('B') are rarely reported as foreground source, and it is particularly difficult to perform a task on them. Here we report a combined behavioral-EEG study that was designed to reveal underlying mechanisms of this so-called middle-stream deficit. We replicated an impairment in behavioral performance for a selective-attention task on the middle tones compared to the outer tones. We then examined how the middle-stream deficit could be overcome. In line with our hypotheses, the performance deficit decreased with either a larger frequency separation between the tones or a higher intensity of the middle tones. Corresponding EEG data during passive listening shed light on bi-directional inhibition from the outer tones as a candidate mechanism for the middle-stream deficit and for its reduction by the applied manipulations. Findings will be discussed in light of current theories of auditory foreground-background formation and selective attention.

Instagram Photography: Subjective and objective balance measures and their relation to aesthetic liking

Katja Thömmes[1] & Ronald Hübner
[1] *University of Konstanz, katja.thoemmes@uni-konstanz.de*

There is much theory on good image composition in photography. However, empirical evidence for the relation between certain compositional features and aesthetic liking is still needed. Research suggests that visual balance is a key compositional strategy used by artists to create pleasing visual displays. The purpose of the current study is to investigate the visual balance of professional photographs derived from Instagram. For two sets of photographs (architecture and dancer photography) we computed balance-related low-level image statistics and gathered subjectively assessed 'mass' centers (Ger. 'Schwerpunkte') in an experiment. This let us examine correlations between objective and subjective visual balance as well as their relations to aesthetic liking. Our results reveal clear connections between objective and subjective 'mass' centers in both dancer and architecture photography. Also, images that are more balanced are more liked. For some images there is a large variability in the subjectively assessed mass centers across participants. Interestingly, this variability is significantly lower in objectively well-balanced compositions. This suggests that more balance leads to a more universal perception of the mass center across observers, which in turn seems to be linked to aesthetic preference.

Cognitive engagement and the perception of time - a mutual relationship?

Sven Thönes[1], Stefan Arnau, Edmund Wascher & Daniel Schneider
[1] *Johannes Gutenberg Universität Mainz, thoenes@uni-mainz.de*

The perception of time varies with the degree of cognitive engagement in attentionally demanding tasks. Perceived passage of time accelerates while working on highly demanding tasks, whereas time appears to drag during boring situations. Our present experiment aimed at investigating whether this relationship between time perception and cognitive engagement is mutual: Can an experimental manipulation of subjective time passage systematically affect the attentional resources applied to a cognitive task? We measured performance and the EEG in a whole-report working memory paradigm with six items of different colors that each had to be reported after a short delay period. The 32 participants were informed about the time of day after each 20 trials, while the clock was running at either 100% (normal clock), 120% (fast clock) or 80% (slow clock) of normal clock speed depending on the experimental block. Task performance (the mean number of correctly reported colors per trial) was significantly increased in the fast as compared to the slow clock condition. In the EEG, we focused on neural oscillations during working-memory encoding and storage. As an electrophysiological correlate of task engagement, frontal theta power during the storage interval was generally increased during the fast-clock condition. Also nicely in line with the behavioral effect, the power of frontal theta oscillations during storage predicted the number of correctly reported colors on a single-trial basis. Our results indicate that the subjective passage of time can be manipulated successfully, affecting attentional processes in the same way as vice versa.

Integration of probabilities from different representation formats

Kevin Tiede[1] & Wolfgang Gaissmaier
[1] *University of Konstanz, kevin.tiede@uni-konstanz.de*

If the way people learn about probabilities differs across options in decisions under risk, people have to integrate these representations to make a choice. However, currently it is unclear how people process probabilities and make choices in such an environment. Therefore, we investigated information search and probability weighting in decisions between a described and an experienced option (mixed paradigm). We examined if a description-experience gap occurs within a choice in the mixed paradigm and if not, how probability weighting relates to that of choices between two identical formats. In two between-subjects experiments (N = 239; N = 209), participants chose repeatedly between two monetary gambles. While both gambles were described and experienced in the description and experience condition, respectively, participants in the mixed condition made choices between a described and an experienced gamble. Based on choices, we estimated CPT parameters, both with separate and equal parameter values for both options. Results showed that people drew larger samples per option in the mixed condition (vs. experience condition). Further, probability sensitivity was similar for the described and experienced option in the mixed paradigm. While the original description-experience gap was replicated, probability sensitivity of the mixed condition was in the middle of this gap. In conclusion, our results suggest that decision makers treat probabilities in different formats similarly across options but different than in purely description- or experienced-based choices. Finally, our findings show that the evaluation of an option is influenced by the format of the other option.

Spatial context supports object memory in a viewpoint-dependent manner – an investigation using an immersive virtual environment

J. David Timm[1] & Frank Papenmeier
[1] *University of Tübingen, dtimm@psycho.uni-tuebingen.de*

Spatial context is the basis for the representation of individual objects in visual working memory. Single objects are less represented independently but rather the relations to other objects (spatial configuration) have a strong impact. We investigated the influence of spatial configurations on mental representation in a VR environment. So far, there is evidence for a viewpoint-dependent processing in 2,5D-studies. We focused on a 3D-VR-adaption to build a bridge between those experimental results and real-world scenarios. We presented six everyday objects on a virtual table and told participants to memorize their locations. A delay period followed while a curtain covered the table. Participants' task was the detection of location changes of a single probed object, which could have changed its position during delay. At retrieval, in addition to the probed object either the complete (all objects) or no (probed object only) configuration was shown. In the first experiment, we varied the delay time and in a second experiment, we varied the rotation of the table between encoding and retrieval. While time did not affect the benefit of spatial context, rotation had an impact of the memory performance. Location change detection performance was higher when the configuration was present compared to a lone single object in general, but with higher rotation the effect disappeared. Therefore, we conclude that the representation of the scene is based on spatial configurations. In the future, we will have a look on the spatial updating process of these viewpoint-dependent mental representations.

Predicting individual differences in generalized reciprocity with HEXACO Agreeableness and Honesty-Humility

Lara Többen[1] & Pascal J. Kieslich
[1] *Universität Mannheim, ltoebben@mail.uni-mannheim.de*

Generalized reciprocity is the phenomenon of reciprocating experienced behavior towards a third party. We investigated if generalized reciprocity occurs in a double dictator game (DDG) and if individual differences therein can be explained through personality traits. In a DDG, participants first receive money from a previous participant and then allocate additional money between themselves and a future participant. We hypothesized that there is evidence for generalized reciprocity, that is, we expected that the amount of money a participant received in the DDG would influence the amount this participant gave to a future participant. In addition, we investigated the relationship of generalized reciprocity with the HEXACO personality factors Agreeableness and Honesty-Humility. Due to its association with direct reciprocity, we predicted Agreeableness would moderate the relationship between the amount received and the amount given so that the relationship would be stronger for individuals low in Agreeableness. Additionaly, we expected that Honesty-Humility would explain the overall contributions of participants (regardless of the behavior of previous participants). In a preregistered online experiment, the amount of money received and Honesty-Humility predicted – as expected – the amount of money a participant gave to future participants. However, Agreeableness did not significantly moderate the relationship between the amount received and the amount given. In sum, the current study provides further evidence and a suitable paradigm for investigating generalized reciprocity in economic games. At the same time, the influence of Agreeableness on generalized reciprocity remains uncertain and requires more attention in future studies.

The effect of auditory pitch manipulations on temporal and spatial accuracy in a manual interception task

J. Walter Tolentino-Castro[1], Anna Schroeger, Rouwen Cañal-Bruland & Markus Raab
[1] *German Sport University Cologne, w.tolentino-castro@dshs-koeln.de*

It is well known that the human auditory system is more sensitive to temporal than spatial information. Here we aimed to examine whether systematic manipulations of auditory information (i.e. pitch) would modulate temporal accuracy more than spatial accuracy in a manual interception task. To this end, participants were presented with a sound that moved in a parabola curve (via vector-based amplitude panning) across a large touchscreen. The sound was produced by five loudspeakers positioned in a pentagon manner around the touchscreen. The manipulations included five different pitches (100Hz, 200Hz, 400Hz, 800Hz and 1200Hz), three different trajectories, three different velocities and three occlusion times (with slight differences between experiments). Participants had to indicate where and when exactly the sound would cross a ground line that was presented on the touchscreen, by tapping at the predicted location. The main difference between experiments 1 and 2 was that the sound stimulus moved in a parabola manner oriented vertically (exp. 1) or horizontally (exp. 2) across the display. Temporal and spatial accuracy was calculated as root mean square errors. Results revealed no effect of sound manipulations on the temporal and spatial accuracy in exp. 1. However, in the horizontal condition, there was a main effect on spatial precision, but nor temporal precision. Taken together, our findings do not seem to support that pitch manipulations affect temporal representations more than spatial representations.

Adjustments of selective attention to response conflict—controlling for perceptual conflict and dismissing non-attentional alternative explanations pertaining to the CSE

Miriam Tomat[1], Mike Wendt, Aquiles Luna-Rodriguez & Thomas Jacobsen
[1] *Helmut-Schmidt-University/University of the Federal Armed Forces Hamburg, miriam.tomat@hsu-hh.de*

In conflict tasks, targets and distractors may be congruent or incongruent regarding their assigned responses. The Congruency Sequence Effect (CSE) describes the modulation of the Congruency Effect by the congruency level of the preceding trial. The CSE is commonly interpreted as a measure of conflict-induced attentional adjustment notwithstanding a number of confounds hitherto discussed. Although recent methodological advances successfully controlled for some confounds which allowed for alternative non-attentional interpretations of the CSE, fundamental issues have remained (e.g., global perceptual differences and differences in overall processing times between congruent an incongruent stimulus displays). Using a temporal flanker task with four choice alternatives, in which distractor and target are presented consecutively, we deconfounded congruency and perceptual similarity by drawing the target and the distractor of a trial from different stimulus sets. Observing a CSE under these conditions ruled out accounts based on perceptual similarity or conflict-induced reversal of distractor-response priming (Experiment 1). Moreover, in Experiment 2 we also controlled for all confounds engendered by the sequence of the congruency level (i.e. feature sequence effects, distractor-response contingency, and temporal learning) by means of a probe task. We probed the temporal allocation of attention to the first and second stimulus of a trial by means of intermixing trials of a temporal search task. The performance accuracy results in this task were consistent with a stronger attentional bias in favor of the target's temporal position after incongruent than after congruent trials, confirming the attentional adjustment account of the CSE.

Agency for prevention behaviour

Solveig Tonn[1], Lisa Weller, Katharina Schwarz, Wilfried Kunde & Roland Pfister
[1] *Julius Maximilians University of Würzburg, solveig.tonn@stud-mail.uni-wuerzburg.de*

We affect our environment through our actions. In doing so, we generally feel in control of our actions and their consequences, a phenomenon which has been termed sense of agency. Agency is well documented for actions that aim at causing perceivable effects in the environment, but not all actions aim at causing an effect – rather, actions may also aim at preventing an event which would occur otherwise. Such prevention behaviour poses a critical challenge to the cognitive system, because successful prevention inherently revolves around the absence of a perceivable change. I will present a series of experiments showing that this state of affairs leads to a profound dissociation of explicit and implicit measurements of agency: Whereas participants reported high levels of agency in explicit judgements, there was no sign of agency in implicit measures of temporal binding. These results attest to an altered action representation for prevention behaviour, in line with current theories of clinical avoidance learning, and they might help to better understand avoidance behaviour.

Auditory-visual cross-modal transfer effects from task switching training: Evidence from old and young adults

Benjamin Toovey[1], Florian Kattner & Torsten Schubert
[1] *Martin-Luther-Universität Halle-Wittenberg, benjamin.toovey@psych.uni-halle.de*

Cognitive training may exercise executive functions shared across many tasks, thus improving general cognitive abilities. In later life, this may protect against cognitive decline, and improve general wellbeing. Task switching training has shown potential to enhance performance in similar untrained tasks (near transfer), but also dissimilar tasks which measure traits like fluid intelligence. However, the boundary conditions which constrain the effectiveness of task-switching training are unknown. One possibility is the modalities of training and testing material; if training potentiates neural pathways only for the trained modality, then cross-modal benefits should be absent. In two studies we demonstrate evidence to the contrary. In Experiment 1 (Kattner et al., 2019), N=57 young individuals were trained on either auditory task switching (AT), auditory single tasks (AC), or received no training (PC). In the AT group only, but not in the AC or PC groups, the RT costs resulting from mixing the two auditory tasks were reduced after four training sessions. Crucially, these mixing costs were also reduced for task switching in the visual modality. In Experiment 2 (Toovey et al., in prep.), with N=36 older adults (aged 60+ years), we observed the same pattern of effects: auditory task switching training reduced the mixing costs and transferred to the visual modality, whereas no training or transfer was observed in the control groups. The consistency of this result implies that task switching trains amodal cognitive processes rather than modality-specific strategies, and that aging is not a barrier to such cross-modal mechanisms.

The influence of pre-stimulus occipital alpha oscillations on visual discrimination and reaction time

Lino Toran Jenner[1], Julian Keil & Christian Kaernbach
[1] *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel, lino@toranjenner.de*

Neural oscillations play an important role in sensory and cognitive processing. Occipital oscillations in the alpha band (8 - 13 Hz) are closely related to perceptional and attentional mechanisms. In multiple studies, increased alpha power has been shown to reduce detection of hard-to-detect visual stimuli. Moreover, the phase of alpha oscillations prior to stimulus onset is critical to the detection of visual stimuli. This is explained by a shift in cortical excitability over the course of each alpha cycle. However, prior studies often used short presentation times of visual stimuli at perceptual threshold. Differing from previous studies, we now use longer presentation times (up to 1.5 s) to elucidate the question whether the same mechanisms hold for the perception of salient stimuli. To this end, we present participants with hard to distinguish but salient upright or tilted Gaussian gratings in a two-alternative forced choice task, while measuring occipital alpha activity. In accordance with previous research, we expect alpha power and phase prior to stimulus onset to differentiate between correctly and incorrectly identified stimuli. Additionally, since the potential perceptual inhibition subsides as the alpha oscillation progresses, we expect to find a correlation between alpha phase prior to stimulus onset and reaction times in correctly identified stimuli.

Der Einfluss von Peerviktimisierung auf die psychophysiologische Reaktion auf soziale Bewertung

Hannah Tramp[1], Thea Paulina Nitschke, Frank Neuner & Benjamin Iffland
[1] *Universität Bielefeld, hannah.tramp@uni-bielefeld.de*

Physiologische Stressreaktionen variieren in Abhängigkeit von negativen Erfahrungen in der Kindheit und Jugend. Frühere Studien haben sich jedoch in erster Linie auf familiäre Ursachen von Kindesmisshandlungen konzentriert. Mögliche Auswirkungen von belastenden Sozialerfahrungen unter Gleichaltrigen auf soziale Stressreaktionen sind weniger bekannt. Die aktuelle Studie untersuchte daher, inwiefern die psychophysiologische und affektive Reaktion auf soziale Bewertungsreize von früheren Peerviktimisierungserfahrungen beeinflusst wird. Es nahmen sechzig gesunde Personen an der Studie teil. Erfahrungen von Peerviktimisierung wurden anhand subjektiver Angaben zu belastenden Sozialerfahrungen erhoben. Als Stimuli dienten sozial bedrohliche, positive und neutrale Videos aus dem Video-Set "E.Vids". In einem sozialen Konditionierungsparadigma wurden die Videos mit neutralen Fotos der Schauspieler assoziiert. Während der Präsentation der Stimuli wurden Herzratenreaktionen und EKPs (mittels 128-Kanal-EEG) der ProbandInnen erfasst. Während sich bei Personen mit wenigen Peerviktimisierungserfahrungen differentielle Herzratenreaktionen auf die unterschiedlichen unkonditionierten Reize zeigten, unterschieden sich die Herzraten in Reaktion auf die unterschiedlichen Valenzen bei Personen mit vielen Peerviktimisierungserfahrungen nicht. Bei Betrachtung der EKPs konnte in frühen Komponenten (P100, N170, EPN) kein Einfluss von Peerviktimisierung gefunden werden. Bei der LPP-Komponente hingegen zeigte sich ein signifikanter Einfluss von Peerviktimisierung. Die Ergebnisse deuten darauf hin, dass belastende Sozialerfahrungen das aktuelle Erleben sozialer Situationen beeinflussen. Dabei scheinen Erfahrungen von Peerviktimisierung zu einer generalisierten psychophysiologischen Reaktion auf soziale Stimuli zu führen.

Individual differences in metacontrast masking and object substitution masking

Tomke Trußner[1], Thorsten Albrecht & Uwe Mattler
[1] *Georg-August-Universität Göttingen, tomke.trussner@uni-goettingen.de*

When a target stimulus is briefly presented its visibility can be reduced by a following spatially adjacent mask. This metacontrast masking phenomenon can be related to the operation of three processes, which contribute to target visibility at different stimulus onset-asynchronies (SOA) between the target and the mask. Previous findings suggest that individuals differ regarding the involvement of each of these processes and that each process might be associated to a specific phenomenological experience, which occurs with the corresponding SOAs. With short SOAs, phenomenological reports comprise an integration of target and masking stimuli, indicating the involvement of an integration process. To examine this hypothesis, we compared metacontrast masking to another masking phenomenon, which has been related to an integration process, object substitution masking. Interestingly, however, integration is assumed to impair target visibility in the object substitution paradigm while it is assumed to improve target visibility in metacontrast masking. The temporal dynamic of target visibility was measured in healthy subjects who participated in both paradigms. Factor analyses replicated previous evidence for three processes contributing to target visibility in the case of metacontrast masking. In the case of object substitution masking, evidence suggests two distinct processes. Correlations of individuals' factor scores reveal the relation between the processes that are involved in the two masking paradigms.

The effect of location-associated words on visuospatial working memory

Oksana Tsaregorodtseva[1] & Barbara Kaup
[1] *University of Tübingen, oksana.tsaregorodtseva@uni-tuebingen.de*

It is well established that visuospatial working memory is disrupted by a visual distractor (Stigchel et al., 2007). Data suggest that the impact is due to interconnections between visuospatial working memory and attention. Another line of research claims that location-associated words (e.g., 'sun' - up vs. 'grass' - down) orient attention reflexively to towards the corresponding location (Dudschig et al., 2012), possibly evoking perceptual simulations at that location (Estes et al., 2008). Hence, the sensory-motor system treats these words similar to an actual object in space. The current research is aimed at examining whether task-irrelevant word meaning would affect visuospatial working memory processes, specifically the recognition of a visual location. In a series of three experiments, participants memorized a dot, and in a recognition test, decided whether another dot was in the same position as the previous dot or not. The word as a distractor appeared during a retention interval, being presented visually in the center of the screen (1st, 2nd experiments), or auditorily (3rd experiment). The stimuli were directional words ('up' and 'down', 1st experiment) or location-associated words (2nd and 3rd experiments). We did not observe stable word effects across experiments. Irrelevant word meaning influenced visuospatial memory only in the second experiment in which the words were not presented multiple times, and only in conditions in which the physical location of the word matched the typical location of its referent. We will discuss the implications of these results for theories of attention and visual working memory.

Looking in patterns: Recurrence quantification analysis (RQA) of eye movements

Monika Tschense[1] & Sebastian Wallot
[1] *Max Planck Institute for Empirical Aesthetics, monika.tschense@ae.mpg.de*

The hypothesis of reading time regularity states that the degree of regularity in measures of the reading process is informative about reading fluency and comprehension. The current study aims at testing this assumption, namely that eye movement fluctuations contingent on linguistic information differ in their temporal structure from endogenous fluctuations of eye movements that are not contingent on external information. To that end, three language-unrelated conditions were chosen which serve as 'baselines' for eye movements in the absence of external information (looking at blank screens, fixation crosses or random patterns of circles on a screen). Another three conditions were selected reflecting different degrees of available linguistic information (encoding x-sequences, reading scrambled texts, actual reading of newspaper articles). Eye movements of 25 native speakers of German were recorded with a sampling rate of 1000 Hz. Gaze steps were computed by differencing the raw 2D position data, and subsequently subjected to recurrence quantification analysis (RQA) quantifying various dynamic properties of the time series related to the degree of randomness and structure of their temporal evolution. The results show that eye movement fluctuations during text reading differ systematically in the strength and degree of temporal structure compared to 'baseline' conditions that putatively capture endogenous fluctuations of eye movements in the absence of (linguistic) information. These findings provide a new and important perspective for further studies investigating natural reading as complex, dynamical process using measures of temporal structure.

A TVA-based perspective on template switching in visual foraging

Jan Tünnermann[1] & Anna Schubö
[1] *Philipps-Universität Marburg, jan.tuennermann@uni-marburg.de*

Visual foraging, the search for many targets of the same types in an area, requires observers to maintain multiple target templates in active states or to multiplex their activation. There is much debate concerning the underlying mechanisms, but so far, no formal, quantitative models have been put forward. In the present work, we extend Bundesen's Theory of Visual Attention to visual foraging tasks and model template switching. Using the model, we simulate foraging data to compare simulations with experimental recordings. In addition to manual selections recorded with a stylus on large tablet PC, we also analyze gaze data gathered with a new setup that allows for manual foraging and concurrent eye tracking. Our results show that TVA, with a few plausible additions, can account for typical patterns in target choice. Moreover, the manual responses occur in close lockstep with the preceding eye movements.

Source of feeling of knowing judgments: An event-related potential study

Gözem Turan[1], Can Soylu, Berna Güler & Metehan Irak
[1] *Goethe University Frankfurt and Bahcesehir University, turan@psych.uni-frankfurt.de*

Feeling of knowing (FOK) is a metacognitive judgment that concerns a belief about the ability to remember an item in the future that one has recently failed to recall. It has been shown that FOK judgments are accurate indicators of future memory performance. This accuracy has led researchers to explain its behavioral and neural sources via three main models: cue-familiarity, recollection of partial information and integrative models. While familiarity model claimed that familiarity of cue leads FOK, recollection model postulated that its source relies on the ability to access partial information. Integrative models tried to explain FOKs using an analytic way which consists of both evaluation process for familiarity and accessibility of information. The present study aims to investigate the source of FOK judgments in terms of their temporal dynamics using Event-Related Potentials. During a classical recall-judgment-recognition task, trivia questions were used to measure FOK judgments of 78 university students. Mean amplitude values at frontal electrodes at 300-500 ms and parietal electrodes at 400-800 ms time were analyzed to investigate familiarity and recollection processes, respectively. In the light of results, positive going parietal activity at 400-800 ms was obtained as an indicator of recollection of partial information. Although familiarity activity at frontal electrodes was not observed, there was a positive activity around 200 ms as a rapid assessment for cue-familiarity. Thus, it can be concluded that the source of FOK judgments is analytic and both familiarity and recollection play a crucial role.

Recognising other-race faces is more effortful: Effects of individuating instructions on encoding-related ERP Dm effects

Simone Tüttenberg[1] & Holger Wiese
[1] *Saarland University, simone.tuettenberg@uni-saarland.de*

Socio-cognitive theories of the own-race bias (ORB) propose that reduced recognition of other-race faces results from the failure to attend to individuating information in these faces during encoding. In support of this suggestion, individuating instructions that explicitly inform participants about the ORB and instruct them to pay close attention to other-race faces during learning can attenuate or even eliminate the ORB. In the present experiment, we investigated the effect of individuating instructions and encoding-related event-related potentials (ERPs) that contrast neural activity related to subsequently remembered and forgotten items (ERP Dm effects). In line with a socio-cognitive account, individuating instructions reduced the ORB in recognition memory, suggesting that increased attention to other-race faces can improve recognition. At the same time, individuating instructions increased ERP Dm effects for other-race faces, indicating that successful learning may require additional effort. Therefore, the present results suggest that although instructions to individuate can improve other-race face recognition, additional effort is needed to reduce difficulties resulting from a lack of perceptual expertise. This indicates that compensating for reduced experience with other-race faces is possible to some extent but requires additional resources.

Bayesian Model Averaging of Mixture Models: A case study of estimating the proportion of false positives in Psychological literature

Deniz Tuzsus[1], Simon Kucharsky & Eric-Jan Wagenmakers
[1] *University of Cologne, dtuzsus@smail.uni-koeln.de*

Given the complex nature of scientific publishing, it is of great interest to assess what proportion of significant results is false positive. Analysis of the distribution of published p-values is one way of estimating that proportion. However, this analysis is surrounded by uncertainty in what model best describes the data, and the results from different models can lead to different conclusions (Gronau, Duizer, Bakker & Wagenmakers, 2017; Schimmack & Brunner, 2019). Instead of choosing a single best fitting model to obtain the estimate of interest, we propose Bayesian model averaging (BMA) as an "in between" solution, in which estimates of different models get weighed proportionally to their posterior probability. In addition to already proposed models, we develop and validate new models to apply this method to 587 significant p values published in the 2007 volumes of Psychonomic Bulletin & Review and the Journal of Experimental Psychology: Learning, Memory, and Cognition.

Estimating decision times from movement trajectories as alternative to reaction times

Philipp Ulbrich[1] & Alexander Gail
[1] *Deutsches Primatenzentrum GmbH, pulbrich@dpz.eu*

In classical reaction time paradigms where subjects indicate a choice between stimuli via discrete responses (e.g. a button press), reaction times can serve as measure for the duration and difficulty of a decision but offer only limited insight into the dynamics of the underlying processes. If instead subjects are asked to perform a movement towards multiple potential reach targets while still being undecided ("go-before-you-know"), the resulting trajectories can serve as continuous behavioral readout of the underlying decision process, capturing temporal dynamics that classical reaction time paradigms cannot. However, estimating the timepoint of commitment to the ultimately chosen option in an ongoing single-shot movement remains challenging. Here we present a newly developed sensitive method ("cone method") for quantifying decision time-points from movement trajectories on a single-trial basis. We validated the method by comparing it to conventional, trial-averaging methods in a validation experiment with experimentally controlled decision time-points, where the cone method achieved comparable performance. Beyond estimation of decision time-points, the cone method has the added benefit of allowing to categorize and preselect trials in terms of whether subject make online decisions or guess prior to movement onset. Also, compared to other trajectory-based methods, the cone method does not require a reference against which the trajectories have to be compared to obtain the decision-time. Ultimately, the cone method provides a reaction time analog for go-before-you-know decision-making experiments, allowing to combine the benefits of both experimental approaches.

When (and why) font size dissociates metamemory and memory for nonwords

Monika Undorf[1]
[1] *University of Mannheim, undorf@uni-mannheim.de*

People expect to remember words printed in larger fonts better than words printed in smaller fonts, although actual memory is similar for smaller and larger words. Incidental observations raise the possibility that this font size illusion in metamemory may not occur with nonwords. If so, this might provide insights into when and why font size dissociates metamemory and memory and, in addition, point to limitations of current theorizing about metamemory. Three experiments obtained judgments of learning (JOLs) for words (e.g., metal), pseudowords (e.g., unsle), and nonwords (e.g., abrtz) presented in four different font sizes between 9 point and 294 point. Results revealed illusory effects of font size on JOLs for words and pseudowords in all experiments and conditions. Provided that participants attempted to master nonwords, font size also affected JOLs for nonwords. These results demonstrate that font size dissociates metamemory and memory for various types of items and inform our knowledge about metamemory.

Introducing the concept of test difficulty into IAT-research in order to improve the predictive validity of the IAT

Merlin Urban[1]
[1] *Friedrich-Schiller-Universität Jena, Germany, merlin.urban@uni-jena.de*

Evidence suggests that the ability of the implicit association test (IAT) to predict behavior is rather low although numerous moderators have been identified. In order to tackle this issue we want to introduce a so far overlooked moderator to the IAT, that is the test difficulty from classical test theory. It is long known that the relationship between two tests depends on their test difficulty (congruency between test difficulty leads to higher correlations than incongruency). Thus, the aim of our first study was to develop IATs with different difficulties and to test the proposed correlational pattern. In total 97 participants took part in our study which consisted of a 2x3 within design with the factors measurement (IAT and behavior) and difficulty (easy, moderate and difficult). We were able to manipulate the difficulty of the IATs, however the expected correlational pattern failed to appear. One possible reason for this unexpected finding is the fact that the moderating effect of test difficulty has been argued to result from the distribution of the data. And indeed the distribution of the individual IAT-effects was close to normality regardless of the difficulty of the IAT whereas the distribution of the behavior measures showed expected ceiling and floor effects. In a second study we thus want to test whether we can induce such ceiling and floor effects into the IAT experimentally by manipulating the attitude towards a priori neutral objects and developing IATs with extreme difficulties. Results and implications for IAT-research will be discussed.

The number of trials shapes the relationship between priming and visibility under interocular suppression

Christian Valuch[1]
[1] *Georg-August-Universität Göttingen, cvaluch@uni-goettingen.de*

Research on the functional segregation of action- and perception-related processing streams in the visual system often studies preserved priming effects in motor responses, which occur independently of perceptual discriminability of the prime stimuli. However, experimental design decisions could influence the resulting relationship between priming and visibility. Here, we reanalyzed a recent dataset on priming effects under Continuous Flash Suppression (CFS), a particularly potent variant of interocular suppression (Valuch & Mattler, 2019, Journal of Vision). Participants completed the same number of priming and visibility trials. Priming and visibility functions were computed for each participant based on an incremental increase of the number of trials, relative to the start of the experiment (8, 16, 24, 32, 40, 48 or 56 trials per experimental condition). The analysis revealed that priming effects remained stable when more trials were added to the analysis. A completely different pattern emerged for visibility effects. The estimated visibility of the prime stimuli increased substantially and monotonically with adding more trials to the analysis. Using a lower number of trials for measuring visibility compared to priming effects (which is not an uncommon choice), could thus underestimate the actual visibility of the primes. We discuss implications for evaluating dissociations between priming and visibility and assess the generalizability of this observation for visual masking techniques beyond interocular suppression.

Do automatic inferences determine our preferences? The role of inferential processes in evaluative learning

Pieter Van Dessel[1]
[1] *Ghent University, Pieter.VanDessel@UGent.be*

Evaluation is at the core of our lives. It not only guides our judgments and decisions, but also dictates how we treat other people or which products we consume. Moreover, much of our more automatic (e.g., habitual, or addictive) behaviour is thought to strongly depend on evaluative processes. It is therefore of critical importance to understand how, when, and why evaluations are established and can be changed. Many theorists have argued that the learning of evaluations and related automatic behaviour is the outcome of implicit processes that operate through mental associations rather than explicit, belief-based processes that drive more controlled behaviour. In applied fields, intervention studies targeting maladaptive behaviour have often used associative learning procedures designed to facilitate automatic changes in mental associations. Yet, recent findings do not fit well with dominant associative (or dual-process) theories and challenged key underlying assumptions of these theories. Building on recent theoretical developments in the field of cognitive (neuro-) science, we proposed an alternative single-process view, that evaluative learning is determined by automatic inferential reasoning processes. From this perspective, automatic inferences determine how we feel and act in response to stimuli. This inferential theory represents a shift in thinking about human behaviour and how we can most efficiently promote behavioural change that benefits our environment at the individual and societal level (e.g., to improve people's well-being, treat clinical disorders, or facilitate protection of our natural environment). I will discuss recent research testing the value of this theoretical framework.

Discrete vs continuous action-feedback and their effects on behavioural and neural processing during predictive action-feedback monitoring

Bianca Van Kemenade[1], Christina Schmitter, Olaf Steinsträter, Tilo Kircher & Benjamin Straube
[1] *Philipps-Universität Marburg, biancavankemenade@gmail.com*

In order to establish meaningful interactions with the environment, we need to be able to distinguish self-generated from externally generated sensory input. It is though that this is mediated by predictions based on the efference copy, which lead to perceptual and neural suppression of self-generated sensory stimuli. However, the brain areas that are suppressed vary across different studies. Furthermore, sometimes perceptual enhancement has been found. In the current fMRI study, we investigated whether the type of feedback can explain the heterogeneous results. Participants performed active and passive hand movements using a passive movement device. In some conditions, participants received continuous visual feedback of the action, in other conditions discrete action outcomes were presented. In all cases, participants were asked to detect variable delays inserted between action and feedback. Behaviourally, we did not find any effect of action type. However, slopes were steeper in continuous conditions, indicating participants were more precise in distinguishing different levels of delay for continuous feedback. On the neural level, we found widespread suppression in active conditions in sensory areas (visual and somatosensory areas), motor areas (motor cortex, cerebellum), and temporoparietal areas often associated with self-other distinction (angular gyrus, middle temporal gyrus). Importantly, a conjunction analysis revealed that this pattern of suppression was similar for discrete and continuous action feedback. Altogether, these results suggest that discrete and continuous action feedback are processed similarly, though continuous feedback might provide us with more cues to reliably detect delays, aiding us in accurate action-feedback monitoring.

Attentional capacity in youth with Tourette syndrome and comorbid disorders

Signe Vangkilde[1] & Kristine Kristjansen
[1] *University of Copenhagen/Department of Psychology, signe.vangkilde@psy.ku.dk*

Tourette syndrome (TS) is a neurodevelopmental disorder involving the basal ganglia and connecting fronto-striatal pathways. TS is characterised by motor and vocal tics, as well as a high comorbidity with attention-deficit/hyperactivity disorder (ADHD) and obsessive compulsive disorder (OCD). In some studies, TS has been associated with cognitive impairments, but the degree to which this is driven by comorbid disorders is unclear. Here we present a parametric investigation of visual attention in TS based on a Theory of Visual Attention (TVA) while correcting for comorbidity. We tested 187 TS patients aged 11-25 years (M = 18.25) and 47 healthy controls aged 14-24 years (M = 18.39) with a TVA-based whole report paradigm to derive individual estimates of visual short-term memory span, visual processing speed, and the temporal threshold of perception. The TS patients were further divided into four subgroups based on comorbidity status: TS-only, TS+ADHD, TS+OCD, and TS+ADHD+OCD. We found no differences between the full patient group and the healthy controls, nor between TS-only and the healthy controls. However, comorbid ADHD appears to be associated with lower processing speed, while comorbid OCD may positively affect the capacity of short-term memory. Thus, a diagnosis of TS alone does not seem to influence visual attention negatively. These findings are discussed in relation to previous studies of cognition in TS and to TVA-based investigations in children and adolescents with neurodevelopmental disorders.

Investigating the effects of ambivalence in evaluative priming: A diffusion model approach

Thomas Verliefde[1] & Mandy Hütter
[1] *Eberhard Karls Universität Tübingen, thomas.verliefde@uni-tuebingen.de*

We investigate attitudinal ambivalence using diffusion models, which compute different parameters mapped to cognitive processes. This allows us to compare ambivalent trials on speed of response execution (d), non-decisional time (t0), and drift rate (v). Participants were instructed to respond speedily to obtain a sufficient amount of incorrect trials for the diffusion modelling. Experiment 1 (N=76) used ambivalent words as primes in an evaluative priming paradigm. Mixed model analysis showed higher latencies for ambivalent trials than for congruent trials. The diffusion modelling, with correct and incorrect as the decision boundaries, also showed differences with congruent trials, where the t0-parameter was higher for the ambivalent trials. Both methods showed little difference between ambivalent and incongruent trials. In Experiment 2 (N=73) ambivalent words served as target stimuli instead of primes. Mixed model analysis showed that ambivalent targets were categorized more slowly than congruent trials. The diffusion model analysis was conducted with positive and negative as the decision boundaries. For both the d-and t0-parameters, negative target trials had significantly lower values compared to both positive and ambivalent target trials. The v-parameter was also significantly different between all three conditions, with positive and negative trials showing drift rates in the direction of their respective boundary, and ambivalent trials showing no preference. In conclusion, it seems that ambivalent targets allow for a faster response execution and non-decisional time than negative targets. This contrasts with ambivalent primes, where their dual nature makes them inherently incongruent with positive or negative targets.

The self as a feature bundle

Stephan Verschoor[1] & Bernhard Hommel
[1] *Leiden University, verschoorsa@gmail.com*

Recent research using enfacement and the rubber-hand illusion suggests that what belongs to the self is quite malleable. The Theory of Event Coding predicts: the more features overlap between self and other, the more pronounced self-other integration. Such integration leads to increased ownership and agency, and feature-migration between self and other. TEC could thus explain the malleability of self-experience. A recent enfacement study from our lab shows that even moods can migrate from avatar to subject. This result holds great promise for therapeutic practice. To test TECs predictions regarding self-other integration and better understand feature-migration, we manipulated the degree of feature overlap between participants and avatars (same gender vs. different gender) and the degree of control that participants have over the avatar. With this setup we tested whether visual similarity between avatar and subject can enhance mood migration. We hypothesized that more feature overlap results in more mood migration.

Thinking fast and slow about words and voices: RT-distributional analyses of voice-specific priming in auditory word recognition

Malte Viebahn[1]
[1] *Leipzig University, malte.viebahn@uni-leipzig.de*

Studies have demonstrated that listeners can retain detailed voice-specific acoustic information about spoken words in memory. A central question is when such information influences linguistic processing. According to episodic models of the mental lexicon, voice-specific details influence word recognition immediately during online speech perception. Another view, the time-course hypothesis, proposes that voice-specific details influences linguistic processing only when processing is slow and effortful. The present study investigates the time-course hypothesis by employing RT-distributional analyses. We conducted a long-term repetition priming experiment using an auditory lexical-decision task. In two blocks, participants made speeded responses to existing and non-existing spoken words. In the second block, items were either repeated in the same voice, repeated in a different voice, or had not been presented in the first block. Ex-Gaussian analyses of the RT distributions in the second block revealed that voice-specific priming is reflected in distributional shifting rather than in distributional skewing. This indicates that voice-specific priming is not limited to very slow responses but that it affects fast and slow responses equally. This finding is inconsistent with a strict version of the time-course hypothesis which claims that voice-specific priming occurs only during off-line processing. Instead, voice-specific information can influence linguistic processing early on.

When the same is not the same: Influence of Stimulus Type, Block Order and Stimulus Category in the Implicit Association Test (IAT)

Lisa Viegas[1], Christina Bermeitinger & Pamela Baess
[1] *Universität Hildesheim, viegasl@uni-hildesheim.de*

The Implicit Association Test (IAT, Greenwald, McGhee & Schwartz, 1998) has been used in almost every field of psychology. Despite its wide spread application as an implicit measure of attitude, the IAT was criticized for different methodical reasons (e.g. confounding with block order, possible recoding of the task, voluntary controllability). Various studies found effects of block order, stimulus material or training in the classical IAT, questioning the interpretation of the IAT effects as solely measure of implicit attitudes. However, no study has yet investigated at the same time different effects of the IAT setup per se. Here, we used the typical insect-flower-IAT in a well-powered study (N = 90) to systematically test for the effects of block order (insect vs. flower combined with positive first) and valence category assignment (positive in the left corner vs. negative in the left corner) as between subject variables. Stimulus type (pictures or letters), stimulus category (positive, negative, insects or flowers) and block type (crossed [e.g. insect + positive] or recrossed [e.g. insect + negative]) were within-subject variables. It was shown that the IAT effect varied based on stimulus type, stimulus category and block order. Further, reaction times for the four stimulus categories differed based on the stimulus type. Another significant interaction was found between stimulus type and block order. Taken together, our research shows that various factors in the IAT setup influenced the underlying IAT effect limiting its validity as an implicit measure for associative preferences.

Can we mindfully control our attention: Comparing the effects of short mindfulness breathing meditation and progressive muscle relaxation on cognitive functions

Elena Vieth[1], Silja Bellingrath & Lisa Von Stockhausen
[1] *Universität Duisburg-Essen, elena.vieth@uni-due.de*

While some studies on mindfulness based interventions (MBIs) present beneficial effects on cognitive functions (e.g. Chiesa et al., 2011) others found no consistent effects (e.g. Anderson et al. 2007; Lao et al., 2016). One reason for the inconsistency of findings may be the great variation in procedures, research designs and absence of active or passive control conditions. Furthermore, processes which underly effects of even very short interventions (10 to 20 minutes; Brown et al., 2016; Ostafin & Kassman, 2009) are not clear, may not be specific to mindfulness training and may be attainable otherwise, such as through relaxation (Fell et al., 2010). Therefore, the current study compared the effects of a short-term mindfulness breathing meditation with progressive muscle relaxation (active control condition) and listening to podcasts (passive control condition). 78 participants were randomly assigned to one experimental condition and received interventions for 20 minutes, twice within 5 days. Measurements took place pre and post interventions. The research followed a 3 (experimental condition) x 2 (time of measurement) experimental design. We assessed components of executive functions and attentional networks with the Attention Network Task, Continuous Performance Task, n-Back and Number-Letter Task. Results were analyzed using Generalized Linear Mixed Modelling, which allowed for the inclusion of single-trial reaction-time data and for the investigation of differences in response patterns within and between individuals. Our results do not show systematic benefits of the mindfulness intervention beyond those of the relaxation training. Theoretical implications for models of mindfulness are discussed.

Entraining visual cortex activity in grapheme-color synaesthesia

Gregor Volberg[1]
[1] *Universität Regensburg, gregor.volberg@ur.de*

Grapheme-color synesthetes have color sensations when viewing specific letters or numbers (inducers). It is known that the visual cortex of synesthetes is highly excitable. We here investigate a possible link between increased visual cortex excitability and color misperceptions in synesthetes. Visual cortex oscillations were entrained by rapid serial presentations of inducers and non-inducers, and steady-state visual evoked potentials (SSVEPs) in the EEG were analyzed at the driving frequencies. Inducers compared to non-inducers produced larger occipital SSVEP amplitudes, originating from neural sources in calcarine sulcus and middle occipital cortex. Moreover, SSVEP amplitude differences between grapheme conditions predicted the vividness of color sensations. No effect was found in a sample of non-synesthetic control participants who saw matched sets of graphemes. Thus, in synesthetes, inducers entrained strong brain responses in the lower visual cortex. The increased brain activity might be maintained during further processing and increase the likelihood for irregular grapheme and color bindings.

Troll Story: Trolling and the Dark Tetrad Revisited

Sara Alida Volkmer[1], Susanne Gaube, Martina Raue & Eva Lermer
[1] *University College Cork, s.a.volkmer@umail.leidenuniv.nl*

Online communication is getting increasingly important in shaping our everyday experiences; especially since it can be used to spread threatening and/or harmful messages. Internet trolling is considered a negative form of online interaction and can have tremendous effects on people's well-being. The present preregistered (osf) experiment had two aims: First, to replicate prior findings of a relationship between internet users' trolling behavior and the Dark Tetrad of personality (Machiavellianism, narcissism, psychopathy, and sadism; RQ1). Second, to investigate the effect of experiencing social exclusion on people's immediate motivation to troll others (RQ2). For our investigation, we conducted an online study. Participants (interim results n = 711) completed self-report questionnaires assessing personality and baseline trolling (i.e., someone's regular trolling activities). Afterwards, participants were randomized to one of two conditions using the Cyberball paradigm: social inclusion vs. social exclusion. Finally, participants rated their immediate trolling motivation. To answer RQ1, we looked at the correlations of the Dark Tetrad with baseline trolling behavior. To answer RQ2, a t-test compared included and excluded participants concerning their immediate trolling motivation. Preliminary results regarding RQ1 indicate highly significant correlations between baseline trolling and the Dark Tetrad. However, our analysis for RQ2 does not suggest that excluded participants experience higher trolling motivation than included participants. The present study confirms that trolling behavior is associated with the Machiavellianism, narcissism, psychopathy, and sadism. Though exclusion did not affect trolling behavior, this study contributes to psychology by being one of the first preregistered experimental investigations of trolling behavior.

Wie wollen menschliche Fahrer in der Stadt automatisiert gefahren werden?

Mark Vollrath[1], Vanessa Stange & Stephanie Wülker
[1] *TU Braunschweig, mark.vollrath@tu-braunschweig.de*

Im Stadtverkehr sind Begegnungen zwischen motorisierten Fahrzeugen und schwächeren Verkehrsteilnehmern besonders zahlreich. Automatisiertes Fahrverhalten soll als sicher wahrgenommen werden. Gleichzeitig soll es aber so gestaltet werden, dass das Verkehrssystem effizient ist. Das Projekt AFiM (Automatisiertes Fahren im Mischverkehr, BMVI) beschäftigt sich mit diesem Zielkonflikt zwischen Sicherheit und Systemleistungsfähigkeit des Verkehrs. In einer Fahrsimulatorstudie wurde untersucht, welches Risiko menschliche Passagiere im automatisierten Fahrzeug in Abhängigkeit von dessen Fahrverhalten bei der Begegnung mit Fußgängern akzeptieren. Die 32 Passagiere (16 weiblich) wurden auf einer geraden Strecke an einer Sichtverdeckung vorbeigefahren, wobei folgende automatisierte Fahrverhaltensweisen variiert wurden: die Spurmittenführung im eigenen Fahrstreifen (links / Mitte / rechts) und die Geschwindigkeit (30 km/h / 50 km/h). Zusätzlich wurde die Präsenz von Gegenverkehr (mit / ohne) und einem Fußgänger auf dem rechten Seitenstreifen (mit / ohne) variiert. Zusätzlich wurde in sechs ausgewählten Situationen eine Verzögerung von 1.0 m/s² auf Höhe der Sichtverdeckung umgesetzt. Erhoben wurden die Bewertungen der Fahrer hinsichtlich ihres subjektiven Risikoerlebens und des automatisierten Fahrverhalten. Die Ergebnisse zeigen, dass Passagiere das automatisierte Fahren in der Mitte des eigenen Fahrstreifens als am sichersten bewerteten. Ein Versatz nach links bei Gegenverkehr sowie nach rechts bei Fußgängerpräsenz auf dem rechten Seitenstreifen wurde dagegen als sehr unangenehm empfunden. Eine Verzögerung führte dann zu einer signifikanten Verminderung des Risikoerlebens, wenn das automatisierte Fahrzeug 30 km/h fuhr, kein Gegenverkehr präsent war und sich ein Fußgänger auf dem rechten Seitenstreifen befand. Die Ergebnisse liefern wichtige Hinweise für die Auslegung automatisierter Fahrfunktionen unter Berücksichtigung des Passagiererlebens.

Increasing compliance by lowering participant burden: The application of simple one-button wearables in Experience Sampling Methodology studies

Selina Volsa[1], Stefan Stieger, David Lewetz & Bernad Batinic
[1] *Karl Landsteiner Privatuniversität für Gesundheitswissenschaften, selina.volsa@kl.ac.at*

The Experience Sampling Method (ESM) allows the investigation of phenomena in a naturalistic setting and in great temporal detail. However, participants can feel burdened by the requirement of frequent inputs, resulting in lower compliance and data quality. If participants' smartphones are employed, as is common in modern ESM research, part of this burden is the overhead of retrieving, readying, and putting away the device. When the number of bings or events is high, this overhead might seem disproportionally large. This is especially problematic when participants are responsible for logging the data on their own, such as in event-based scheduling. To solve this problem, we promote the use of wrist-worn one-button wearables. Simple devices like these offer benefits like substantially reducing this overhead. They also offer certain benefits over alternative approaches, like smartwatches, as they can be operated without looking at the devices screen, and need less maintenance like charging the battery. We test these benefits in an ongoing study. Participants are asked to log laughter events throughout a four-week period, using either a wearable or a smartphone. First, preliminary results show a significantly higher number of logged events in the wearable group, which indicates an improvement in data quality over the smartphone group. We further discuss the possibilities and limitations of this approach.

Multimodal Emotion Perception in Cochlear Implant Users: A Pilot Study

Celina Von Eiff[1] & Stefan R. Schweinberger
[1] *Friedrich Schiller University, Jena, Germany, celina.isabelle.von.eiff@uni-jena.de*

466 million people(WHO, 2019) suffer from disabling hearing loss. Although cochlear implants(CIs) are successful sensory prostheses to treat profound sensorineural hearing loss, they only permit a rudimentary form of hearing compared to normal hearers(NHs), with speech comprehension achieved by perceptual learning of sensory signals via cortical plasticity. Actually, there is some evidence for enhanced crossmodal face-voice processing in CI users, which seems to reflect genuine cortical reorganization. However, cortical plasticity in CI users has not been studied for the processing of emotional signals, although the ability to perceive emotions was previously found to be related to CI users' perceived quality of life. To systematically investigate the role of multisensory information for CI users' perception of vocal emotions, we produced high-quality videos depicting speaking faces: Using emotion induction rather than posed expressions, we recorded 12 speakers(6 females) speaking different pseudowords with different emotional expressions(angry, disgusted, fearful, happy, neutral, sad, surprised). We used temporal morphing technology to create precisely synchronized audiovisual stimuli with congruent or incongruent audiovisual expressions. We report initial data from 4 CI users and 22 NHs who rated these stimuli in an auditory-only, a visual-only, and a congruent audio-visual condition. While CI users and NHs were least likely to correctly classify auditory-only stimuli, CI users performed above chance but poorer than NHs in recognizing vocal emotions. Since they performed best at recognizing surprise and anger in voices only, we plan to use these emotions to further investigate multimodal emotion perception in CI users.

Studying individual differences in diffusion model parameters in a rather large sample

Mischa Von Krause[1], Stefan Radev & Andreas Voss
[1] *Heidelberg University, mischa.vonkrause@psychologie.uni-heidelberg.de*

The diffusion model (Ratcliff, 1978) is a mathematical model for the analysis of response time distributions and accuracy rates in simple binary decision tasks. The three main parameters estimated when applying the diffusion model are the speed of information uptake (drift rate), conservatism of the decision criterion (boundary separation), and non-decision time, which encompasses all non-decisional processes contributing to response times. Stemming from the roots of the model in cognitive research, the sample sizes in most studies utilizing the diffusion model have been relatively low when to compared to the usual Ns found in individual differences research. We present findings on the nomological network of the main diffusion model parameters based on large sample (N>4,000,000) of Implicit Association Test data. In order to fit the model to these data, we had to adjust the model to provide two different forms of non-decision time for correct and error responses. To handle the great number of participants, we also used a new parameter estimation procedure based on machine learning, that yields valid results in a very short amount of time. We report findings on the relationships of the model parameters to demographic and personality measures.

Training gender and case with specially designed children´s books and songs

Friederike Von Lehmden[1], Claudia Müller-Brauers & Eva Belke
[1] *Ruhr-University Bochum, Friederike.vonLehmden@rub.de*

Acquiring the nominal inflection system in German is a challenge for many children. We designed three children´s books to support the acquisition of the German gender and case system. The stories included frequent repetitions of cues, redundant morphological cues, contrasts, and a presentation of cues in a grouped, structured fashion. In addition, we selected children's songs with parallel textual features. In our study with 117 preschool children, we evaluated the efficacy of these materials in language training, training one group with the specific intervention (EG), one group with an unspecific intervention (CG1) and one group with no intervention (CG2). Using a specifically designed test of German gender and case processing, we compared the children's performance pre (T1) and post (T2) intervention and six weeks after T2 (T3). In the present research, we focus on the results for those 20 to 21 children per group (mean age: 4.1 years) who had only reached a raw score < 5 in the TROG-D in pre-tests. The performance of all children improved significantly from T1 to T3. There was no main effect of group but a significant interaction of group and testing point: Only the EG showed a significant positive effect immediately after training. CG1 only improved significantly after T2 and CG2 only showed a significant difference between T1 and T3. These results suggest that the training was effective. We discuss our findings with regard to the quality of the training material and the test material and address the heterogeneity among the children.

A surprise to remember: How does prediction error strength influence memory?

Julie Sophie Von Westerman[1], Javier Ortiz-Tudela & Yee Lee Shing
[1] *Goethe University Frankfurt, s8701626@stud.uni-frankfurt.de*

Our mind uses priors based on past experiences to predict outcomes and events in reality, thus enabling us to efficiently interact with our environment. Since the requirements of our environment are often changing, priors need to be constantly updated in order to meet new demands. One factor that can enhance these updating processes is prediction error (i.e., the difference between the predicted information and the actual evidence received). The strength of this errors reflects the amount of novel information that was not part of our mental representations of the world before the evidence was encountered. The present study measured the effects of three different levels of prediction error (high, medium and low) on memory performance. In four different phases we separately manipulated the establishment of the priors, the prediction verification as well as the immediate and delayed memory consequences. We were able to measure a significant effect of prediction error on memory performance: the effect of high prediction error exceeds the effect of low prediction error in the delayed memory test (i.e., after consolidation). Unexpectedly, we also measured an marked improvement in memory performance for medium prediction error. These results support the idea that predictive processing has a long-term influence on memory.

Evaluating memory models for paired word recognition

Anne Voormann[1], Mikhail S. Spektor & K. Christoph Klauer
[1] *University of Freiburg, anne.voormann@psychologie.uni-freiburg.de*

In a typical recognition task, participants study word lists and categorize single-words in a subsequent recognition phase as previously studied or not. Pairing two words randomly in a recognition phase (paired-words), combined judgements to each pair differ from two separate responses to the same words. Previously, two models have been used to describe the performance of paired-words: two-high threshold model (2HTM) as an example for discrete-state models and general recognition theory (GRT), a multidimensional signal detection theory, as an example for continuous models. Previous studies showed consistently that the discrete-state model could explain the paired-word recognition task best. However, both models have not been validated so far. Within this talk, we present a first attempt to validate those models using selective influence studies. We tested whether both models capture a base-rate manipulation in a meaningful way. Theoretically, it is expected that base-rate manipulations only affect parameters describing decisional processes. Inspecting those hypotheses within models allowing both, mnemonic and decisional parameters to differ between different base-rate manipulations, exactly those results can be observed. However, comparing model versions locating the effect on either the mnemonic or the decisional processes, former models are preferred. Within this talk, we will discuss the theoretical implications for those two models.

A Lévy-Flight model of decision making

Andreas Voss[1], Marie Wieschen & Stefan Radev
[1] *Heidelberg University, andreas.voss@psychologie.uni-heidelberg.de*

In psychology, decision making is often – and successfully – modelled with the diffusion model, which is based on the assumption that evidence accumulation follows a Wiener diffusion process, that is, evidence accumulates over time with a constant drift and normal noise. Here, I will present a model suggesting that noise in evidence accumulation is not Gaussian but is better described by heavy-tailed distributions. Thus, the evidence accumulation process is mapped no longer by a diffusion process but by a so-called Lévy-flight. An important characteristic of Lévy-flights is the incorporation of jumps in the process. In decision making, such jumps indicate sudden changes in the subjective believes about the current situation. In the present talk I will (a) discuss possibilities to estimate parameters of the Lévy-Flight model, (b) compare the fit of the standard diffusion model and the Lévy-Flight model to empirical data, and (c) present first evidence of both individual-related and task-related predictors of the "heavy-tailed-ness" of the noise distribution.

Long-term visual deprivation effects selective visual attention, short-term memory and cortical plasticity

Franziska Wagner[1]
[1] *Universitätsklinikum Jena, franziska.wagner@med.uni-jena.de*

Little is known about plasticity in the human adult visual cortex. Aim of this study was to better understand the nature of neuroplastic changes in the visual cortex. Studies with up to 150 minutes of monocular deprivation have shown to alter visual perception in adult humans. In this study we used long term monocular deprivation about 7 days with intervals of 1, 3, 5 and 14 days to test for short- and long-term structural and functional changes in brain visual networks by structural and functional MRI. TVA (theory of visual attention)-based assessment was used for sensitive investigation of functional changes in short-term memory and visual attention.

Examination of test-retest reliability of stimulus intensity amplitude at pain threshold by using cutaneous electrical stimulation

Viola Wagner[1], Carolina Kanig, Mark W. Greenlee, Rainer Rupprecht & Jens V. Schwarzbach
[1] *Universität Regensburg, viola.wagner@ukr.de*

Cutaneous electrical stimulation allows one to assess sensory and emotional processing in healthy participants as well as in patients with neurologic and emotional dysfunctions. A standardized procedure for studying changes in the processing of potentially painful stimuli should, among other criteria, involve as few as possible painful stimuli while yielding a high retest reliability. Here, we present a new developed calibration method "STEP" (Sensory Threshold Estimation Procedure) for estimating the intensity of cutaneous stimulation at pain threshold, which we apply in the context of investigating neural correlates of fear and anxiety. We applied brief electrical stimuli (1 ms) with intensity increasing every 500 ms from 4.7 mA to maximally 70 mA in steps of 0.84 mA. Concurrently, participants manually adjusted a cursor on a labelled visual analogue scale. They were instructed to abort the procedure once they experienced the stimulation as painful. We investigated forty healthy subjects examined on four subsequent time points within three sessions (i.e. after 15 minutes, 24 hours and 168 hours) using six different electrode positions at the arms and legs in each session. Intraclass correlation coefficients (ICC) indicated moderate to good reliabilities of stimulus intensities at pain threshold for each location, but reliability decreased over time. Positive and negative affect as state variables predicted intensity at pain threshold, whereas traits did not. Our results suggest renewed calibration for follow-up testing sessions (>15 min). Finally, our STEP procedure provides a suitable method to calibrate individual stimuli at pain threshold in an efficient and standardized way.

Sensorimotor adaptation in VR: Magnitude and persistence of the aftereffect increase with the number of interactions

Svetlana Wähnert[1], Alexander Gerhards & Gisela Müller-Plath
[1] *Technische Universität Berlin, svetlana.waehnert@tu-berlin.de*

Humans constantly adapt their skills to changing environmental conditions. This learning process is called sensorimotor adaptation. Previously investigated in prism experiments, several studies have shown sensorimotor adaptation in VR systems (e.g. Veilleux & Proteau, 2015). Before using VR in different applications, it is important to understand the mechanisms underlying sensorimotor adaptation. A sensorimotor adaptation can occur when a buggy VR system displays a visually displaced environment. The elimination of the visual displacement can result in an aftereffect. An aftereffect is the spatial deviation of the motor actions in the direction opposite to the visual displacement. Prism adaptation experiments have shown that a higher number of interactions led to an increased magnitude and persistence of the aftereffect (Dewar, 1970; Fernández-Ruiz & Díaz, 1999; Welch, 1971). The aim of the present study was to investigate this relationship in VR. Thirty subjects performed pointing movements within a VR. After a baseline measurement, the virtual environment was displaced visually. During this adaptation phase, the subjects performed either 0, 5, or 35 pointing movements. Afterwards, all subjects performed the pointing movements without the visual displacement. Performing 5 pointing movements during the adaptation phase was already sufficient to produce an aftereffect. With 35 pointing movements, both magnitude and persistence of the aftereffect increased. These results replicate studies of prism adaptation in reality. The present study contributes to the suitability of VR as a research method on motor learning and emphasizes the importance of failure-free VR systems, especially in risky, fine motor actions (e.g. surgery).

Multidimensional Detrended Fluctuation Analysis (MdDFA) for the quantification of global long-memory processes and its application to EEG data

Sebastian Wallot[1] & Monika Tschense
[1] *Max Planck Institute for Empirical Aesthetics, sebastian.wallot@ae.mpg.de*

Investigations of physiological and behavioral time series data have shown that such data contain complex autocorrelation profiles, known as long-memory, fractal fluctuations, or 1/f noise. Such autocorrelation profiles are characterized by a less-than-exponential decay of correlation strength with increasing lag. The main hypothesis on the origin of such long-memory is, that it is a result of the non-linear interactions between cognitive or (neuro-)physiological components (such as cells, organ systems, cognitive functions). However, currently available analysis techniques that are used to quantify long-memory, such as spectral-based analysis or detrended fluctuation analysis (DFA), take only univariate data to quantify long-memory. Hence, the first part of this talk presents a new analysis technique, multidimensional detrended fluctuation analysis (MdDFA), which allows to analyze multivariate time series data. The result of such an analysis is a Hurst exponent H, which quantifies the strength and type (persistent or antipersistent) of long-memory in multivariate time series data. The second part of this talk presents the application of MdDFA to EEG data from a timing study, investigating the effects of accuracy feedback on time interval production and showing how MdDFA can be used to capture global long-memory characteristics in EEG dynamics. In conclusion, MdDFA allows to quantify global or cluster-wise long-memory processes in multivariate data sets, and does so more accurately then combinations of univariate applications, such as simple DFA.

Estimating task load from spectral properties of the EEG

Edmund Wascher[1], Julian Elias Reiser, Stefan Arnau, Melanie Karthaus & Stephan Getzmann
[1] *IfADo – Leibniz Research Centre for Working Environment and Human Factors, wascher@ifado.de*

The inherent difficulty of a task, the so-called task load, is hard to estimate when the measurement scenario becomes more natural than the typical abstract laboratory paradigm. In particular changes in task requirements during an ongoing task are hard to be determined by an observer from a third person perspective. Nevertheless, there is evidence that properties of the EEG might help to overcome this problem. In a large-scale study we intended to determine continuous task load in a driving test situation. More than 300 participants drove along a realistic driving scenario in a fixed-base simulator. EEG was recorded by means of round-the-ear electrodes (cEEGrids) which were developed for mobile use. In a first step, the task load of semantically different segments was estimated by an expert. Followingly, EEG parameters of mental load (theta) and attentional allocation (alpha) were extracted and averaged across these different segments. As expected, theta activity increased and alpha power decreased with increasing task load. In a subsequent analysis, time frequency data morphed to match the position on the track revealed a finer resolution of task load estimates for any waypoint of the driving situation. The low-resolution EEG recording equipment and the realistic driving scenario were chosen in order to transfer this approach to real life situations. The results showed that it appears to be feasible considering data quality. Thus, the measurement of ongoing task load in more natural settings based on objective data might become possible in the future.

The head-fake effect in basketball is based on the automating processing of head orientation, but not on gaze information

Matthias Weigelt[1], Iris Güldenpenning & Yvonne Steggemann-Weinrich
[1] *University of Paderborn, matthias.weigelt@uni-paderborn.de*

The head fake in basketball has been used as a paradigmatic example to investigate the cognitive mechanism of deceptive actions in sports. When a player looks to one side while passing the ball to the opposite side, responses of the observer are slower and more error prone than when the players looks into the pass direction. It is not known if this head-fake effect is based on the processing of the action-irrelevant gaze orientation or on the head orientation, or on both. Two experiments were designed to disentangle the impact of these two different sources of information conflict during the processing of head fakes. In Experiment 1, the size of the head-fake effect was not reduced when the eyes of the player were covered. In Experiment 2, the effect remained fully present when only the head orientation was change while the eyes gazed into the pass direction, whereas (vice versa) the effect was completely gone when the eyes gazed away while the head was oriented into the pass direction. This was independent of manipulating the different experimental conditions blockwise (Experiment 2A) or fully randomized (Experiment 2B). These findings suggest that the head-fake effect in basketball is based on the automating processing of the head orientation, but not on the (otherwise socially important) gaze information.

Traffic Psychological Implications for a Productive Work Environment in SAE Level 3 Automated Vehicles: Text Comprehension in Heads-Up Reading vs. Auditory Listening

Klemens Weigl[1], Clemens Schartmüller, Philipp Wintersberger, Andreas Riener & Marco Steinhauser
[1] *Department of Psychology. Catholic University of Eichstätt-Ingolstadt, klemens.weigl@gmail.com*

Automobile manufacturers worldwide are working on concepts for automated driving. A special opportunity for automated individual mobility lies in the possibility to perform office work during traveling and commuting. However, traditional (automotive and office) user interfaces were not optimized for this purpose, and thus, may be preventing effective productivity and even present a safety risk in conditional automation (SAE Level 3), where driver-passengers are still required to promptly act as a fallback if needed. Hence, we hypothesize that mobile offices will only be accepted by the general public when the tools are seamlessly integrated into automated vehicles, and thereby offering safe and productive mobile work environments. Therefore, it is crucial, that user interfaces are adapted to (a) the operational design domain of (conditionally) automated driving systems, and (b) workers' capabilities of the driver-passenger. Consequently, we carried out an experimental driving simulator study (N = 32) and investigated several advanced interface variants for a typical office task (text-comprehension). Varied were the display modality, as well as the user interface behavior in time-critical take-over situations (i.e., transfers of control from the vehicle to the human). Moreover, we assessed several physiological indicators and self-report questionnaires for this domain as well as performance measures. Our results suggest that productivity and physiologically indicated workload benefit from heads-up displays, when compared to the auditory display condition. The latter was, however, reported as more attractive to users, revealing an interesting contradiction in self-rated and physiologically measured workload levels.

Sociomotor Actions: Anticipated Partner Responses Are Primarily Represented in Terms of Spatial, Not Anatomical Features

Lisa Weller[1], Roland Pfister & Wilfried Kunde
[1] *University of Würzburg, lisa.weller@uni-wuerzburg.de*

People can represent their actions in terms of the behavior these actions evoke in others, as proposed by the sociomotor framework. In line with this idea, motor actions are facilitated if they are foreseeably being imitated by a social partner and impeded if a social partner reacts with incompatible actions. In social interactions such as imitation this approach thus highlights the acting model rather than the responding person. We investigated how exactly another's behavior is represented in such situations. The beneficial effect of anticipated imitation could be explained by two different forms of compatibility between model and imitator actions: correspondence of anatomical features (imitative compatibility) and correspondence of spatial features (spatial compatibility). Both forms of compatibility often go hand in hand, but research on motor priming has shown that they are represented independently. We therefore investigated to which degree the benefit of being imitated is caused by spatial or imitative compatibility. We found that only spatial compatibility of the imitator's behavior influenced the model's actions, while imitative compatibility had no influence. Actors thus seem to represent actions of their social partners mainly in terms of nonsocial, spatial features.

Affective processing does not require awareness. On the use of the perceptual awareness scale in response priming research

Dirk Wentura[1] & Michaela Rohr
[1] *Saarland University, wentura@mx.uni-saarland.de*

Lähteenmäki, Hyönä, Koivisto and Nummenmaa (2015) introduced new ideas to tackle the old and notorious question whether it can be reliably shown that stimuli, which participants are not aware of, will be evaluatively or semantically processed. Methodologically, they suggested a trial-by-trial subjective rating task (perceptual awareness scale; PAS) administered directly after each masked priming trial to assess awareness of the prime stimulus more directly. They claimed to have found no priming for subjectively unaware primes in two response priming experiments. Beside the super-ordinate question whether the proposal should in principle be considered a better solution compared to more traditional ones (e.g., a direct prime detection block administered subsequently to the priming block), their experiments can be inherently criticized for deviating from typical masked priming experiments with regard to several details. Therefore, in two experiments we integrated the PAS-rating in a more standard masked priming paradigm. We obtained priming effects even for subjectively unaware primes.

Moneyball - Inducing situations of actual social exclusion

Benedikt Werner[1], Wladislaw Mill & Wasilios Hariskos
[1] *University of Erfurt, benedikt.werner@uni-erfurt.de*

We adapted the Cyberball paradigm by Williams and colleagues in order to create a new paradigm, coined Moneyball. In Cyberball, one participant plays a virtual ball game with (usually unbeknownst to him/her) two computer players who are programmed to either include or exclude the participant. In Moneyball, however, situations of social inclusion or exclusion are induced among a group of three human players. Players have a free choice to throw the ball to whomever they want but either all three players are financially incentivized to include everybody or two players are financially incentivized to exclude the third. It is shown that being excluded under these circumstances results in the same detrimental effects on self-esteem, mood, and the senses of belonging, control, and meaningful existence as previously found in Cyberball studies. More importantly, Moneyball also allows to examine possible effects of the situations on the excluders, whose mood and self-esteem appears to suffer as well. The paradigm promises to not only be a tool for various interesting research questions surrounding social exclusion but also presents a viable method for experimental behavioral economists to study social exclusion, as it does not rely on any form of deception.

Spatial Components in the Mental Representation of Physical Dimensions

Martina Wernicke[1] & Uwe Mattler
[1] *Stiftung Universität Hildesheim, wernicke@uni-hildesheim.de*

Spatial components in the representation of ordinal information were initially revealed by Dehaene, Bossini and Giraux (1993). The authors found faster left- than right-hand responses to small numbers and a reverse effect with large numbers. This SNARC effect (Spatial-Numerical Association of Response Code) was also found with overlearned and newly learned non-numerical information (Gevers, Reynvoet & Fias, 2003). The current study examined whether physical dimensions are also mentally represented with a spatial component. Response times to mentally visualized clothing of different weight and brightness were analyzed. Subjects were asked to either categorize the items as lighter vs. heavier or brighter vs. darker than a reference. The characteristic interaction of position (before or after the reference) and side of response (left or right) was found with the dimension of weight: left (right) hand responses were faster for lighter (heavier) clothing. Findings suggest that the representation of physical dimensions may also include spatial components.

Self-relevance across the senses: The role of the percept

Ann-Katrin Wesslein[1] & Sarah Schäfer
[1] *Eberhard Karls University Tübingen, ann-katrin.wesslein@uni-tuebingen.de*

It is well-established that stimuli inheriting self-relevance yield beneficial information processing. For example, one's own name captures attention and one's own face –if presented among others' faces– is recognized more quickly than those of others. It has been demonstrated that when controlling for the familiarity of self-associated stimuli like one's own name or face, self-prioritization can still be observed. That is, the association of geometric shapes to oneself, a familiar other, and a stranger leads to better performance in self-associated trials of a subsequent matching task. Specifically, the verification of the self-associated geometric shape and the self-related label as a "correct pair" is faster and more accurate than those of other-associated geometric shapes and other-related labels; this is known as the self-prioritization effect (SPE; Sui, He, & Humphreys, 2012). In the current experiment, we tested the dependence of the SPE on perceptual features by using a crossmodal variant of the matching task. That is, participants associated specific temporal patterns to themselves, a familiar other, and a stranger. In detail, the temporal patterns were represented by vibrations (tactile stimulation) in the association phase. In the subsequent matching task, the temporal patterns were represented by visual flashes. Remarkably, we observed a visual self-prioritization effect – even though the visual flashes had never been paired with the labels. This indicates that abstract representations of the stimuli at hand rather than perceptual features underpin the SPE.

Implementation of an online imitation inhibition task

Mareike Westfal[1], Emiel Cracco, Jan Crusius & Oliver Genschow
[1] *University of Cologne, mareike.westfal@uni-koeln.de*

Imitation is an important social construct (Chartrand & Bargh, 1999). People do imitate a wide range of different behaviors, including language (e.g. Capella & Penalp, 1981), gestures (e.g. Bernieri, 1988) and simple movements (e.g. Genschow et al., 2013). One of the most commonly used measurement methods in this context is the imitation-inhibition task (Brass, Bekkering, Wohlschläger, & Prinz, 2000). Like all other measurements of imitation, this task has only been carried out in the laboratory so far—a time-consuming and costly procedure. To solve this issue and to offer an imitation procedure for online settings, we validated a javascript-based imitation-inhibition task within two studies. In Study 1 (N = 87), we tested the functionality of the online task. In Study 2 (N = 180), we compared the effects and reliability of the online task with those of a laboratory study. Reaction times and the error rates were recorded as dependent variables. Across both studies, we replicated the typical imitation-inhibition effects: congruency effect (individuals responded faster and with fewer errors to congruent than to incongruent trials), facilitation effect (individuals responded faster in congruent than neutral trials) and interference effect (individuals responded faster in neutral than incongruent trials). Compared to the laboratory sample the effects produced with the online measure were similar in size and reliability. Thus, the online imitation-inhibition task provides a well-functioning alternative to its laboratory version.

EEG correlates of age-related decline in phasic alerting

Iris Wiegand[1]
[1] *Max Planck Institute for Human Development, wiegand@mpib-berlin.mpg.de*

We investigated adult age differences in phasic alerting effects on visual attention. Parameters of visual attention capacity and selectivity, based on the Theory of Visual Attention, were measured together with electroencephalograpy (EEG) in a partial letter report task, in which half of the visual stimulus displays were preceded by an auditory warning cue. Younger adults showed an alertness-related increase in the parameter visual processing capacity. The behavioral alerting effect co-occured with reduced latencies of stimulus-related visual event-related lateralizations (ERLs), indicating faster stimulus processing in the visual stream. By contrast, older adults, on average, did not benefit from the alerting cue, neither on the behavioral nor electrophysiological level. Assuming that the age differences may result from ineffective processing of the warning signal, we analysed EEG power and phase-locking time-locked to the cue. We found a cue-related increase in both power and phase-locking with a maximum in the alpha band across age groups. Importantly, this cue-related response was stronger in older than younger adults. Furthermore, the cue-related increase in power and phase-locking was negatively correlated with the behavioral alerting effect in the older group. These findings indicate age-related changes in the brain network underlying alertness and attention. More specifically, older adults' may benefit less from alerting cues than younger adults, if their neural response is strongly driven by the cue and, thus, hinders the effective use of the warning signal to foster processing of the following stimulus.

Jumping to conclusions? Lévy flights better describe younger than older adults' fast binary decisions

Marie Wieschen[1], Aalim Makani, Andreas Voss & Julia Spaniol
[1] *Heidelberg University, marie.wieschen@psychologie.uni-heidelberg.de*

Over the past 20 years, applications of the drift diffusion model (DDM) have advanced cognitive-aging research by identifying age differences in component processes of perceptual and memory-based decisions. The classic DDM assumes that fast binary decisions are based on an evidence-accumulation process with Gaussian noise. However, recent research suggests that young-adult data may – under certain conditions – be better characterized by so-called Lévy flight models with heavy-tailed noise distributions. These models allow for occasional extreme jumps in the accumulation process (Voss et al., 2019). Jumpy information accumulation causes fast errors, but may be adaptive in contexts that reward exploration. In the current study, we examined age differences in decision processes in the context of a letter-number discrimination task. Healthy younger and older adults completed simple and complex versions of the task. In the complex task, younger and older adults' performance was best described by the standard DDM. In the simple task however, larger proportions of jumps were observed in both groups with younger adults showing an even more pronounced Lévy flight pattern. The current findings are the first to show that Lévy flights are more characteristic of decision making in younger than in older adults. Therefore, conclusions can be drawn regarding the applicability of Lévy flight models in decision making as well as regarding the exact processes underlying age differences in decision making.

Recognising personally familiar and famous faces from highly variable images: Evidence from event-related brain potentials

Holger Wiese[1]
[1] *Durham University, holger.wiese@durham.ac.uk*

People recognise familiar faces from an impressive range of highly variable images. Recently, we found highly reliable event-related potential (ERP) correlates of personally familiar face recognition when participants were tested with large numbers of highly variable "ambient" images, both in the N250 (visual recognition) and in the Sustained Familiarity Effect (SFE; integration of semantic/affective information). Interestingly, corresponding effects were not observed for celebrities. These findings may suggest that famous and personally familiar faces are processed qualitatively differently. However, they might alternatively reflect insufficiently robust representations to identify random celebrities from highly variable images. Here, we compared participants' ERPs to "ambient" images of their favourite celebrities (Experiments 1-3), personally familiar faces (Experiments 1 and 2), strongly disliked celebrities (Experiment 3), and unfamiliar faces. Most importantly, we found clear familiarity effects for favourite celebrities, both in the N250 and the SFE. Moreover, the SFE was larger for personally familiar faces than favourite celebrities (Experiment 1), and for favourite relative to disliked celebrities (Experiment 3). These findings suggest that ERP familiarity effects are not qualitatively different for personal versus media-based familiarity. Instead, increasing familiarity may result in more robust representations that allow recognition from increasingly variable images.

Implicit learning of color and shape sequences

Sarah Wilts[1] & Hilde Haider
[1] *Universität zu Köln, sarah.wilts@uni-koeln.de*

Keele et al. (2003) had supposed that implicit learning is based on encapsulated modules processing information within single dimensions. However, it is not clear whether these dimensions refer to modalities (visual, auditory perception) or to distinct features (color, location etc.). The findings of Eberhardt et al. (2017) suggest the latter by showing that a visual-color sequence can be learned concurrently with a visual-spatial sequence. Since location might be a special feature, the aim of the current study was to test whether this also holds for other non-spatial features within the visual modality. Conway and Christiansen (2006) had already shown that this might be true for shapes and colors. In experiment 1 (n=30), we replicated the statistical learning experiment of Conway and Christiansen (2006). Participants saw short sequences of colors or of shapes. Both were derived from different grammars. Results showed learning effects for both, color and shape grammars. In experiment 2 (n=58), we used a sequence learning paradigm. In the learning phase, participants saw a color patch and a shape, and had to judge whether one of the stimuli was dotted. Unbeknown to the participants, colors and shapes followed separate, uncorrelated sequences. Results of a wagering task showed that participants learned both sequences. Thus, both experiments suggest that the term "dimension" of Keele et al. (2003) refers to abstract features (color, shape, location) rather than to modalities.

The role of social processing in attentional bias towards angry faces

Benedikt Wirth[1] & Dirk Wentura
[1] *Saarland University, benedikt.wirth@uni-saarland.de*

Several theories of emotional attention claim that angry faces capture attention because they are highly relevant stimuli for the observer. However, in the dot-probe task – a paradigm commonly used to asses emotional attentional bias – usually only anxious participants show an attentional bias towards angry faces. We conducted three experiments to investigate social processing as a potential moderator for the occurrence of such a bias in non-anxious samples. In Experiment 1, participants performed a dot-probe task with two different target types. In the social target condition, participants had to categorise socially meaningful targets (schematic faces). In the non-social target condition, socially meaningless targets (scrambled schematic faces) were employed. Before the onset of the target display, two photographic face cues – one angry and one neutral – were presented for 100 ms. Participants only showed a significant bias towards angry face cues in the social target condition, but not in the non-social target condition. In Experiment 2, we increased the SOA between cue and target onset to 200 ms. Again, a significant bias towards angry face cues only occurred in the social target condition. In Experiment 3, we additionally observed the N2pc component of the ERP as a measure of shifts in spatial attention. N2pc components elicited by angry face cues were significantly larger in the social target condition than in the non-social target condition. These results suggest that social processing moderates the occurrence of attentional bias towards angry faces in non-anxious samples.

Intraindividual variability in affect: A formalized, theoretical approach

Maria Wirth[1], Klaus Rothermund & Andreas Voss
[1] *Friedrich Schiller University Jena, maria.wirth@uni-jena.de*

Studying the ebb and flow of affect in daily life provides important insights into psychological functioning and well-being. However, little attention has been paid to the sources and underlying processes of these short-term changes. We propose a model in which affect is conceptualized as the output of dynamic processes. Given that affect reflects transactions between an organism and its proximal environment, we relate the evaluative aspect of events in terms of their pleasantness or unpleasantness (iV, "valence") to fluctuations in momentary affective experience (dV, "affect"). The model explains affective experience as resulting from the cumulative effects of previous valent events ("accumulation principle"). The core of the model consists of parameters that moderate the relation between valent events and affective experience. These parameters reflect individual differences in the extremity of short-term changes (reactivity) and in longer-term changes in affective experience (attenuation) caused by positive or negative events. A simulation study revealed identifiability of the model's core parameters via Bayesian data analysis. An empirical application of our model will be presented using daily affect and event ratings from 315 individuals ranging in age between 14 – 86 years. The general pattern of results suggested more age-related similarities than differences. For reactivity and the attenuation of negative event impact, no age-related changes were found. However, attenuation for the impact of positive events decreased with increasing age. We discuss potentials and limitations of the approach and close with an outlook on the broader implications for understanding emotional development.

Age differences in affective flexibility

Maria Wirth[1] & Klaus Rothermund
[1] *Friedrich Schiller University Jena, maria.wirth@uni-jena.de*

A flexible adaptation of one's affective experience to a changing environment is central to the psychosocial functioning of an individual. Although several studies have examined affective flexibility in young adulthood, it is largely unclear to what extent older adults are able to flexibly adapt their affective experience to different situations. Taking into account older adults' strengths such as accumulated life experience and motivation to regulate emotions, we expected that older adults should be more affectively flexible than younger adults. To investigate age difference in the flexible adjustment of affective experience to situational changes, a series of pictorial stimuli differing in valence was presented to 30 younger (Mage = 25) and 29 older adults (Mage = 68). On the basis of each participant's series of affect ratings for the picture stimuli, we computed measures of affective stability and change. Specifically, the autocorrelation between successive affect ratings was used as a measure of affective inertia, indicating to what extent affective reactions for one stimulus transferred to the subsequently presented stimulus. Furthermore, the frequency and extent of change in affect was quantified by computing the average value of squared changes in affect between successive trials for each participant. We did not find age difference in affective inertia or affective change, with Bayesian analyses providing moderate support for the null hypothesis. Implications for current theoretical work in the realm of emotional aging will be discussed.

Category Labels can Influence the Effects of Selective Retrieval on Nonretrieved Items

Michael Wirth[1] & Karl-Heinz T. Bäuml
[1] *Regensburg University, Michael.Wirth@ur.de*

Using lists of unrelated items as study material, recent studies have shown that selective retrieval of some studied items can impair or improve recall of the nonretrieved items, depending on whether the lag between study and selective retrieval is short or long. This study examined whether the results generalize when the items are studied together with their category labels (e. g., bird-magpie) and the category labels are reexposed as retrieval cues at test (e. g., bird-m___). Experiment 1 employed lists of unrelated items in the absence of any category labels, replicating both the detrimental and the beneficial effect of selective retrieval. Experiment 2 employed the same items but provided the items' category labels during both study and retrieval, and Experiment 3 employed a categorized list, again providing the items' category labels during study and retrieval. In both Experiment 2 and Experiment 3, selective retrieval impaired recall in both lag conditions, indicating a critical role of category labels for the effects of selective retrieval. The results are consistent with a two-factor explanation of selective retrieval and the assumption that reexposure of category labels during retrieval reinstates study context after longer lag.

What to do and what not to do: Breaking positively and negatively formulated rules

Robert Wirth[1], Anna Foerster, Wilfried Kunde & Roland Pfister
[1] *Julius Maximilians University of Würzburg, Robert.Wirth@uni-wuerzburg.de*

Most of our daily life is organized around rules that tell us what to do. By now, numerous studies show that humans have a tendency to abide by the rules, and that breaking them comes with cognitive costs. i.e., a marked behavioral influence of the original rule during rule violations. However, rules also specify what not to do. In the current experiments, we tested how negatively formulated rules affect behavior. Participants conducted finger movements via the touchscreen of an iPad to either follow or break a given rule, and we analyzed temporal and spatial parameters of the ensuing movement trajectories. We found that negatively formulated rules promoted the choice to violate, and violating these rules comes with a benefit rather than behavioral costs. As it turns out, it is not generally more difficult to violate rules, but this difficulty depends on how the to-be broken rule is formulated.

Automated Discomfort Detection in Aviation-Seating Contexts

André Wittenborn[1], David Daxberger, Maike Lindhaus, Mats Bosshammer, Jarek Krajewski & Sebastian Schnieder
[1] *Institut für Experimentelle Psychophysiologie, a.wittenborn@ixp-duesseldorf.de*

To enhance satisfaction and improve seating comfort, objective and accurate monitoring systems are necessary to evaluate and optimize seating solutions in various contexts such as aviation, automotive and office environments. Existing systems, like questionnaires, pressure maps or physiological measurements each lack in some of these requirements. We present a novel and objective measurement approach aiming for an easily accessible and contactless method to automatically detect and assess episodes of discomfort. To this end, we explored the feasibility of an automated video-based discomfort detection using state of the art computer vision methods. For acquiring learning-data, N = 30 participants attended for two 150-minutes session in a simulated flight cabin mockup (economy class seats) in one 'high-' and one 'low-discomfort' condition. Data streams consisted of 4 synchronized camera streams, ECG sensor-data and acceleration-data from sensors placed on wrist and ankle. Additionally, discomfort was rated on Corlett and Bishop's body part discomfort scales (BPD) by the participants. For all datasets behavioral discomfort events (e.g. painful facial expression, head leaning, back rotation, hip and leg movements) were manually annotated by 10 raters. Convolutional neural networks were then trained on 2D–coordinates of estimated body keypoints to classify 20 distinct movement classes. Performance on the test-set revealed significant classification rates for identifying various discomfort related movements. For future applications, the development of 3D computer-vision models may help to further improve the usability in daily life conditions.

Naming pictures and sounds - Semantic context effects in the blocked-cyclic naming paradigm

Stefan Wöhner[1], Jörg D. Jescheniak & Andreas Mädebach
[1] *Leipzig University, stefan.woehner@uni-leipzig.de*

Semantic context effects in naming tasks have been most influential in devising and evaluating models of word production. In the present study we investigated semantic context effects in one prominent task, blocked-cyclic naming, in which stimuli are named repeatedly either sorted by semantic category (homogeneous context) or intermixed (heterogeneous context). Previous blocked-cyclic naming studies have consistently shown that picture naming responses are slowed down in the homogeneous context from the second cycle (i.e., presentation) onwards. We compared semantic context effects in two task versions, picture naming and sound naming. Target words were identical across task versions (e.g., participants responded with "dog" to either the picture of a dog or to the sound produced by a dog [barking]). We found that (a) semantic interference in the homogeneous context was also obtained with sounds and (b) that the effect was substantially larger with sounds than with pictures. This was true regardless of whether stimulus type was constant (tested between participants, Experiments 1 and 2) or mixed (tested within participants, Experiment 3). Our findings demonstrate that (a) semantic context effects in blocked-cyclic naming generalize to stimulus types other than pictures and (b) are modulated by pre-lexical processes that depend on the nature of the stimuli used for eliciting the naming responses.

Top-down control of saccades requires inhibiting suddenly appearing stimuli

Christian Wolf[1] & Markus Lappe
[1] *Westfälische Wilhelms-Universität Münster, chr.wolf@wwu.de*

Humans scan their visual environment using saccade eye movements. Where we look is influenced by bottom-up salience and top-down factors like value. For reactive saccades in response to suddenly appearing stimuli, it has been shown that short-latency saccades are biased towards salience and that top-down control increases with increasing latency. Here we investigate whether this transition is determined by the time it takes to integrate value information into the saccade plan or by the time it takes to inhibit suddenly appearing stimuli. Participants made consecutive saccades to three fixation crosses and a vertical bar consisting of a highly salient and a low salient region. The bar was foveated last and appeared left or right of the last fixation cross with the salient region pointing upwards or downwards. Participants received a monetary reward for successfully looking at the low salient region. When the bar was displayed continuously from trial beginning, saccades were not biased towards salience. However, when the vertical bar appeared after foveating the last fixation cross, short-latency saccades were biased towards salience. This was also true if the outline of the rewarded region was displayed from trial beginning, but the salient region suddenly appeared above or below. In this last condition, while there was enough time for saccade planning to integrate value information, there was no possibility to suppress salience. Altogether, these findings highlight the importance of inhibition for top-down eye movement control.

The relevance of boredom for self-control research

Wanja Wolff[1] & Corinna Martarelli
[1] *University of Bern, wanja.wolff@edu.unibe.ch*

Self-control is among the most researched concepts in psychology. The most popular theoretical account on self-control has been the strength model of self-control which postulates that the capacity for self-control relies on a limited global resource that can become temporarily depleted, resulting in a state called ego depletion. However, the validity of the ego depletion effect has recently been questioned. Here, we suggest that inconsistencies in ego depletion literature might be caused in part by a confound that has unknowingly but systematically been introduced into ego depletion research: Boredom. It has been proposed that boredom occurs due to a mismatch between task-imposed attentional demands and one's mental resources. We suggest that the control conditions that are frequently used in ego depletion research induce this type of mismatch and hence elicit boredom. Surprisingly, the role of boredom in ego depletion research has been largely overlooked so far. We propose that boredom might have influenced results of ego depletion studies by 1) placing an unwanted self-control demand due to the need to keep working on a boring task, and by 2) signaling that one should explore behavioral alternatives. Building upon recent theoretical accounts that conceptualize self-controlled behavior as the outcome of an ongoing cost-benefit analysis, we suggest that boredom and the sensation of applying self-control (i.e., perceived exertion) contribute distinctively to the outcome of this cost-benefit analysis and thereby to the resultant behavior.

The effect of threat belief on generalization of extinction

Alex Wong[1], Juliane Boschet, Valentina Glück & Paula Engelke
[1] *University of Würzburg, hon.wong@uni-wuerzburg.de*

Fear generalization refers to the spread of fear to novel stimuli. In contrast, generalization of extinction refers to the spread of extinction learning to other novel stimuli. Past studies found that presenting a generalization stimulus (a novel stimulus similar to a fear-related stimulus; GS) in fear extinction could not effectively extinguish fear to the original fear-related stimulus (CS+) or to other novel stimuli. That is, extinction learning to a GS could not effectively generalize to the CS+ or to other novel GSs. However, recent findings from our lab found that individuals may utilize different rules to guide their generalization process, which resulted in qualitatively different generalization gradients. In other words, the rule served as the basis of an individual's threat belief, which subsequently affected one's generalization of fear. In the present study, we utilized this rule-based generalization framework and examined whether rule-based generalization affects the extent of generalization of extinction. Participants first underwent a differential conditioning procedure, followed by a generalization test. A GS was then presented in extinction, followed by a re-test of fear generalization. We hypothesized that different rules formed during generalization would result in different threat belief towards the extinction GS, which subsequently lead to different extent of generalization of extinction gradients. Preliminary results will be discussed.

Neural alpha oscillations implement distractor suppression independent of target selection

Malte Wöstmann[1], Mohsen Alavash & Jonas Obleser
[1] *University of Lübeck, malte.woestmann@uni-luebeck.de*

In principle, selective attention results from target enhancement and distractor suppression. However, it is unclear whether the human neurocognitive system implements a mechanism to suppress distraction that is independent of target enhancement. Neural oscillatory power in the alpha frequency band (~10 Hz) has been implicated in the selection of targets, but there is lack of empirical evidence for its involvement in the suppression of distractors. I will present evidence from electroencephalography (EEG) in support of the hypothesis that alpha power directly relates to distractor suppression and thus operates independently from target selection. In an auditory spatial pitch discrimination task, we modulated the location (left vs right) of either a target or a distractor tone sequence, while fixing the other in the front. When the distractor was fixed in the front, alpha power relatively decreased in the hemisphere contralateral to the target and increased ipsilaterally. Most importantly, when the target was fixed in the front, alpha lateralization reversed in direction for the suppression of distractors on the left versus right. These data show that target-selection–independent alpha power modulation is involved in distractor suppression. While both lateralized alpha responses for selection and for suppression proved reliable, they were uncorrelated and distractor-related alpha power emerged from more anterior, frontal cortical regions. Lending functional significance to suppression-related alpha oscillations, alpha lateralization at the single-trial level was predictive of behavioral accuracy. I will argue that these results fuel a renewed look at neurobiological accounts of selection-independent suppressive filtering in attention.

The brighter, the better? The impact of brightness contrasts on offside judgments in soccer

Peter Wühr[1] & Daniel Memmert
[1] *TU Dortmund University, peter.wuehr@tu-dortmund.de*

Judging offside positions in soccer is an important and demanding task of the assistant referees. Even professional assistant referees make significant amounts of errors when judging offside, which may seriously affect the results of a game. We investigated the impact of brightness contrasts between the players' clothes and the background on the accuracy of offside judgments in layman participants. Participants had to judge the presence or absence of offside positions in static displays, in which the spatial positions of a forward and a defender were systematically varied. Players of one team wore bright gray shirts and white shorts, whereas players of the other team wore dark gray shirts and black shorts. In Experiment 1, the background, which consisted of a green ground and a blue sky, was so bright that the contrast between the background and the dark shirt was larger than the contrast between the background and the bright shirt. As expected, offside judgments were more accurate for the dark team than for the bright team. In Experiment 2, the brightness of the background was in between the brightness values of the two shirts, in an attempt to equate the contrasts between the shirts and the background. Somewhat unexpectedly, offside judgments were now somewhat more accurate for the bright team. In summary, our experiments are the first attempts to study the impact of brightness contrasts on offside judgments, and our results suggest that these contrasts may have a systematic impact on the accuracy of offside judgments.

The Role of Timbre and Fundamental Frequency in Vocal Emotion Adaptation

Christine Wulf[1], Verena G. Skuk, Sascha Frühholz, Celina Von Eiff & Stefan R. Schweinberger
[1] *Friedrich-Schiller-Universität Jena, Germany, christine.wulf@uni-jena.de*

Although previous research has demonstrated perceptual aftereffects in emotional voice adaptation, the contribution of different vocal cues to this effect is unclear. We used parameter-specific morphing of adaptor voices to investigate the relative roles of fundamental frequency (F0) and timbre in vocal emotion adaptation, using angry and fearful utterances. Thirty young adults (15 females, 18-26 years [M = 21.6; SD = 2.3]) adapted to morphed voices containing 100% emotion-specific information in either F0 or timbre, with all other parameters kept at an intermediate 50% morph level. As reference conditions, full adaptors (with all parameters at an emotion-specific level of 100%) and ambiguous adaptors (with all parameters non-informative at 50%) were used. Stimuli were created using TandemSTRAIGHT software. Consistent aftereffects were found in all three conditions (dFull = 1.83 , dTimbre = 1.31, dF0 = 0.51). Crucially, aftereffects following timbre adaptation were much larger than in the F0 condition ($t(29) = -3.36$, $p = .002$, $d = 0.56$) and only nonsignificantly smaller than those elicited by full adaptors ($t(29) = -1.95$, $p = .060$, $d = 0.35$). These results suggest a prominent role of timbre information, and a smaller role of F0, in vocal emotion adaptation. Although these findings are limited to angry and fearful voices, they add to the growing body of evidence suggesting a major role of timbre in auditory adaptation.

The Semantic Representation of Risk Across the Life Span

Dirk Wulff[1] & Rui Mata
[1] *University of Basel, dirk.wulff@gmail.com*

We aim to contribute to a better understanding of the psychology of risk by describing the semantic representation of risk across the life span using a novel word-association paradigm. We obtained responses from 1204 respondents (age range = 18-86) to a word-association task that involved naming associates of the word "risk" as well as word associations to the risk-associates (30 responses per participant). We find that the types of risks and clusters elicited by our task overlap extensively, albeit not perfectly, with past approaches to the psychology of risk. We also find that associates vary systematically across age groups, with older respondents showing more negative connotations and mentioning more often certain types of activities as being associated with risk (e.g., recreational activities). Our work has implications for the measurement of risk perception and risk preference in psychology and related fields by suggesting that risk has different meanings to different individuals and age groups.

Beyond Source Memory: What Governs Our Memory for the Destination of Outgoing Information?

Liliane Wulff[1] & Nikoletta Symeonidou
[1] *University of Mannheim, lwulff@mail.uni-mannheim.de*

In social interactions, it is central to remember to which interaction partner one has said or given something. This process is referred to as destination memory and distortions of the latter can provoke (potentially embarrassing) redundancy in communication (e.g., tell a person the same joke twice). Albeit closely related to source memory, there has been only little research on destination memory in the past. To foster the understanding of this process, we examined to what extent it is affected by familiarity of the interaction partner and by reciprocity of one's act. In two computerized experiments, individuals assigned everyday objects (e.g., bike, computer) to either of two persons (destinations). In Experiment 1, we manipulated familiarity of destinations between subjects such that individuals gave objects to either of two close relatives/friends or unknown persons. In Experiment 2, we manipulated the reciprocal nature of the interchange within subjects such that individuals lent or gave away objects to either of two close relatives/friends. In a subsequent (destination-) memory test, individuals decided whether, and if so to which destination, they gave the object (and additionally whether they had lent or gave away the object; only in Experiment 2). Individuals remembered better to whom they had assigned objects when they interacted with familiar than with unfamiliar persons. Individuals, however, remembered equally well to whom they had lent/given away the objects. We discuss substantive and methodological commonalities and differences when assessing the cognitive processes of both source and destination memory.

Using blink-related brain activity to investigate visual information processing in the real world

Anna Wunderlich[1] & Klaus Gramann
[1] *TU Berlin, anna.wunderlich@tu-berlin.de*

Investigating the use of navigation assistance systems and its neuronal correlates in a lab environment with restricted movement allows only conclusions with respect to this artificial setting. This study, however, focused on cognitive processes in the real world allowing natural movement in a complex and dynamic environment. We thus analyzed the neural dynamics during pedestrian navigation to investigate incidental spatial learning during the use of landmark-based navigation instructions. The performance results replicated a suppression of incidental learning of the environment especially at navigation relevant route segments when using standard navigation instructions as compared to navigation instructions including landmark information (Gramann, Hoepner, Karrer-Gauss, 2017, Wunderlich & Gramann, 2018, 2019). To further investigate this incidental spatial learning during navigation, we used eye blink-related potentials of the EEG as indicators for changes in visual information processing while naturally moving in an uncontrolled environment. Blinks provide meaningful events as they serve as a partitioning tool of the visual information stream. The results revealed that meaningful blink-related potentials and spectral measures can be extracted from EEG data of moving participants in uncontrolled real-world protocols and that blink-related brain activity measures allow for investigating cognitive processes during ongoing tasks. Gramann, K., Hoepner, P., & Karrer-Gauss, K. (2017). Frontiers in psychology, 8, 193. Wunderlich, A., & Gramann, K. (2018). In German Conference on Spatial Cognition (pp. 261-278). Springer, Cham. Wunderlich, A., & Gramann, K. (2019). bioRxiv, 789529.

The computational and neural basis of credit assignment: Evidence for hierarchical task representations in environments with multiple feedback

Franz Wurm[1], Benjamin Ernst & Marco Steinhauser
[1] *Katholische Universität Eichstätt-Ingolstadt, franz.wurm@ku.de*

In the reinforcement learning framework, credit assignment describes the process which allows an agent to link its actions to the corresponding outcomes, thereby constituting a prerequisite for learning. While it has been shown that humans are able to solve the credit assignment problem even in probabilistic and volatile environments, little is known about the underlying computational and neural mechanisms. In the present study, we investigated these mechanisms by considering event-related potentials in a probabilistic learning task comprising two independent decisions. Following the decisions, two feedback stimuli were presented without explicitly indicating which feedback was linked to which decision. On the behavioral level, successful credit assignment was indicated by a specific stay/switch pattern in the learning task. Furthermore, subsequent transfer task performance showed that participants were able to explicitly act on the acquired decision-feedback mapping due to devaluation instructions. On a computational level, behavioral data could be explained by an extended reinforcement learning model. Core assumption of this model is that credit assignment can be solved within a hierarchical task representation through comparative evaluation of reward prediction errors based on alternative decision-feedback assignments. Crucially, prominent neural components of feedback processing (FRN and feedback-P3) were sensitive to central parameters of this computational model, indicating a comparison of reward prediction errors between valid and invalid decision-feedback mappings.

Decoding the meaning of actions across vision and language

Moritz Wurm[1] & Alfonso Caramazza
[1] *CIMeC, University of Trento, moritz.wurm@unitn.it*

How is knowledge about actions like opening, giving, or greeting represented in the brain? A key aspect of this question focuses on the neural distinction between the representation of specific perceptual details (e.g. the movement of a body part) and more general, conceptual aspects (e.g. that a movement is meant to give something to someone). Critically, the former representation is tied to a specific modality, whereas the latter is generally accessible via different modalities, e.g. via observation or language. A popular view is that perceptual action details are encoded in occipital and temporal cortex, whereas conceptual aspects are encoded in frontoparietal cortex, potentially overlapping with the motor system. Using fMRI-based crossmodal MVPA, we provide evidence that favors an alternative view: Action representations in left lateral posterior temporal cortex (LPTC) generalize across action videos and sentences, indicating that they can be accessed both via observation and language. Moreover, multiple regression RSA demonstrated that these modality-general representations are organized following semantic principles, which further corroborates the interpretation that LPTC represents actions at a conceptual level. By contrast, frontoparietal areas revealed functionally distinct representations for the different modalities, suggesting that they represent modality-specific details, and, more generally, challenging the widely-held assumption that overlap in brain activity indicates the recruitment of a common representation or function.

Alpha rhythms in the visual cortex impact what we see and how fast we see it

Andreas Wutz[1]
[1] *University of Salzburg, andreas.wutz@sbg.ac.at*

Alpha-frequency band rhythms (9-13 Hz) are thought to reflect inhibitory control on neural excitability in visual cortical areas. Consequently, previous research has established strong links between visual perception and alpha rhythms. For example, whether we see a visual stimulus or not has been found to depend on the power and phase of occipital alpha rhythms before stimulus onset. Here, I present magneto-encephalography (MEG) evidence that suggests that alpha rhythms impact the speed and the content of our visual experiences. First, the frequency of alpha rhythms over occipital and inferior temporal cortex increases when task demands emphasize segregation vs. integration of visual inputs over time. These findings link alpha frequency to the temporal resolution of visual perception and show that it can be strategically adjusted to meet task goals. Second, network states between occipital and inferior temporal cortex that communicate at alpha frequencies predispose the future perception of the bi-stable Rubin's face-vase stimulus. These results suggest that pre-established, alpha-timed connectivity pathways bias not only the detection of visual stimuli but also their perceived contents. Overall, this work relates the time profile of alpha rhythms to visual speed and content. It suggests that dynamic visual inputs are processed through an alpha-timed (~100 ms cycle period) rhythmic-temporal architecture in the visual cortex.

Perturbation of Initial and Final Action Goals during the Preparation of Grasping: An ERP Study

Lin Yu[1], Thomas Schack & Dirk Koester
[1] *Bielefeld University, lin.yu@uni-bielefeld.de*

Previous studies found people re-plan their movements to adapt to unexpected changes in the target object (size, orientation, etc.), as well as the action goal. For grasping, an action goal is not restricted to reaching and grasping the object (initial goal; how to grip). The action goal is also important for a later, subsequent goal (final goal; the action effect). The planning and coordination (i.e., processing) of initial and final action perturbation on re-planning grasp movements are still unknown. Here, we cued participants to grip a handle (initial) and then rotate it to a target position (final). The initial or final goals changed unexpectedly for some trials (25%) and participants had to re-plan their movement when the goals changed. Event-related potentials (ERP) were used to examine the neurophysiological mechanisms of re-planning in different perturbed conditions. Behaviorally, goal perturbation slowed down the reaction time and the execution time. Additionally, participants reacted and executed more slowly when initial goals were perturbed, as compared to the final-perturbed and non-perturbed. Larger frontal P2 and more positive centro-parietal slow waves time-locked to perturbation cues were found for initial-perturbed trials. No difference was found for frontal N2 and parietal P3 between the initial- and final-perturbed conditions. The results suggest that re-planning grasping movements to adapt to the unexpected changes in the initial goal needs more efforts and initial demands seem to be more demanding than final demands for modifying an existing movement plan.

Memory Benefits of Guessing with Delayed Feedback

Oliwia Zaborowska[1], Ewa Butowska, Krzysztof Piątkowski, Katarzyna Zawadzka & Maciej Hanczakowski
[1] *SWPS University of Social Sciences and Humanities, Warsaw, Poland, ozaborowska@swps.edu.pl*

Trying to guess what the correct answer to a question might be can facilitate future learning of this answer when presented in the form of corrective feedback. One issue that determines the effectiveness of guessing as a learning strategy is the timing of the presentation of feedback: it can be presented either immediately after the guess, or after a delay. Whereas the timing of feedback is of little importance for complex materials such as trivia questions, previous research suggests that for simpler materials such as related word pairs guessing seems to benefit learning only when feedback is immediate. In order to test whether this always has to be the case, we conducted two experiments in which we enhanced study materials by superimposing the to-be-learned word pairs over unrelated context pictures. We then manipulated the match between contexts at study and at test, and at the time of feedback delivery. Contrary to previous studies showing no benefits of guessing with delayed feedback, our results show that learning related word pairs can benefit from guessing even when feedback is delayed. These benefits of guessing occur if participants are reminded of their guessing at the time of feedback delivery. Our results help constrain theories of guessing benefits and extend theories of reminding.

Can Food Preferences be Modified by Posthypnotic Suggestions? An event-related brain potential study

Anoushiravan Zahedi[1] & Werner Sommer
[1] *Humboldt Universität zu Berlin, zahedian@hu-berlin.de*

Unhealthy food choices are implicated in two worldwide issues, the burden of global disease and climate change. Important factors involved in unhealthy food choices are the preference for high- over low-calorie food contents and difficulties in inhibiting the desire for high-calorie food. Here we explored posthypnotic suggestions (PHS) as a possible new tool to increase the preference for low-calorie food and inhibit the desire for high-calorie items. In a counterbalanced design, a food-face classification task, measuring implicit food preferences, and a Go-NoGo task, measuring inhibition, were administrated with PHS being activated or deactivated, while ERPs were recorded. In the food-face classification task without PHS the early visual P1 amplitude, was larger in response to high than low-calorie food pictures, possibly reflecting differential reward-associations; these differences were eliminated by PHS. The obtained positive bias toward low-calorie food enhanced the effective processing of these stimuli and increased motivated attention toward them, as was inferable from faster reaction times and increased late positivity amplitudes in response to low- versus high-calorie items in PHS-active condition, respectively. In the NoGo condition of the Go-NoGo task, PHS diminished the N2 component to low-calorie items, and in the Go condition, PHS strongly increased the P3 amplitude in high-calorie items, indicating the facilitation of both response inhibition and calorie-based classification. Together, PHS effectively altered both food preferences and inhibition; therefore, PHS may serve as a promising tool to counteract unhealthy food choices.

Stable first impressions about unfamiliar people from dynamic face-voice information

Romi Zäske[1], Celina Von Eiff & Stefan R. Schweinberger
[1] *University Hospital Jena, romi.zaeske@med.uni-jena.de*

Humans rapidly form personal impressions about others based on appearances as conveyed by faces or voices. For instance, stable impressions of trustworthiness are established within less than 100ms visual exposure to static faces, and even from short acoustic exposure to utterances such as vowels. For more naturalistic dynamic audiovisual face-voice stimuli, however, it is unclear how and when first impressions are formed and stabilized. Here we manipulated exposure times to videos of 60 unfamiliar speakers uttering a short sentence, and measured ratings of trustworthiness and dominance from two groups of 30 listeners each: while exposure time to videos was constant and maximal for Group 1 (1958ms), it was varied for Group 2 (50ms, 125ms, 313ms, 783ms, or 1958ms). Ratings made after maximal exposure (Group 1) were significantly correlated with ratings in all exposure time conditions (Group 2) except for the shortest 50ms exposure time, for both rating dimensions. Across consecutive exposure times, significant increases of correlations were seen only between 50ms and 125ms for both rating dimensions, and between 313ms und 783ms for dominance. Confidence in ratings increased with exposure times, and was higher overall for dominance than for trustworthiness. These results suggest that impressions based on dynamic face-voice information stabilize within ~125ms and ~783ms for trustworthiness and dominance, respectively. Additional exposure time nevertheless promotes confidence in judgments.

Attention and Multimedia Usage – A Study on Children Aged Between 6-10 Years

Melanie Zerr[1], Stephanie Antons, Matthias Brand & Magnus Liebherr
[1] *University of Duisburg-Essen, melanie.zerr@stud.uni-due.de*

The use of digital media has changed over the last years. New technologies have been added, usage times have increased and media-multitasking has become more important. Previous studies, on the one hand, report negative effects of digital media usage on children's attention. On the other hand, findings on video gaming show positive findings on specific attentional domains, such as selective attention. Therefore, the aim of the present study was to investigate the effects of multimedia use on the performance of skills of selective and divided attention in children ranging from 6-10 years. Participants performed the SwAD-task for testing selective and divided attention as well as an acoustic oddball task while simultaneously watching their preferred series. Media usage was quantified by a questionnaire and split into active (smartphone, tablet, computer, game console) and passive media use (TV). Higher active media usage leads to both better selective ($F(1,59)=8.35$, $p=.005$, $R^2=.124$) and better divided attention ($F(1,59)=6.41$, $p=.014$, $R^2=.098$) in the SwAD-task. Furthermore, higher active media usage led to increased task-performance in the oddball task ($F(1,61)=5.73$, $p=.020$, $R^2=.086$). Passive media use had no effect on skills of performance of selective or divided attention. In addition, attentional skills improved with increased age. Although the present study provides important findings in the field of attention and multimedia usage, future studies should focus on further domains such as switching attention or attention span.

Can we process task-irrelevant stimuli better than task-relevant stimuli? The case of number- and line-stimuli

Iris Zerweck[1], Sascha Meyen, Catarina Amado & Volker Franz
[1] *University of Tuebingen, iris.zerweck@uni-tuebingen.de*

In priming research, many researchers claim that processing of task-irrelevant stimuli can be better than processing of task-relevant stimuli (a pattern we dubbed 'indirect task advantage', ITA). Typically, two tasks are compared: In the 'direct' task, participants discriminate a masked 'prime'-stimulus and perform close to chance-level. In the 'indirect' task, participants respond to a 'target'-stimulus following the masked prime. Despite the prime is now task-irrelevant, it nevertheless has effects on reaction times (RTs): Responses are faster if prime and target are congruent (and vice-versa). Based on this pattern of close-to-chance discrimination of the prime in the direct task and a significant effect of the prime on RTs in the indirect task, the standard reasoning concludes a better, internal discrimination of the prime in the indirect task than in the direct task. However, our group showed that this reasoning is flawed for mathematical reasons. The correct approach would be to convert the significant RT-effect in the indirect task to a discrimination performance and then compare the discrimination performances in the direct and indirect tasks. We selected two typical stimulus-sets from the literature and tested whether the correct approach would still yield an ITA: (a) semantic processing of numbers (experiments1+2) (b) discrimination of the orientation of simple lines (experiment3). In all three experiments, discrimination performances in direct and indirect tasks were similar (direct/indirect for exp1:57.2%/56.9%; exp2:55.4%/53.1%; exp3:68.1%/66.4%). This suggests that earlier claims for ITAs with these stimuli might have been premature.

Origami folding: Memory load effects on acquisition of sequential skills

Fang Zhao[1], Robert Gaschler, Anneli Kneschke, Simon Radler, Melanie Gausmann & Christina Duttine
[1] *Fernuniversität in Hagen, fang.zhao@fernuni-hagen.de*

Cognitive and motor memory loads can affect the execution of performance. Yet they do not necessarily impair the acquisition of performance. This study examined whether the learning of Origami folding can be moderated by cognitive or motoric dual-task interference. 53 participants folded five Origami figures for four times (in total N = 1060), which were randomly paired with five types of secondary tasks to cause either cognitive (verbal vs. visuospatial) or motoric (simple isochronous vs. complex asynchronous tapping) memory overload or none. By comparing the Origami performance from repetition 1 to repetition 4 with different secondary task variants, we found a typical learning curve in the repeated origami-folding task. Less and less time was needed as the repetition number increased. The learning of Origami folding was only interfered by the memory load of cognitive visuospatial secondary task as well as by the simple isochronous tapping secondary task. It might be due to the use of visuospatial sketchpads and absolute timing mechanism during the acquisition of Origami folding.

Hierarchical organization of actions

Tonghe Zhuang[1] & Angelika Lingnau
[1] *Universität Regensburg, tonghe.zhuang@ur.de*

Actions can be described at different hierarchical levels, ranging from very broad (e.g., doing sports) to very specific ones (e.g., breaststroke). Here we aimed to determine the characteristics of actions at different levels of abstraction. Following up the literature on object classification (e.g. Rosch et al., 1976), we carried out several behavioral studies in which we presented action words at the superordinate (e.g., locomotion), basic (e.g., swimming) and subordinate level (e.g., breaststroke). We instructed participants to list features of actions (e.g., 'arm', 'rotating', 'water', 'diving' for the action 'swimming') and measured the number of features that were provided by at least six out of twenty participants ('common features'), separately for the three different levels. Specifically, we determined the number of shared (i.e. provided for more than one category) and the number of unique (i.e. provided for one category only) features. We found that participants produced the highest number of common features for actions at the basic level. Participants described actions at the superordinate level with more unique features compared to those provided at the basic level. At the same time, actions at the subordinate level shared most features with actions from different categories from the same (subordinate) level. Our results suggest that the basic level, for which the information of action categories is maximized, plays a central role in categorization, in line with the corresponding literature on object categorization.

Perceptual Coherence Increases Judgments of Learning (JOLs)

Malte Felix Zimdahl[1] & Monika Undorf
[1] *University of Mannheim, malte.zimdahl@psychologie.uni-mannheim.de*

People give higher judgments of learning (JOLs) to word triads that share a common associate (e.g., silk–cream–even: smooth) than to word triads without a common associate (e.g., deck–stool–pocket). This effect of semantic coherence has been interpreted as evidence that fluency impacts metacognitive judgments. In the present study, we used another form of coherence, that is, perceptual coherence, and investigated the hypothesis that the impact of fluency on JOLs is mediated by brief positive affects. In three experiments, people made JOLs for fragmented line drawings that either depicted meaningful objects (coherent fragments) or randomly displaced line segments (incoherent fragments). In all three experiments, people gave higher JOLs to coherent fragments than to incoherent fragments. Moreover, JOLs were higher when fragments were presented with a high figure-ground contrast (Experiment 2), further supporting the idea that fluency underlies the effect of perceptual coherence on JOLs. In contrast, JOLs were not higher when fragments were preceded by a positive mood manipulation (Experiment 3). Thus, our results indicate that higher processing fluency influences metacognitive judgments but do not support the idea that this is mediated by positive affects.

Spatial avoidance versus attraction evoked by gestures as evidenced by EEG/ERP

Ulrike Zimmer[1], Leonie Wulff & Anja Ischebeck
[1] *Medical School Hamburg, ulrike.zimmer@medicalschool-hamburg.de*

In our recent neuroimaging studies, we showed that people turn away from a disgusting sound, but towards a fearful sound scream (Zimmer et al., 2015; 2016; 2019). This opposite behavior was mirrored by an inversion of P3-activity. Another possible factor influencing spatial attention in social context are gestures. While a pointing gesture directed spatial attention toward its pointing direction (Porciello et al., 2014; Damalso et al., 2013), data for avoidance gestures, like holding up one or two palms, are still missing. We asked if pointing versus fending gestures indicate similar spatial interactions as the ones found in fear versus disgust. In an ERP-study, a left- or right sided gestural cue (pointing/fending) preceded a visual target (white triangle) on the same (valid) or opposite (invalid) side. The interstimulus-intervall (ISI) was set to 100ms and 700ms with equal randomization for each condition. Twenty participants ignored the gestural cue and signaled the direction of the triangle (up/down) as fast and accurately as possible with a button press. Behavioral and neuronal interactions were mainly found after short ISI. Behaviorally, performance for valid versus invalid targets improved after pointing cues but decreased after fending cues. ERP-data showed a P2-activity that increased for invalid targets only after pointing, however not fending. In contrast, later validity differences at P3 seemed unchanged by gestural type. While spatial interactions of gestures resemble behaviorally emotional shifts, underlying neuronal circuits suggest separate attentional systems.

Influence of exploration length on force adaptation in softness discrimination

Aaron C. Zoeller[1] & Knut Drewing
[1] *Justus-Liebig University Giessen, aaron.zoeller@psychol.uni-giessen.de*

When haptically exploring objects, humans enhance their perception by using prior information to adapt their behavior. E.g. humans use higher initial peak force when expecting a smaller difference between the compliance of two objects or harder objects. Higher peak forces increase differential sensitivity. Here we investigated if expected constrictions of exploration length influence exploration. When exploring freely, humans gather sufficient sensory information about softness using successive indentations. When the number of indentations is limited, also the sensory information input is limited. We hypothesize that humans compensate limited sensory input in short explorations by using higher peak force. Participants performed a 2IFC task discriminating the softness of two rubber stimuli out of one category (hard, soft). In two conditions trials of different softness categories were presented either randomized or in blocks of one category only. In Experiment 1 (N=8), exploration length was limited to one or five indentations per stimulus. In Experiment 2 (N=8), exploration length was free or limited to one indentation. Initial peak forces were higher when indenting stimuli only once as compared to five times or free exploration (leading to three indentations, on average). No difference in peak forces between blocked and randomized presentation was found. No difference in the percentage correct responses was found between the different exploration lengths. However, participants performed better when stimuli were presented in blocks. We conclude that humans can trade off different ways to gather sufficient sensory information for perceptual tasks, integrating also prior information on exploration length to enhance their performance.

The effects of unattended threatening images on visual search performance: an eye-tracking study

Andras Zsido[1], Diana Stecina, Rebecca Cseh, Orsolya Inhóf, Andras Matuz & Arpad Csatho
[1] *University of Pecs, zsido.andras@pte.hu*

Recent publications argue that the assessment of attentional biases for threat is now in crisis as concerns had been raised about the reliability of the measures used. Here, we present our paradigm that provides an opportunity to measure both short term (e.g. orientation, attentional draw) and longer-term (e.g. executive attention, vigilance-avoidance) processes. Participants (N=40) saw a number matrix (numbers from 1 to 10) in the centre of the screen and an image either directly beside the matrix or on the periphery. Images could be neutral, moderately or highly threatening. The task was to find nr1 and then find the rest of the numbers in ascending order. We analysed reaction time (RT) and eye-movement measures relating to finding nr1 and the elapsed time between finding nr1 and nr10. Finding nr1 was faster as the threat level increased when the image was close to the matrix. When the image was on the periphery, RT was faster for moderately threatening stimuli compared to the other conditions. Regarding the overall search performance, participants were faster when images were presented on the periphery and there was an increase in search times as the threat level increased. Eye-movements showed that first fixation was relatively late for the images, which also increased with threat level. And the total amount of fixation decreased for the more threatening images. Overall, the paradigm could serve as an alternative for the classical ones. Further research should take covert and overt attention into account when discussing attentional biases.

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