

TeaPo



61st Conference of Experimental Psychologists | London 2019

Abstracts

Edited by
Christiane Lange-Küttner



LONDON
METROPOLITAN
UNIVERSITY



Christiane Lange-Küttner (Ed.)

Abstracts of the 61st Conference of Experimental Psychologists

61. TeaP 2019

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of the 61st Conference of
Experimental Psychologists

(**T**agung **E**xperimentell **A**rbeitender **P**sychologInnen)

Edited by Christiane Lange-Küttner

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WELCOME ADDRESSES

LIZ CHARMAN, PRO-VICE CHANCELLOR, LONDON METROPOLITAN UNIVERSITY



Just to introduce myself, my name is Liz Charman, and I am the pro-Vice Chancellor of the London Metropolitan University. I am delighted to offer a very warm welcome to you on this conference today. Our Vice Chancellor Lynn Dobbs is unfortunately away on business at the moment so was unable to open the conference herself, but she does send her very best wishes for a successful conference and she's very pleased that we are able to host the very first TEAP conference here in England. I'm delighted to welcome you all here today particularly so because at one time I was in fact Head of Psychology here at London Metropolitan University. So this is a conference that is very close to my heart. It is really good to see so many people here for a psychology conference. Psychology has been at London Met for a long time, for over 40 years now although it does not extend right back to 1898 when we first opened our doors to the poor young men for metropolitan evening classes.

I understand that this conference has in fact been running every year since 1959 at a different university but this is the first time that it is being held at a university in England. I'm especially proud that London Met is in a position to be able to host it and all credit for this goes to Dr Chris Lange-Kuettner who has been the mastermind of this conference. Thank you very much for doing that on behalf of them at London Met. I take this round of applause to mean that all has been going very well so far. It looks like you are going to have an exciting and very good program, with very distinguished speakers. I'm sure you'll find the discussions stimulating and interesting throughout the next three days.

**CHRISTIANE LANGE-KÜTTNER, LONDON METROPOLITAN UNIVERSITY,
CONFERENCE CHAIR**



Dear TEAP 2019 participants,

I am very pleased that you have made your way to London, and particularly to the London Metropolitan University which hosts the TEAP 2019. The London Met and its predecessor organisations always had a social mission that goes back to 1848. Our most well-known alumnus is the Lord Mayor of London, Sadiq Kahn, who studied law at the London Metropolitan University. He is already committed elsewhere today and passes on his sincere apologies and kind regards.

To orient you a bit about the country to which you have travelled and its Higher Education system, the UK is a country where scientists at the university are tenured relatively early, but they can also be made redundant, or even demoted, as they are no civil servants, and this really happens, it is not just on paper. The Commonwealth title of lecturer, senior and principal lecturer is rather awkward from a continental perspective as it is astonishingly not linked to the US system - given the UK-US preferred partnership. But then the UK are only the cousins!

Moreover, the more research-oriented title of a reader was formerly the academic who was merely reading out the lectures of the professor. These titles, though, are in use in far-away Commonwealth countries such as Canada and Australia.

In the UK, we are late risers. Lectures usually start at 10 am. In Marburg in 2018, sessions started at 8:30 pm and in Heidelberg in 2016, sessions started at 8:40. But at the TEAP in London, we start at 9 am.

More about timing. We have somewhat fewer submissions than some earlier TEAPs because the envisaged Brexit date was only two weeks resp. one weekend before the TEAP 2019 would have started. But the Brexit has now been postponed to Halloween this autumn.

One could imagine that some of our participants may have thought that they would have needed to paddle across the Channel to get here, and not all scientists would have been tough enough for this journey. I certainly wouldn't. Moreover, some scientists may have actually needed boat rescue and you should be able to listen to these stories in the lunch break. I have heard that there was also a counter-attack by German authorities in response to Brexit saying that extra health insurance would be needed for these swimming, paddling and flying scientists and they could not allow them to travel. However, then the German administration had second thoughts and changed its mind. In the end, they did allow business travel by swimming, paddling or flying maybe because it would toughen up the 'liberal elite'.

But we also have presenters from countries other than the European Union, from Australia, China, Iceland, India, Israel, Liechtenstein, Malaysia, Mongolia, New Zealand, Norway, South Korea, Switzerland and the United States. We are really happy that the TEAP conference finds some world-wide recognition. Until this year, the TEAP only took place in German-speaking countries - although the conference language is English since many years. German-speaking cognitive psychologists clearly contributed to this world-wide interest as they are leading German Psychology into internationalisation and renewed global recognition. When I started with my first lectureship at the University of Aberdeen, the oldest Psychology department in Scotland, in the nineties, many of my colleagues had still learned Experimental Psychology in German language and asked me to help them with some translation of German references. However, more than in any other discipline in German psychology, German experimental psychologists are publishing in English language peer-reviewed journals. Being fluently bilingual is nearly a necessary condition for success. Publishing in another language than your mother tongue is a career requirement that my native English colleagues find both challenging and awesome. You may find that you may have their compassion and admiration.

The TEAP 2019 programme is really comprehensive. We have 14 symposia and 21 sessions with individual presentations. I thank those colleagues who organised, or accepted invitations, to chair these sessions. We also have three parallel poster sessions both on Monday and Tuesday which are thematically sorted so that you can walk right into your research area. Last but not least, we have three highly distinguished keynote speakers, David Shanks who will speak in a few minutes on retrieval from long-term memory, Jutta Mueller who will speak Tuesday on the ontogenetic and phylogenetic roots of grammar, and John Duncan who will speak on Wednesday about his research on fluid intelligence and cognitive control.

Now after this welcome, here is some more practical information about the TEAP conference. The North Campus buildings organically grew from a college in 1896 into a modern-day university. Hence, I have provided you with pathway maps in the programme that should help you navigate our maze. One colleague wrote me a probably ironical email that this was the best conference programme that he has ever seen.

I hope you will enjoy these three days at the TEAP 2019.

HANS-PETER LANGFELDT, GOETHE UNIVERSITY FRANKFURT, 60 YEARS OF TEAP - IN MEMORIAM HEINRICH DUEKER



The sixty years' anniversary of TEAP (*Tagung Experimentell Arbeitender Psychologen*, meeting of experimentally working psychologists) is most certainly a worthy opportunity to take a look back to the roots. I appreciate the invitation to present a brief report about the first TEAP back in 1959, and to showcase the role of Professor Heinrich Dueker.

To understand the relevance of the first TEAP it is necessary to throw a glance at the situation of the academic psychology in Germany after World War II.

Up to the sixties the mainstream in academic psychology was neither experimental nor empirical. In fact, then current theories and concepts were more or less speculations based on introspection at best, with a lack of scientific rigor and objectivity. It was rather ideology than science. Experiments were characterized as "old school", and the experimentally working psychologists more or less were considered outcasts. In this climate, a young research assistant at the Psychological Institute of the University of Marburg, Werner Traxel, had the initial idea that experimental psychologists should found a group to cooperate and to support each other. Heinrich Dueker, the director, who also was interested in the relevance of sciences (Dueker, 1958) acted on this idea and reached out. This is how TEAP was born.

Dueker and his group invited like-minded colleagues from across the country to the first meeting at the University of Marburg in 1959, April 25 -27. The participants assembled in a lecture hall of the psychological institute, located in former military barracks which dated back to the nineteenth century. The picture shows the small group of participants.



Participants of the first meeting 1959 (the white arrow indicates Heinrich Dueker).
 Courtesy of the University of Wuerzburg
 Adolph Wuerth Center for the History of Psychology.

There were 35 participants (6 full professors, 27 scientific assistants, and 2 guests) mainly discussed the situation in their institutes. The agenda was:

- What could be taught in experimental psychology?
- What were their current and their prospective research projects in general, and in special areas?

Some years later 24 out of the 27 participating assistants had brilliant careers as professors and Heinrich Dueker became one of the leading experimental psychologists. Experimental psychology was back in Germany. To sum up, it seems to be adequate to consider the first TEAP meeting as the beginning of a shiny success story. And the meeting here in London is another highlight of TEAP's history. It is the first one outside German speaking countries hosting more than 400 participants from Europe and overseas.

But, what do we know about Heinrich Dueker as a person? Let us have a glance on his CV. Born in 1898 as a son of a farmer's family, he was drafted for the army in World War I. When the young man returned severely wounded (he lost a leg) from the battle field in 1918, he first went back to live on his parent's farm. After his recovery, he worked as a teacher in elementary schools. In 1920, he enrolled at the University of Goettingen to study psychology. There, he completed his PhD and started an academic career. His main research interests were in the areas of attention and concentration, motivation, and volition.

In 1936, his career came to an abrupt end. As a member of a socialistic resistance group who produced critical flyers and distributed international newspapers, Heinrich Dueker was dismissed from the university and sentenced to three years in prison. In sharp contrast, the majority of the professors who had not emigrated by then, found more or less comfortable arrangements with the predominant racial ideology. As a consequence, psychology as an academic discipline took a disastrous development.

In 1940, Heinrich Dueker found a job at Schering Pharmacological Industry in Berlin, where he tested the effects of drugs and medicaments on humans (e.g. Dueker, 1943). So, it does not come as a surprise that he was named a pioneer in Pharmaco-Psychology later in his life.

However, he stood under strong observation. In 1944 he was deported to the Concentration Camp Sachsenhausen (near Berlin). At the same time his wife Erna Dueker, was arrested by the Gestapo in Berlin. They left a two-year old daughter behind. They never had any information neither about each other's nor their daughter's destiny. In April 1945, before the Russian army reached the concentration camp, more than 30 000 prisoners were forced to march to the north, towards the Baltic Sea. Thousands of them didn't survive this so called "*Todesmarsch*" ("Death March"). They were shot or died from hunger, frost, and exhaustion. During the march, the guards left Heinrich Dueker behind, assuming that he was dead or dying. Fortunately, he was found in time and nursed by women from a nearby farmhouse.

Back in Goettingen, Heinrich Dueker was reinstated at the university, and based on his political role in past, he was elected as the city's Lord Mayor in 1946. A year later he had to make a critical personal decision: Should he stay in Goettingen and continue City Mayor or should he step down and accept a full professorship in Marburg? He decided in favour of science and left for Marburg. His career as the director of the Psychological Institute was very successful. In the mid-sixties, the institute held the top rank in terms of publication rate in Germany (Murch & Wesley, 1966). In addition to his academic work he continued to serve in public offices. For more than ten years, he served as an Honorary Member of the Constitutional Court of the Federal State of Hesse.

Although Heinrich Dueker was success oriented, he never imposed any research topics on his assistants. They were totally free to choose their own area for research. Research had to meet only one criterion: quality. Dueker's dictum was "*saubere Experimente!*" which means "clean experiments!". If he found this criterion violated, his criticism could be very harsh. In unison, when his former assistants looked back, they told the story that they had to work very, very hard, but that they felt as members of a team with a good leader, who was well aware of the relevance of social gatherings, too. Two regular events stand out: The annual „ground pork dinner“ for the entire staff and faculty and the carnival nights for all members of the institute.

Heinrich Dueker was widely honoured for his achievements as a scientist and as a politician. He received an Honorary Doctorate of the University of Duesseldorf and he held a number of honorary memberships in scientific societies, even streets were named after him.



The president of the German Society of Psychology, Prof. Erwin Roth, presents the Wilhelm Wundt medal to Heinrich Dueker on the 21st TEAP, 1979. Origin: private

I would like to mention only these two awards which are probably the most significant ones: He was presented with the Wilhelm Wundt Medal, the highest award of the German Psychological Society; and he was awarded with Honorary Citizenship in Goettingen.



Heinrich Dueker, *1898, November 24 , †1986, November 2

Heinrich Dueker passed away 1986, 88 years old. Lothar Tent (1999), his last assistant, characterized his life as *“Ein Leben fuer die Psychologie und eine gerechte Gesellschaft”* (“A life for psychology and for a fair-minded society.”)

References

- Dueker, H. (1943). Psychopharmakologische Untersuchungen über die Wirkung von Keimdrüsenhormonen auf die geistige Leistungsfähigkeit [Psychopharmacological studies concerning the effect of sex hormones on mental efforts]. *Archiv für experimentelle Pathologie und Pharmakologie*, 202, 262-313.
- Dueker, H. (1958). Psychologie und Geisteswissenschaft [Psychology and arts]. *Studium Generale*, 11, 290-298.
- Murch, G. M. & F. Wesley, F. (1966). German psychology and its journals. *Psychological Bulletin*, 66, 410-415.
- Tent, L. (1999). *Heinrich Dueker - Ein Leben für die Psychologie und eine gerechte Gesellschaft*, 2 Bände [Heinrich Dueker - A life for psychology and for a fair-minded society, 2 volumes]. Lengerich: Pabst.

KEYNOTE SPEAKER DAY 1 DAVID SHANKS, UCL 'TESTING YOUR MEMORY: THE MANY CONSEQUENCES OF RETRIEVAL ON LONG-TERM LEARNING AND RETENTION'



KEYNOTE FILM

<https://easychair.org/smart-program/TEAP2019/KEYNOTES.html>

We are now coming to our first keynote speaker, Prof David Shanks from the UCL.

He did his undergraduate degree and PhD in Cambridge and then went on to the MRC Applied Psychology Unit in Cambridge. He was a postdoctoral fellow at the Department of Cognitive Science at University of California, San Diego. He is at the University College London since 1993. We now welcome David to give the first keynote lecture on the TEAP 2019 at the London Metropolitan University!

ABSTRACTS DAY 1

META-COGNITION (SYMPOSIUM)

Beatrice G. Kuhlmann, Monika Undorf
(University of Mannheim, Germany)

Metacognition – monitoring and controlling one’s own cognitions – is among the most fascinating abilities of the human mind. In recent years, metacognition has received considerable attention in experimental psychology. This symposium presents new findings from this intriguing field of research. In the first talk, Zawadzka and Hanczakowski examine how metacognitive monitoring during repeated study trials benefits learning. In the second talk, Zimdahl and Undorf report research showing that knowledge about retrieval success and failure biases metamemory judgments. The following two talks address social aspects of metacognitive monitoring and control. Undorf presents work indicating that judgments about other persons’ memories are similar to judgments about one’s own memory in that both rely on nonanalytical, experience-based processes. Kuhlmann reports experiments showing that the ability to generate helpful memory cues for oneself is spared from aging, whereas the ability to generate memory cues in order to help other persons to remember is impaired in older age. Finally, Rouault, Dayan, and Fleming report behavioral and neuroimaging data indicating that confidence in single decisions supports the formation of global self-performance estimates. Taken together, the five talks of the symposium offer an up-to-date overview of current research in metacognition.

METACOGNITIVE MONITORING OF REPEATED STUDY

Katarzyna Zawadzka, Maciej Hanczakowski
(SWPS University, Poland)

Mastering study materials often requires repeated learning. However, the strategy of restudying the same materials has been criticized for not giving sufficient opportunity for retrieval in the form of self-assessments that are known to benefit not only learning but also metacognitive monitoring of the learning process. What these criticisms miss, though, is that restudying need not be devoid of retrieval: when relearning previously studied materials, spontaneous retrieval in the form of reminding might occur. Here we demonstrate how metacognitive measures can be used to assess the effects of reminding at restudy. In five experiments (with n s varying between 30 and 59), we manipulated at restudy the environmental context accompanying to-be-learned materials in order to vary the incidence of spontaneous reminding, and had participants provide judgements of learning (JOLs). JOLs turned out to be sensitive to the occurrence of context-induced reminding, demonstrating their utility as a metacognitive measure of reminding which can complement the existing performance-based measures. We will discuss these results in the context of the difference between the cues that feed into metacognitive assessments of encoding and retrieval effectiveness.

IS THERE A HINDSIGHT BIAS IN METAMEMORY? THE EFFECT OF OUTCOME KNOWLEDGE ON JUDGMENTS OF LEARNING (JOLs)

Malte F. Zimdahl, Monika Undorf
(University of Mannheim, Germany)

Hindsight bias – one of the most prominent judgment illusions – refers to the influence of outcome knowledge on recollected judgments. Typically, recollected judgments are closer to the correct answer than original judgments made before the correct answer is revealed. Two experiments investigated whether outcome knowledge also affects judgments of learning (JOLs). Both experiments contained a learning phase and a test phase. In the learning phase, participants studied 60 word pairs and made a JOL for each word pair. In the test phase, they recollected their original JOLs either after attempting to recall each item (Experiment 1, $N = 58$) or before vs. after attempting to recall half of the items (Experiment 2, $N = 101$). Results showed that outcome knowledge produced a hindsight bias on JOLs, with higher recollected JOLs than original JOLs for correctly recalled items and lower recollected JOLs than original JOLs for not recalled items. Thus, the current study supports the idea that outcome knowledge affects JOLs as it does with judgments about the external world.

JUDGMENTS OF LEARNING FOR SELF AND OTHERS: A STATE-TRACE ANALYSIS

Monika Undorf (University of Mannheim, Germany)

Judging others' knowledge is ubiquitous in social interactions. However, little is known about the basis of judgments about other persons' memories in general and, more specifically, the contribution of nonanalytical, experience-based processes to these judgments. In the current set of experiments (with *ns* varying between 40 and 56), people made judgments of learning for themselves (Self JOLs) and others (Other JOLs) under conditions where experience-based processes are known to underlie Self JOLs. State-trace analysis revealed that Self and Other JOLs depended on a single latent variable, thus indicating that experience-based processes contributed to judgments of others' knowledge. This result was independent of the order in which participants made Self and Other JOLs and replicated across different amounts of study-test practice. Overall, the current research demonstrates a similar basis of metamemory judgments for oneself and others.

HELPING YOURSELF AND OTHERS REMEMBER: CHARACTERISTICS OF SELF-GENERATED MEMORY CUES IN YOUNGER AND OLDER ADULTS

Beatrice G. Kuhlmann (University of Mannheim, Germany)

We often rely on self-generated memory cues, for example when naming a file. Memory cues are particularly important for older adults' successful recall of past information. In two experiments, I examined older adults' (60-80 years old, *N* = 64) ability to generate effective memory cues for themselves and (unknown) others. Compared to younger adults (18-30 years old, *N* = 64), older adults' memory cues for themselves were more idiosyncratic and had lower normative cue-to-target associative strength based. Self-generated cues resulted in better recall than cues generated by another participant of the same age group. This benefit of self-generated cues was comparable in both age groups. Although older adults generated different cues for themselves versus for others more often than younger adults, they failed to increase the normative cue-to-target associative strength of cues for others. When given to another participant of the same age group, older adults' cues generated for others did not elicit better recall than their cues generated for themselves. In contrast, younger adults' cues for others elicited better recall in another participant than their idiosyncratic cues for themselves. In Experiment 2, memory cues were additionally exchanged intergenerationally (i.e., between age groups). Younger adults' cues (both for themselves and others) supported older adults' recall better than cues from another older adult. Taken together, these results suggest that older adults have difficulties with perspective taking and ignoring idiosyncratic knowledge when generating memory cues for others.

FORMING GLOBAL ESTIMATES OF SELF-PERFORMANCE FROM LOCAL CONFIDENCE

Marion Rouault

(Wellcome Centre for Human Neuroimaging, University College London, UK)

Peter Dayan

(Max Planck Institute for Biological Cybernetics, Tübingen, Germany)

Stephen Fleming

(Wellcome Centre for Human Neuroimaging, University College London, UK)

Metacognition, the ability to internally evaluate our own decisions, is particularly useful since many real-life decisions lack immediate feedback. Most previous studies have focused on the construction of confidence at the level of single decisions, but little is known about the formation of “global” self-performance estimates (SPEs) aggregated from multiple decisions. Here, we compare the formation of SPEs in the presence and absence of feedback, testing the hypothesis that local decision confidence supports the formation of SPEs when feedback is unavailable. In a series of three behavioral experiments (N=29, N=29 and N=46 subjects), we reveal that humans pervasively underestimate their performance in the absence of feedback, compared to a condition with full feedback, despite objective performance being unaffected. We found that fluctuations in confidence contribute to global SPEs over and above objective accuracy and reaction times. Preliminary neuroimaging results (fMRI) suggest that during SPE formation, prefrontal areas may differently represent local confidence signals according to whether they are congruent or incongruent with global SPEs (N=39 subjects). Our findings create a bridge between local confidence and global SPEs, and support a functional role for confidence in higher-order behavioral control.

PSYCHOPHYSIOLOGICAL CORRELATES OF EFFORT-RELATED PROCESSES (SYMPOSIUM)

Michael Richter (Liverpool John Moores University, UK)

Recent decades have shown increased interest in physiological measures reflecting effort-related psychological processes. This symposium combines six presentations that showcase the variety of examined topics and employed measures in the field. The first two presentations will elaborate on the association between physiological and behavioural measures of effort. Capa will present research examining behavioural and physiological adaptations to changes in mental workload showing that the association between pre-ejection period and cognitive performance varies as a function of task demand. Bijleveld will then discuss the relationship between feelings of effort and physiological correlates of effort presenting data that reveal a dissociation between task demand-induced changes in self-reported effort and changes in pupil dilation. The following presentations will present applications of motivational intensity theory's effort-related predictions to different psychological phenomena. Gendolla will elaborate on boundary conditions of implicit priming on effort showing that briefly presented affective pictures only affect effort-related cardiovascular activity if they are processed in an achievement context and without explicit awareness. Lasauskaite will present a study that highlights the impact of light conditions on effort-related sympathetic activity showing that cold, blue light results in weaker pre-ejection period response than warm, red light. Richter will compare two conflicting predictions about the impact of the implicit achievement motive on effort presenting findings that demonstrate that its impact on effort varies as a function of the clarity of task demand. Slade will discuss an application of motivational intensity theory to listening presenting results that suggest that pre-ejection period reactivity reflects listening demand.

A CURVILINEAR EFFECT OF MENTAL WORKLOAD ON MENTAL EFFORT AND BEHAVIORAL ADAPTABILITY: AN APPROACH WITH PRE-EJECTION PERIOD

Rémi Capa (Federal University of Toulouse, INU Champollion, France)

Michael Richter (Liverpool John Moores University, UK)

Erik Bijleveld (Behavioural Science Institute at Radboud University, Netherlands)

Guido Gendolla (Université de Genève, Switzerland)

Ruta Lasauskaite (Université de Genève, Switzerland)

We tested Hancock et al.'s mental workload model, which has never been experimentally validated at a global level with the measure of pre-ejection period (PEP), a purer index of beta-adrenergic sympathetic impact. A common idea is that operators adapt to mental workload. When the level of mental workload increases, behavioral and physiological adaptability intensifies to slow down decline in performance. However, if mental workload exceeds an intermediate level, then a decrease of behavioral and physiological adaptability occurs to protect from excessive perturbations. This decrease is associated with change in behavioral strategies and disengagement. The experimental task was based on a modified Fitts' task used in Hancock and Caird (1993). Five levels of task difficulty were computed. One hundred participants were randomly assigned to one of five difficulty conditions (very easy, easy, intermediate, very difficult, impossible). Performance with speed-accuracy trade-off and PEP reactivity were used as indexes of behavioral and physiological adaptability. Results showed a significant curvilinear effect of task difficulty on PEP reactivity, with high reactivity at intermediate level but low at other levels. We observed a decline in performance (i.e., increase of error rate and of movement time) up to the intermediate level and a speed-accuracy trade-off above this level. In agreement, with the Hancock et al.'s mental workload model, we observed for the first time a behavioral and physiological adaptability as a function of mental workload.

THE FEELING OF EFFORT DURING MENTAL ACTIVITY

Erik Bijleveld (Radboud University, Netherlands)

The feeling of effort is familiar to most, if not all, humans. Prior research shows that the feeling of effort shapes judgments (e.g., of agency) and decisions (e.g., to quit the current task) in various ways, but the proximal causes of the feeling of effort are not well understood. In this research, I address these proximal causes. I conducted two preregistered experiments ($N = 58$ and $N = 50$, both within-subjects designs) in which participants performed a difficult vs. easy short-term memory task, while I measured effort-related phenomenology (feeling of effort) and physiology (pupil dilation) on a moment-to-moment basis. In both experiments, difficult tasks increased the feeling of effort; however, this effect could not be explained by concurrent increases in physiological effort. To explain these findings, I suggest that the feeling of effort during mental activity stems from the decision to exert physiological effort, rather than from physiological effort itself.

IMPLICIT AFFECTIVE INFLUENCES ON EFFORT ARE MODERATED BY PRIME AWARENESS AND TASK CONTEXT

Guido Gendolla, David Framorando
(University of Geneva, Switzerland)

Research on the Implicit-Affect-Primes-Effort model (Gendolla, 2012) has revealed ample evidence that implicitly processed facial expressions of emotions influence effort-related responses of the cardiovascular system (especially cardiac pre-ejection period) during cognitive performance: As long as success is possible and justified, processing sadness or fear primes during task performance results in higher effort than implicit activation of the happiness or anger concept. This talk presents the results of recent studies, which revealed that these automaticity effects depend on the unawareness of this affective influence. Results of three studies showed that (1) making people aware of the presentation of affect primes results in a boundary condition of implicit affects' systematic impact on effort mobilization. (2) Another study found that affect primes only systematically influenced effort when they were processed in an achievement context that called for effort and in which implicit affect could inform about task demand. When the affect primes appeared in a "just watch" context, they had no impact on cardiovascular responses. Implications for understanding the conditions that foster or impair behavioral automaticity are discussed.

LIGHT AND MENTAL EFFORT DURING AN AUDITIVE WORKING MEMORY TASK

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Michael Richter (Liverpool John Moores University, UK)
Christian Cajochen (Psychiatric Hospital of the University of Basel, Switzerland)

Mental effort, defined as mobilization of resources to carry out behaviour, is not only determined by task difficulty, but is also influenced by mood, ability perception, reward, implicit affect, implicit pain. Recently, Lasauskaite and Cajochen (2018) predicted, that also ambient lighting can affect mental effort. Light, beyond visual function, exerts a number of non-visual functions, including effects on circadian entrainment, sleep, hormones, mood, alertness, or attention. Especially the blue components within the light spectrum are important for the non-visual function. In accordance to their predictions, Lasauskaite and Cajochen demonstrated that cool light (containing more blue spectrum components and associated to higher alertness and attention) leads to lower effort in comparison to warm light (containing less blue spectrum components). In the present study, we tested the effects of warmer and cooler light during an auditive n-back task. Participants (N = 77) spent 15 min in either warm or cool ambient lighting before performing an auditive working memory (n-back) task (5 min). The results showed that ambient lighting conditions significantly affected mental effort during the task performance: as predicted, effort-related cardiovascular reactivity was stronger in warm lighting condition compared to cool light. In conclusion, ambient lighting can influence mental effort even during performing a non-visual working memory task.

THE IMPACT OF THE IMPLICIT ACHIEVEMENT MOTIVE ON EFFORT-RELATED SYMPATHETIC ACTIVITY DEPENDS ON THE CLARITY OF TASK DEMAND

Michael Richter (Liverpool John Moores University, UK)

Florence Mazeres (University of Geneva, Switzerland)

Kerstin Brinkmann (University of Geneva, Switzerland)

The traditional achievement motive literature and motivational intensity theory differ regarding the predicted impact of the achievement motive on effort. The achievement motive literature suggests that motives are direct determinants of effort—the higher the motive, the higher the effort—whereas motivational intensity theory postulates such a direct impact only if task demand is unclear. Under conditions of clear task demand, motives should exert an indirect impact on effort by determining the maximum amount of effort one is willing to invest. Two studies ($N = 60$ and $N = 68$) measured participants' implicit achievement motive (nAch) and manipulated task demand (only Study 2) to compare the conflicting predictions of the two perspectives. Using a cognitive task with an unclear difficulty, Study 1 found evidence for the predicted direct impact of nAch on effort: Pre-ejection period reactivity—an indicator of changes in effort-related sympathetic impact on the heart—increased with increasing nAch strength. Study 2 demonstrated that nAch indirectly affects effort in a cognitive task with fixed and clear difficulty levels. Pre-ejection period reactivity did not differ as a function of nAch strength if task demand was low. However, if task demand was high, high nAch resulted in higher pre-ejection period reactivity than low nAch. Both studies thus provided supporting evidence for the perspective of motivational intensity theory that the impact of nAch on effort is moderated by the clarity of task demand.

SYMPATHETIC CARDIOVASCULAR RESPONSES REFLECT CHANGES IN EFFORTFUL LISTENING

Kate Slade (Liverpool John Moores University, UK)

Michael Richter (Liverpool John Moores University, UK)

Audiologists recently started to explore the utility of physiological measures to assess the effort that individuals invest to understand speech in noise in difficult listening situations. Motivational intensity theory suggests that measures reflecting sympathetic impact on the heart (like pre-ejection period or systolic blood pressure) might be suitable candidates for this purpose. According to the theory, effort-related myocardial sympathetic activity should increase with increasing task (listening) demand until the task becomes too demanding (either because it is impossible to succeed or because the required effort is not justified by the importance of task success). A study ($N = 48$) tested this prediction in a within-persons design manipulating listening demand across four levels (low vs. moderate vs. high vs. impossible). Participants performed ten trials of a speech-in-noise task with four different signal-to-noise ratios while their cardiovascular responses (pre-ejection period, respiratory sinus arrhythmia, blood pressure, heart rate) were assessed. As predicted, pre-ejection period reactivity and systolic blood pressure increased with increasing listening demand in the three possible conditions but were low in the impossible condition. These findings suggest that sympathetic-driven measures might be useful tools to assess effort-related processes associated with listening.

Priming (Individual Talks)

INDEPENDENT EFFECTS OF DISTRACTOR-TARGET SOA AND PROPORTION CONGRUENCY

Michaela Rohr (Saarland University, Germany)

Imke Marilla Gillich, Thomas Jacobsen, Mike Wendt (Helmut Schmidt University / University of the Federal Armed Forces Hamburg, Germany)

Two different control processes affecting distractor processing have been suggested, (a) inhibition of distractor-related activation during a pre-target interval leading to a reduction of distractor interference when the distractor-target SOA is increased, and (b) strategic adjustment to the proportions of congruent and incongruent target-distractor combinations, eliciting larger distractor interference when the proportion of congruent trials is increased (i.e. Proportion Congruent [PC] Effect). To explore the interplay of PC-based adjustment and the time course of distractor-related activation, we varied the PC as well as the distractor-target SOA. In a first experiment, we controlled for a confound with item-specific priming by keeping distractor-related contingencies constant for a subset of the stimuli. Dismissing accounts of item-specific priming, a PC Effect was found even for these stimuli. The reduction of distractor-related interference did not interact with PC condition, suggesting independent control processes. In a second experiment, we added neutral distractors to disentangle modulations of the facilitatory component and of the interference component of the congruency effect. Both components were increased when the PC was high whereas the SOA-related reduction of the congruency effect was largely confined to the interference component. Our results are consistent with assumption of independent processes of strategic (i.e. PC-related) distractor-based response activation and decreased emergence of response conflict or enhanced conflict resolution, after a long SOA.

PRIMING THE SPECIFIC EMOTION CATEGORY WITH INDIVIDUALLY SELECTED NOUNS: EVIDENCE FOR FAST PROCESSING OF EMOTIONAL CONNOTATIONS

Michaela Rohr, Dirk Wentura
(Saarland University, Germany)

Automatic evaluation, that is, the fast, unintentional activation of the valence associated with an object, is known to be a pervasive phenomenon. It has been extensively studied with diverse implicit behavioral paradigms, probably most popularly with the evaluative priming paradigm (Fazio, Sanbonmatsu, Powell, & Kardes, 1986), and also be shown to have real-life consequences, for example, in prejudiced behavior (Cameron, Brown-Iannuzzi, & Payne, 2012). What has been largely neglected in this field, however, is whether more specific emotional associations can also be automatically activated. We tested this question in two experiments (N = 50 in Exp.1, N = 83 in Exp.2) with the emotion priming paradigm, a four response-option response priming paradigm. Participants classified emotional facial expressions according to the specific emotion category (i.e., happiness, anger, disgust, fear). These targets were preceded (SOA: 140 ms in Exp.1, 60 ms in Exp.2) by shortly presented (i.e., 40 ms) emotion connoted nouns, which were individually pre-selected through an allegedly unrelated “word rating” task. Both experiments yielded emotion category specific priming effects, showing that emotional connotations from task-irrelevant nouns can be activated very fast.

WORD-TO-IMAGE PRIMING OF GENDER INFORMATION: BEYOND BINARY RESPONSE DESIGNS

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Pascal Gygax
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(University of Turku, Finland)

Ute Gabriel
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Paradigms assessing how language activates gendered representations are typically limited to designs in which responses are implemented as binary distinctions between female and male categories. The current study moves beyond this limitation by developing and evaluating a response design which also includes a third response category intended to capture mixed or gender-neutral representations. Written primes associated with gender information preceded a face pair decision task in which participants decide whether two visually presented faces are male, female or both. Successful priming occurs if the presentation of a prime whose associated gender is congruent with the target picture leads to a facilitation in the response relative to when the gender associated with the word is incongruent with the target picture. Since the inclusion of multiple response alternatives increases the number of possibilities as to how these may be implemented, language-to-image priming was assessed in two experiments (N=32; N=34) differing in the extent to which the response layout reflects the structure of the response categories. While increased stimulus-response compatibility is associated with more efficient stimulus processing, the present study is to our knowledge the first assessment of its impact on the detection of priming effects. Results from both experiments show significant effects of gender priming, though larger effect sizes were obtained when stimulus-response compatibility was kept high. These findings demonstrate that language-to-image priming can be successfully investigated using a relatively elaborate set-up (three response categories), and further underline the advantages of considering stimulus-response compatibility when designing experiments.

INVESTIGATING THE ROLE OF RECOGNITION IN THE ASSOCIATION OF PRIMING AND SOURCE MEMORY

Nicholas Lange, Christopher J. Berry, Timothy J. Hollins
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We have previously presented behavioral data and modeling that links repetition priming, recognition, and source memory. In a series of experiments, the magnitude of the priming effect, as measured with identification response time in a gradual clarification task, was 1) greater for studied items receiving correct source decisions than incorrect source decisions, and 2) tended to increase as confidence in the source decision increased. Building on the framework for modeling recognition and priming proposed by Berry, Shanks, Speekenbrink, and Henson (2012), we developed a single-system signal-detection model in which source memory decisions are driven by the same memory strength signal as recognition and priming. A version of this model that allows source-rating criteria to converge with greater recognition confidence, and allows the variances of old and new item strength distributions to be unequal, provided the best qualitative and quantitative account of the data, and was preferable to a “multiple-systems” version of the model. In new experiments, where participants did not make recognition judgments, the association of priming and source memory persisted, suggesting this association is not driven by overt recognition judgments. While the model, without recognition, can account for the difference in identification RT for correct and incorrect source decisions, it struggles to account for the effect of RT across source confidence. We explore alternative explanations for the pattern of this association.

EMOTION-SPECIFIC CROSS-MODAL PRIMING WITH BRIEF PRIME DURATION AND STIMULUS ONSET ASYNCHRONIES: TESTING THE CROSS-MODAL INTEGRATION ACCOUNT

Timea Folyi, Michaela Rohr, Dirk Wentura
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We investigated the influence of brief auditory emotional context on visual emotional processing in a cross-modal variant of the emotion priming paradigm (e.g., Rohr, Degner, & Wentura, 2012). Participants were instructed to ignore the non-verbal emotional vocalizations and categorize the visually presented facial expressions. While typical cross-modal evaluative priming studies present relatively long sounds with long stimulus onset asynchrony (SOA; > 1000 ms), we used 200 ms long prime duration and 100 and 0 ms SOA, as we expected that brief prime and SOA durations warrant more automaticity in the paradigm. In Experiment 1 ($N = 77$), we found emotion-specific priming effects that were not moderated by SOA. These results can be explained either by response competition, similarly to unimodal evaluative priming, or by audio-visual integration of facial and vocal emotions. Hence, in Experiment 2 ($N = 58$), we introduced a manipulation that either hindered or promoted face-voice integration: We presented vocalizations and faces that were produced by expressers of the same versus opposite gender (i.e., natural versus arbitrary gender pairings). If cross-modal integration of vocal and facial emotions underlies the priming effects, we expected that unnatural prime-target pairings eliminate or significantly reduce priming effects. We expected no moderation in the case of response priming. In Experiment 2, we found no moderation of priming effects by natural versus arbitrary prime-target pairings, suggesting that emotional face-voice integration is not likely to explain the remarkable efficiency of the cross-modal emotion priming. Possible mechanisms will be discussed.

BINDING TIME: INTEGRATION OF RESPONSE DURATION INTO EVENT FILES

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Reacting to stimuli in the environment creates so-called event files that temporarily bind perceptual and/or action features. Recently, we have shown that also temporal features like stimulus duration are integrated into such event files. Furthermore, there are many situations in which the duration of an action is an important feature. As an example, duration as response feature plays a significant role for braking or acceleration actions. The purpose of the present two experiments was to examine whether the duration of a manual response is integrated into event files. In the first experiment ($n = 20$) we applied a prime-probe paradigm. Participants responded with short and long key presses to visual prime and probe stimuli (triangles and circles). A response cue (one of two letters) indicated a short or long key press. This key press had to be executed as soon as the prime stimulus appeared. The probe response was a speeded short or long key press that was indicated by the shape of the probe stimulus. Analyses of RT and error data revealed partial repetition costs indicating binding: performance was better when both stimulus shape and response duration repeated or switched relative to partial repetitions (only stimulus shape or only response duration repeated). In a second experiment ($n = 20$) we adopted a free choice variant of the first experiment. Here, at stimulus shape repetitions the tendency to repeat the response duration was higher than at shape switches. Both experiments indicate the integration of response duration into event files.

PERCEPTION (INDIVIDUAL TALKS)

VISUAL SENSORY PATTERN SEPARATION AND COMPLETION

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Two years ago, we presented a test of pattern separation using visual pink noise. We could produce lure stimuli similar to learned target stimuli with any desired degree of physical congruence. We found that for pink noise, similarity seems to be based on the physical correlation of lures and targets. Sensitivity followed roughly r^4 . In the main experiment we tested this functional relationship. We tested 48 participants in two experimental groups. In one group, lures were produced by blending old and new stimuli, in the other group by pixel selection. Blending and selection quotas were selected so as to yield well-defined evenly-spaced values of expected lure sensitivity (r^4). We measured lure sensitivity as a function of lure-target correlation and of production method. Sensitivity values increased about linearly with r^4 and did not differ significantly for the two production methods. Different methods to produce lures led to similar sensitivity values as long as the lure-target correlation was the same. Studying pattern completion with sensory stimuli requires the ability to learn and retain names of these stimuli. We report on a pilot study. Participants ($N=28$) learned one-letter names for four old stimuli. During testing with old and new stimuli they had to tell whether the stimulus was old or new, and to name it. This test was repeated after one week. Sensitivity was 1.42 ± 0.16 vs. 1.27 ± 0.15 (1st/2nd test). Naming performance was $61 \pm 5\%$ vs. $56 \pm 5\%$. Participants are able to learn names for pink noise stimuli and retain them for at least one week.

COMPLETION OF PARTS INTO WHOLE OBJECTS: SURFACE AND CONTOUR GROUPING IN KANIZSA FIGURES

Markus Conci, Hermann J. Müller, Siyi Chen
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A fundamental operation of human vision concerns the identification of coherent perceptual units, or objects in the visual environment. An example for such a mechanism of object integration is the Kanizsa figure, which illustrates that separate parts may be effectively bound to represent an integrated whole. This study was performed to investigate complementary mechanisms underlying object completion, namely the extraction of a bounding contour and its concurrent estimation of the surface area in perceiving a coherent illusory Kanizsa figure. In a series of experiments, observers had to judge whether a briefly presented dot probe was located inside or outside the region demarcated by inducer elements that grouped to form variants of a Kanizsa-type figure. From the resulting psychometric functions, we then determined observers' discrimination thresholds as a sensitivity measure. Our results showed that sensitivity was systematically modulated by the amount of surface and contour completion afforded by a given configuration. Moreover, the completion of a coherent surface was found to be relatively independent from the estimation of the illusory contours. An additional experiment then used retinotopic mapping during functional magnetic resonance imaging (fMRI) to locate brain regions that represent the completed objects. The results showed completion-specific processing to be localized in the lateral occipital complex (LOC), revealing a modulation of the neural signals by the configuration's grouping strength, mirroring the pattern of behavioral performance. Together, these results show that both contour and surface completions are related to activations in LOC and crucially determine illusory figure sensitivity.

PROACTIVE CONTROL OF AFFECTIVE DISTRACTION: EXPERIENCE-BASED BUT NOT EXPECTANCY-BASED

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Affective stimuli disrupt ongoing information processing, even when they are entirely task-irrelevant. We examined whether such affective disturbances can be controlled proactively. In particular, we tested whether experience-based proactive control, triggered by the frequency of affective distractors, and expectancy-based proactive control, triggered by predictive valence cues, can shield the attentional system from affective disturbance. Participants solved a letter classification task while being exposed to neutral or negative distractor pictures. We manipulated whether distractors were predominantly negative or neutral and whether cues were informative or uninformative about the valence of the upcoming distractor. In two experiments ($N = 75$), we found reduced affective disturbance in predominantly negative compared to neutral contexts, suggestive of experience-based proactive control, whereas announcements of distractor valence were neither helpful nor harmful. There appears to be no explicit top-down influence on immediate attentional control settings of affective distraction, but only sustained adjustments to affective contexts.

MULTIMODAL EFFECTS OF DIFFERENTIALLY ATTRACTIVE FACES AND VOICES ON RATING SCORES AND PUPIL DILATION

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First impressions about unfamiliar people are strongly and rapidly influenced by the attractiveness of both their face and voice (e.g., Zuckerman et al., 1991). To assess relative contributions of facial and vocal attractiveness, we combined face photographs and spoken sentences which had individually been rated as attractive or unattractive. 48 participants then rated facial attractiveness of these bimodal face-voice stimuli. We hypothesised that an attractive (vs. unattractive) voice would boost (vs. lower) the rating of an attractive face, and vice versa for unattractive faces. We also recorded pupil size, reasoning that incongruent attractiveness of face and voice could result in enhanced pupil dilation due to the processing of the inconsistency (Laeng et al., 2011). Alternatively, pupil size might align with the predicted rating responses, since it has been reported to reflect the attractiveness of a stimulus (Petit & Ford, 2015; Schweinberger et al., 2014). In fact, the rating responses revealed significant main effects of both face and voice attractiveness (both p s < .001). However, the two factors did not interact, supporting suggestions that attractiveness information from multiple channels is combined additively, at least for explicit ratings (Mileva et al. 2018; Rezlescu et al., 2015). In contrast, a significant interaction was present in the implicit pupil size measure (p = .01), at least for male participants, who showed larger pupil dilation for incongruent, relative to congruent face and voice attractiveness. Overall, the findings demonstrate that explicit ratings and implicit pupillary responses tap into different aspects of multimodal perceptions of speaker attractiveness.

INVESTIGATING EFFECTS OF PERSON KNOWLEDGE AND FACIAL TRUSTWORTHINESS ON THE ACCESS TO VISUAL AWARENESS

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The perception and evaluation of a person's face is determined by different visual and non-visual sources of information, including the perceived trustworthiness of the face as well as knowledge about the person's social behavior. Previous research indicates that these factors might also influence whether a face is consciously perceived at all. To investigate this matter, in study 1 ($n = 40$), faces differing in facial trustworthiness (low vs. average trustworthy looking faces) were associated with negative or neutral person knowledge and subsequently presented as target stimuli in an attentional blink task. Ratings of trustworthiness and facial expression were affected by both sources of information independently. Under conditions of reduced attentional resources in the attentional blink, participants were better able to detect faces associated with negative as compared to neutral social information. In contrast, facial trustworthiness did not affect detection rates. These findings indicate that affective knowledge is processed on a pre-attentive level and can affect which stimuli are prioritized for access to conscious visual awareness. Study 2 ($n = 32$) uses a similar experimental design to replicate these behavioral findings and investigate underlying neural correlates through EEG recording.

IMPLICIT REWARD ASSOCIATIONS IMPACT FACE PROCESSING: TIME-RESOLVED EVIDENCE FROM EVENT-RELATED BRAIN POTENTIALS AND PUPIL DILATIONS

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Igor Kagan (German Primate Center (DPZ), Germany)

To support adaptive behaviour in complex environments, the human brain developed efficient selection mechanisms that bias perception in favour of salient information. The present study aimed at investigating whether associated motivational salience causes preferential processing of inherently neutral faces similar to emotional expressions by means of event-related brain potentials (ERPs) and changes of the pupil size. To this aim, neutral facial expressions were implicitly associated with monetary outcome, while participants (N=44) performed a face-matching task with masked primes that ensured performance around chance level and thus an equal proportion of gain, loss, and zero outcomes. During learning, motivational context strongly impacted the processing of the fixation, prime and mask stimuli prior to the target face, indicated by enhanced amplitudes of subsequent ERP components and increased pupil size. In a separate test session, previously associated faces as well as novel faces with emotional expressions were presented within the same task but without motivational context and performance feedback. Most importantly, previously gain-associated faces amplified the LPC, although the individually contingent face-outcome assignments were not made explicit during the learning session. Emotional expressions impacted the N170 and EPN components. Modulations of the pupil size were absent in both motivationally-associated and emotional conditions. Our findings demonstrate that neural representations of neutral stimuli can acquire increased salience via implicit learning, with an advantage for gain over loss associations.

EXECUTIVE FUNCTION: MULTI-TASKING (INDIVIDUAL TALKS)

DIFFERENT IMPACT OF TASK SWITCHING AND RESPONSE COMPATIBILITY ON LONG-TERM MEMORY

Michèle Muhmenthaler, Beat Meier (University of Bern, Switzerland)

In three experiments ($N = 112$), we investigated the impact of task switching and response compatibility on subsequent recognition memory. At study, participants had to classify photographs of animals and easy-to-name objects according to size or to animacy in a AABB task order. As the same set of response keys was used for both tasks, for half of the stimuli the responses for the two tasks were the same (i.e., compatible) and for the other half they were not (i.e., incompatible). At test, which occurred either after a short delay (Experiment 1), after one week (Experiment 2) or, using a within-subject design, at both time points (Experiment 3), participants completed a surprise recognition test. The results of the immediate tests revealed that memory was consistently lower for switch compared to repeat stimuli, while response compatibility did not affect memory performance. In contrast, after one week, the effect of task switching disappeared, but memory performance for incompatible stimuli was significantly lower than for compatible stimuli. Thus, the immediate test depended on the encoding context: in switch trials, attention was drawn away from encoding by task requirements resulting in impaired memory performance. In contrast, consolidation before the delayed test weakened the effect of the encoding context but increased interference due to response incompatibility. Together, the results demonstrate that task switching and response incompatibility impair memory performance differently across different delays.

LACK OF OCULOMOTOR DOMINANCE WHILE SWITCHING AMONG EFFECTOR SYSTEMS?

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Iring Koch (RWTH Aachen University, Germany)
Lynn Huestegge (University of Würzburg, Germany)

In the task switching paradigm, where participants switch between two tasks in a sequence of trials, performance is typically worse in task alternation trials than in task repetition trials. These switch costs are often distributed asymmetrically between tasks, which is usually explained by referring to processes related to task set configuration or inhibitory mechanisms. Previous studies indicated that effector systems associated with two tasks may be considered an integral component for defining a task set. Here, we systematically compared switch costs when combining tasks that differ in their associated effector systems. In Experiment 1, 16 participants switched (in unpredictable sequence) between oculomotor and vocal tasks. In Experiment 2, 72 participants switched among oculomotor, vocal, and manual tasks (in pairwise combinations). Interestingly, the results did not consistently reflect a prioritization of the oculomotor task in task switching. This observation appears to be at odds with previous observations of oculomotor dominance in dual-task paradigms which require two simultaneous actions in different effector systems. Overall, the results demonstrate the importance of temporally overlapping action demands for observing typical effector-based prioritization effects. Implications for the role of effector systems in task set configuration and inhibitory mechanisms in task switching will be discussed.

TASK ORGANIZATION IN MULTITASKING – IMPACT OF LOWERED BETWEEN-TASK RESOURCE COMPETITION ON THE EFFICIENCY OF RESPONSE STRATEGIES IN FREE CONCURRENT DUAL-TASKING

Jovita Brüning, Marie Mückstein, Dietrich Manzey
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Recent considerations of task coordination strategies in multitasking revealed that individuals prefer blocking, switching or response grouping strategies to organize their responses in a free concurrent dual-tasking (FCDT) paradigm. In this study, we investigated to what extent such response strategies and their efficiency are influenced by a low vs. high resource competition between two concurrently performed tasks in FCDT. Taking Wickens' multiple resource theory into account, we designed four simple cognitive tasks requiring different central processing and response types. In a condition of low resource competition, the dual-task included one task involving spatial processing and manual responses, whereas the second task involved verbal processing and vocal responses. In a condition of high resource competition, both tasks involved spatial processing and manual responses. In the low compared to the high resource competition condition the access to different resource types enhances the overall scope of available resources considerably, which should facilitate the efficiency of switching and response grouping strategies. Data of 47 participants showed no differences between all strategies of response organization in case of high resource competition between both tasks. However, clear efficiency advantages of switching and response grouping compared to blocking were observed if resource competition was low. Furthermore, participants preferring a switching strategy of response organization increased their switch rates or even changed to a strategy of response grouping in case of low compared to high resource competition. The study, thus, provides evidence for an interesting interplay between the efficiency of individually chosen response organization strategies and task characteristics.

EFFECTS OF POSTURAL CONTROL IN MULTITASKING

Erik Friedgen, Iring Koch, Denise Nadine Stephan
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The influence of postural control was examined in a task-switching paradigm in three postural conditions: standing, sitting, and lying. The respective tasks employed in the two experiments (with 48 participants each) were auditory variations of commonly used task-switching setups, the Stroop task and the Meiran paradigm, two tasks that show robust congruency effects: A congruent stimulus requiring the same response in both tasks will lead to faster and more accurate responses than an incongruent one to which a subject must respond differently depending on the task. Based on the strong evidence that postural control requires attention, shielding of the irrelevant task set should be facilitated by lower postural control demands, while higher ones should detract more strongly from attentional resources. Hence, congruency effects were expected to be largest while standing, medium while sitting, and smallest while lying. However, the results revealed a different pattern, with performance in the lying condition being worse than in the other two, and no significant differences between sitting and standing. This suggests that either, there may not be any advantages for cognitive performance arising from reduced postural requirements while lying, or that any potentially existing advantages might be outweighed by other factors specific to lying, such as physiological changes in arousal.

RESOURCE DISTRIBUTION IN CROSS-MODAL ACTION – CHALLENGING THE VIEW OF SEPARATE RESOURCE POOLS FOR EFFECTOR SYSTEMS IN MULTITASKING

Aleks Pieczykolan
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Lynn Huestegge
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Executing two simultaneous responses usually yields performance costs in form of longer response times compared to single responses. While several theoretical frameworks explain these multitasking costs by assuming limited cognitive resources, multiple-resources theory particularly focuses on the role of effector systems for resource distribution between responses, according to which different effector systems draw on separate resource pools. Therefore, resource distribution between responses involving different response modalities should cause less interference (i.e., fewer multitasking costs) than between responses involving the same modality (Wickens, 2002). We tested this prediction by contrasting performance of the same (right) manual response in two different dual-response conditions: In the intra-modal condition the context response consisted of a (left) manual response, while in the cross-modal condition the context response consisted of an oculomotor response (Experiment 1) or a vocal response (Experiment 2). Surprisingly, manual costs were larger in cross-modal conditions than in intra-modal conditions in both experiments, a finding that contradicts the assumption of separate resource pools for effector systems. Additionally, the total amount of dual-response costs (i.e., the sum of manual and context-response costs) was larger in cross-modal conditions, indicating that the increase of manual costs in cross-modal compared to intra-modal conditions was not compensated for by a cost decrease for the context response. The present results suggest that stronger dual-response interference is not the result of drawing on common effector-system resource pools. Instead, selection or activation of effector systems appears to require additional cognitive resources, eventually rendering cross-modal dual-actions cognitively more demanding.

DECISION-MAKING 1 (INDIVIDUAL TALKS)

BELIEF-BASED ASSESSMENT OF THE RELIABILITY OF SOURCES – LIGHT AT THE END OF THE TUNNEL?

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Ulrike Hahn
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The reliability of sources is normally not an a priori given but rather must be learned. In communication, reading, and witness reports, we are often not provided with a criterion of ultimate truth at a later point. Alternative belief-based models of updating subjective reliability (trust) have been proposed. Using agent-based modelling (ABM), we investigate the accuracy of belief-based models of sequentially updating both beliefs about H and trust, based on reports and current beliefs. We investigate the influential Bayesian model by Eric Olsson (2011, 2013) that explicitly represents anti-reliability. We point out that it is a naïve Bayesian model only, for instance, since it does not account for interactions between sources. We explore the conditions under which this 'Bayesian heuristic' truly yields adequacy-improvements over non-communicators or non-trust-updaters. First we sketch quite disastrous results (e.g., Hahn, Merdes, & Sydow, 2018; Hahn, Sydow, & Merdes, 2019). Second, results on situations with prior knowledge are somewhat more positive but remain mixed. The third, new results – our focus here – document the change over time of average accuracy. Trust-updaters appear to have some advantages over fixed-trust agents in the short run but not in the long run (or in the limit). In conclusion, our initial results show that belief-based updating of trust is problematic, but more recent results may be interpreted as "light at the end of the tunnel." However, the utility of the detected speed-effects now depends crucially on auxiliary assumptions.

IMPROVING CHILDREN'S UNDERSTANDING OF HOW SUBSTANCES MIX THROUGH TASTE EXPERIENCE AND ANALOGY

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Many properties of substances/materials are intensive, and children have difficulties reasoning about intensive quantities. Here we reconsidered children's understanding of sweetness when sugar dissolves in water. We used an IIT approach, eliciting ratings of sweetness for factorial combinations of sugar and water amounts (3 x 3 design), expecting that, as in other domains, this would allow children (N=139, age 5 to adult) to display early intuitions missed by standard choice methods. Improvements, however, were small, in particular, 5- and 7-year-olds still typically ignored the diluting effect of water, despite additional support during instruction/practice (causal experience of mixing coloured sugar and water, with visual feedback of how water dilutes concentration). These results appear to confirm that understanding of intensive properties is intrinsically difficult for children. However, in everyday life visual information often misinforms about dilution, e.g., diluted orange juice looks unchanged, but tastes very different, which may lead to children ignoring visual information. Accordingly, in Experiment 2 (68 5- to 7-year-olds), children mixed, then tasted the mixtures on 4 initial trials. In Experiment 3, 28 7-year-olds initially mixed 4 coloured bead mixtures -- children typically treat visual concentration feedback in discrete object mixtures as accurate -- and were told that the sugar-water was doing something similar. Both interventions produced significant dilution effects for sugar-water mixtures, maintained in follow-up sessions, up to 14 weeks later. Children's difficulties do not reflect cognitive-developmental limitations, but may reflect that everyday experience of concentration/dilution affects the chemical senses in ways that diverge from visual information.

UNIT FAMILIARITY LEADS TO HIGHER SENSITIVITY TO ATTRIBUTE DIFFERENCES: AN APPLICATION TO ATTRIBUTE TRANSLATION OF CAR CONSUMPTION

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The CO₂ emissions of mobility and transportation continue to increase and constitute a major challenge on the way to reaching climate change goals. Nevertheless, consumers are reluctant to adopt new technology, such as electric vehicles (EVs). We argue that this could partially be due to the lack of a common metric to compare levels of consumption across technologies (liter / 100km vs. kWh / 100km). Data from two experiments suggest that the use of the less familiar unit of kWh reduces consumers' sensitivity to differences in consumption and perceived environmental image when making comparisons between cars. Additionally, we find some evidence for an "environmental bonus" accorded to cars displayed in terms of kWh, which might be due to associations relating the unit with sustainability. We provide converging empirical evidence from car drivers and a student sample to support our findings. Additionally, we identify fluency with a given unit of measurement as an important driver of the effects. This claim is supported by data from an additional condition where participants were presented with gallons / 100 km which did not differ from the results found in the kWh condition. Although there is substantial variation in the numerosity of units (gallons < liter < kWh), we do not find that this has an impact on the perception of differences in consumption. Our findings translate into specific recommendation on how to display the consumption of EVs in order to make their fuel efficiency more salient to the consumer and therefore increase preference.

EXPLAINING AWAY: PROBABILITY INTERPRETATIONS AND DIAGNOSTIC REASONING

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Explaining away is a pattern of inference that occurs in situations where independent causes compete to account for an effect. Despite being widely addressed in the literature of causal reasoning, the phenomenon of explaining away remains highly elusive. Majority of empirical studies have found that people ‘insufficiently’ explain away. Several potential explanations of this insufficiency have been put forward thus far. At present, we explore the novel possibility that it may be driven by (i) differential interpretations of probabilities and (ii) an erroneous diagnostic reasoning strategy. In particular, we test for the possibility that some people interpret probabilities as propensities, leading to a lack of probability updating and insufficient explaining away behaviour. Also, we test a ‘diagnostic split’ hypothesis, which predicts that in diagnostic reasoning, people erroneously split the probability space between the two causes, leading to inaccurate explaining away. We empirically tested ($N = 453$) in a 3x3 between-subject design these hypotheses by varying (i) the characteristics of scenarios and (ii) prior probabilities of the causes, in an online inference task. Results suggested an overall insufficiency of explaining away. In one large cluster participants did not update their estimates of the causes throughout the task. The proportion of these participants in the sample varied between conditions, which is in accordance with the propensity hypothesis. In another large participants’ diagnostic reasoning responses partially suggested they utilised a specific strategy that fit the diagnostic split hypothesis. Further results are discussed, as well as their implications in relation to the previous literature.

DECISION MAKING BASED ON PSEUDOCONTINGENCIES – A MATTER OF INFORMATION SAMPLING

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In a trivariate decision scenario, with two contexts, two options, and two outcomes, decisions should depend on the probability of a positive outcome. However, statistically inappropriate information, i.e. skewed base rates of options and outcomes varying across contexts, may determine choice in terms of a pseudocontingency. While past research has investigated the effect of pseudocontingencies overriding true contingencies by presenting predetermined learning trials, the current project aims at the effects of self-determined information sampling on pseudocontingency inference and choice. In a series of three experiments ($N_1 = 126$, $N_2 = 76$, $N_3 = 76$), we compared predetermined learning to learning from free information sampling. Across the three experiments we manipulated whether participants in the information sampling condition were allowed to select the option, the context, or both for each learning trial. Furthermore, we tested whether pseudocontingencies are still inferred when engaging in self-determined information sampling during learning. The results revealed the inference of pseudocontingencies in a trivariate scenario, even if it led to mistakenly preferring the actually inferior option in a decision phase. When information sampling was self-determined during learning, the choice patterns indicated a preference for the option that was sampled more frequently within a context.

HUMAN-AUTOMATION INTERACTION IN A SIMULATED CABIN BAGGAGE SCREENING TASK WITH AUTOMATED EXPLOSIVE DETECTION

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This study investigated human-automation interaction with explosive detection systems during cabin baggage screening as a diagnostic aid. We tested three practically relevant EDSCB scenarios that varied systematically in automation reliability. EDSCB should increase human-machine system performance for detecting explosive threats. A diagnostic aid with many false alarms should result in a cry-wolf effect. The positive predictive value should increase compliance with automation alerts and screeners may use the probability matching strategy when making decisions under uncertainty. We conducted a laboratory experiment with 118 screeners of an international airport where they performed in a simulated screening task. We tested human-machine system performance in four test conditions: no EDSCB as baseline and three EDSCB scenarios differing systematically in the diagnostic aid's d' and PPV. Screeners had to detect improvised explosive devices, bare explosives, guns, or knives. Screeners benefited from automation when the diagnostic aid's reliability was high in terms of d' and PPV. Poor automation PPV resulted in a cry-wolf effect. A high PPV enhanced screeners' compliance with the diagnostic aid. Equivalence tests and confidence ratings suggest that screeners are using the probability matching heuristic when making decisions under uncertainty, i.e. bare explosives. EDSCB increases the detection of explosives when reliability in terms of d' and PPV are high. Furthermore, many false alarms lead to a cry-wolf effect. A high PPV and thus high compliance with automation can compensate for a less reliable diagnostic aid in terms of d' . Operators use a probability matching heuristic when using a diagnostic aid under uncertainty.

POSTER SESSION 1: PERCEPTION AND (WORKING) MEMORY

I FEEL YOU – TACTILE NOTIFICATIONS VIA WEARABLE DEVICES IN THE INDUSTRIAL ENVIRONMENT OF THE FUTURE

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Wearable technology for support of the workers is a widely discussed and investigated topic in today's research and industry. As an interface between human and automation, the advantage of wearable devices, such as smartwatches, lies in the possibility of a location independent, direct worker-machine communication and allows fast as well as personalized notification in case of an important work-related event. Smartwatches provide the options to alert the user via vibration, sound or visual signals. This study contributes to current research by examining, which modality is suitable in an industrial environment. We hypothesized that a combination of modalities is recognized faster and evaluated as more useful than using a single mode. Additionally, compared to other modalities, the vibro-tactile notification can also be recognized faster and is evaluated more useful in an industrial environment with industry noise. In a 3 x 3 factorial within-subject design laboratory experiment, 40 participants conducted a building task and simultaneously received a notification (visual, auditive, or vibro-tactile) in one modality or a combination of the modalities. Response times retrieved from video recordings were analyzed and usability was rated via questionnaire. The results showed that the response time was lower for all combinations of modalities compared to a single modality notification. The latter was evaluated as less useful. Auditive and vibro-tactile notifications were recognized faster and evaluated as more useful. In conclusion, important notifications via wearable devices in an industrial environment should use a combination of modalities and the auditive and vibro-tactile modality should be preferred.

ATTENTIONAL DEMANDS OF POSTURAL STATE TRANSITIONS IN OLDER ADULTS: THE BENEFIT OF PREPARATORY CUES

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Automatic processes for body balance control are susceptible to aging-related functional degradation, which may be compensated for by the deployment of attention. Adapting to a steady-state postural set to changing task requirements may raise the demands for attentional control further. Will a preparatory cue lower the attentional load of transiting between postural steady states? Ten older adults were compared to twelve younger adults in a continuous voluntary swaying task externally paced by a visual cue. Frequency of swaying (0.3/0.5 Hz) and direction (anteroposterior/mediolateral) or a combination of both could change at random time points. The specific type of a transition was either unknown or known by the presentation of a preparatory transition cue. In order to probe the concurrent attentional load, a manual trigger response to an auditory signal was requested randomly before or during a transition. Sway performance measures comprised spatial regularity of Centre-of-Pressure movements during a 4 s transition period. Older adults expressed greater attentional load in terms of longer manual response latencies and showed reduced position variability as well as swaying amplitude during a postural state transition. They benefitted from being able to anticipate a transition, however, specifically when required to speed up from 0.3 to 0.5 Hz. Preparatory cues also made their swaying trajectories resemble a sinusoidal oscillation more closely thereby approaching the performance of the younger adults. Our findings are discussed in the context of the task switching literature with a generalization to postural set switching.

HOW TO LOSE A HAND: THE TEMPORAL STRUCTURE OF DISEMBODIMENT

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Much research has been conducted investigating the embodiment of body-external entities (e.g., a rubber hand). By now, compelling evidence that the self is flexible and can readily be expanded to external corpora has been amounted. In contrast, the fading or disappearance of such recently acquired feelings of embodiment has received little attention. Precisely this process of disembodiment, however, may reveal critical properties of minimal self-identification. In our experiment, participants ($N = 42$) were to embody a moving rubber hand, and we then explored the temporal dynamics of this hand's subsequent disembodiment. Participants first established the moving rubber hand illusion. Then they were exposed to each of three intervention conditions in a complete within-subjects design. They either (a) continued to actively operate the rubber hand, thus maintaining synchronous visuo-tactile feedback (active condition), or (b) passively left their hand in the apparatus, thus receiving no more synchronous visuo-tactile feedback (passive condition), or (c), the rubber hand was struck by a hammer which imposed diverging visual and tactile information (disruption condition). After the intervention, subjective embodiment ratings declined slowly in the passive condition relative to the active condition and showed an abrupt drop following the disruption. Proprioceptive drift estimates also differed between intervention conditions despite similar pre-intervention baselines, but were overall subject to considerable variability. These findings suggest that (dis-)embodiment is driven by mechanisms of multisensory integration which require continuous synchronized input to maintain a recently acquired entity as part of the self.

SOCIAL, PSYCHOLOGICAL AND ENVIRONMENTAL FACTORS INFLUENCING STAIRCASE USE

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We argue that the proper assessment of influencing environmental, social and psychological factors is key in designing and executing successful choice architecture interventions. Staircase use is an ideal field of study to show the advantages of prior assessment since numerous studies exist with different intervention methods, but only a few influencing factors have been considered so far. Our aim was to explore which factors (e.g., fatigue, environmental consciousness) influence people when deciding whether to use the stairs or the elevator. In our survey, we asked 392 university students, as well as 10 researchers of the topic to give as detailed answers as possible about the assumed factors. During the evaluation of the responses, categories of influencing factors were created based on the collected answers and each time a certain type of influencing factor was mentioned, it was registered as a new category. We found 14 categories: Speed, Comfort/Laziness, Health/Sports, Goal height, Fatigue, Physical limitations, Luggage, Claustrophobia, and technical problems, Number of people in the elevator, Elevator availability, Company, Environmental Consciousness, Elevator/Stair placement, and Temperature. In order to adequately measure the explored influencing categories and develop a structure of influencing factors, a questionnaire was created. To explore the common underlying factors behind the different categories and see which items measure the same factors an exploratory factor analysis was conducted. We suggest that for the most effective choice architecture interventions regarding staircase use, these factors should be considered and measured.

MOTOR IMAGERY OF BIMANUAL COORDINATION IN PIANISTS AND NON-MUSICIANS

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It has been observed that bimanual coordination constraints are represented in motor imagery. Further, sometimes, but not always, imagination is more similar to execution in experts than in novices, presumably because experts have more precise internal models of the respective action. We investigated whether better performance in symmetric than in parallel bimanual finger coordination is reflected in motor imagery and whether this differs between pianists and non-musicians. Pianists (N = 20) and non-musicians (N = 20) performed bimanual coordination patterns by repeatedly pressing keys on a keyboard. Six different finger combinations (always consisting of two fingers from each hand) were used. With all finger combinations symmetric and parallel patterns were performed. Finger movements were a) executed with both hands, b) executed with the right hand and imagined with the left hand, and c) imagined with the right and executed with left hand. Inter-response intervals were measured. Results showed that in both, imagination and execution, symmetric patterns were performed significantly faster than parallel patterns and that pianists performed coordination patterns significantly faster than non-musicians. This indicates that that bimanual coordination constraints and performance ability are represented in motor imagery. Data did not indicate that non-musicians are less precise than pianists in their imagination (the respective interactions were not significant). In conclusion, bimanual coordination constraints and performance ability are represented in motor imagery regardless of expertise.

AN INVERSE CORRELATION BETWEEN NEED FOR UNIQUENESS (NfU-G) AND VISUAL AESTHETIC SENSITIVITY (VAST*)

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The present study investigated the need for uniqueness, visual aesthetic sensitivity, and their correlation. To date, no studies concerning this correlation have been conducted. To investigate these variables, we asked 71 participants to complete the German adaptation of the Need for Uniqueness scale (NfU-G) and the Visual Aesthetic Sensitivity Test (VAST)- including the VAST-Revised (VAST-R). The NfU-G measures the need to set oneself apart from others, whereas the VAST(-R) tests the ability to discover the objective aesthetic goodness of a figural composition. The findings of this study are significantly compliant with theoretical considerations: the higher a participant scores on the NfU-G scale, the lower the percentage of correctly identified drawings on the VAST(-R), with the unrevised VAST being a stronger predictor than the VAST-R. Thus, the results suggest that participants who strive for individuality have lower visual aesthetic sensitivity since they tend to violate norms in order to assert their uniqueness. Possible explanations and limitations regarding this outcome are discussed.

PREDICTION EFFECTS IN THE INTERACTION OF SCENE AND OBJECT PROCESSING

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The dissociation or interaction of scene versus object processing is a highly debated topic. There is behavioral and neuropsychological evidence that scene and object processing are dissociated. However, several studies find context effects in object judgement tasks. Following that, it is argued that objects are perceived in terms of their usage, suggesting that objects 'afford' potential actions. In this study, we tested the opposite relation: Do scenes of humans performing actions activate congruent object representations? From a much-used scene stimuli database of complex real-life scenes of humans performing actions with congruent or incongruent objects (e.g. drinking from a bottle vs. from a potato; Mudrik et al. 2010) we cut out the critical objects and used the scenes as primes in an object identification task. We manipulated intactness of the scene (intact/scrambled), and object congruity (scene-congruent/scene-incongruent) within-subject. Priming should occur only between intact scenes and congruent objects. The analysis over all 95 scenes (n=26) did not reveal an interaction between intactness and congruity. As specified in the pre-registration, we relativized the congruity effect (RTintact(incongruent-congruent)) with the baseline RT difference (RTscrambled(incongruent-congruent)), and selected only scenes for which the effect remained with a Wilcoxon rank-sum test. Including only these scenes, we found a significant interaction effect of congruity and intactness, but not in the direction hypothesized. Overall, the results are illuminative for a methodological approach to scene-object processing, and the future use of the scene stimuli database by Mudrik et al. (2010).

SIZE REPRESENTATION IN THE DORSAL SYSTEM SEEMS TO BE LESS NOT MORE ACCURATE THAN SIZE REPRESENTATION IN THE VENTRAL SYSTEM

Frederic Göhringer, Miriam Löhr-Limpens, Thomas Schenk
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Ganel et al. (2012) demonstrated that objects which were perceptually equivalent led to significantly different maximum grip apertures (MGAs). They therefore concluded that the visual information used by the motor system is more accurate than the visual information available to the perceptual system. The direct comparison of the accuracy in the perceptual and visuomotor system is however difficult, given that a dichotomous variable is used for perception and a continuous variable to measure accuracy in the visuomotor task. We addressed this problem by dichotomizing the visuomotor measures based on the signal detection theory. These results ($n = 93$) showed that the visual accuracy based on visuomotor measures is actually inferior to that found in the perceptual discrimination task.

THE AESTHETIC IMPRESSION OF STEREOSCOPIC IMAGES

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In the middle of the 19th century, stereoscopes were a popular entertainment medium and stereo cards elicited strong fascination among viewers all around the globe. However, it remains unclear which factors contribute to the aesthetic appraisal of such stereoscopic image cards. A possible parameter is the amount of binocular disparity in each picture, which influences the subjective impression of depth. Following the idea of processing fluency, disparities that are easier to process may facilitate the formation of a positive aesthetic impression. A sample of $n = 34$ participants judged digitised anaglyph versions of historic stereoscopic image cards on a computer screen according to their aesthetic content in a paired comparison scheme. The stereo cards used were taken from the collection of the Adolf-Würth-Center for History of Psychology. Participants compared different versions of each image with a manipulation of the near point disparity and additionally a single (2D) image version containing no disparity. Furthermore, participants rated the visual comfort of viewing each image on a visual analogue scale and the interpupillary distance (IPD) of each participant was measured. A first analysis revealed that stereoscopic images were in general preferred over their 2D counterparts. In addition, the aesthetic appraisal was higher for smaller values of binocular near-point disparity.

STRUCTURED QUANTITIES LIKE FINGER PATTERNS OR DOTS OF DICE ARE OF RELEVANCE FOR ARITHMETICS

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Silvia Pixner (UMIT The Health & Life Science University, Austria)

Children can differentiate quantities early and almost automatically without any aim to practical differentiate a quantity. The usage of their fingers to show quantities or playing games with dices can be seen as an early arithmetic skill. This research would like to investigate how far structured quantities like finger patterns or dots of dice are rather identified correct and quicker than unstructured quantities. This research also investigates the impact of the association with representation of quantities to the later performance in addition tasks. The sample size of the longitudinal study contains 116 preschoolers (58 boy and 58 girls) and took place at the end of the preschool and in first grade. The structured and unstructured quantities were captured with a computer experiment which measured the correct response rate and the reaction time. The acquiring of the data took place in a single setting. The results showed that structured quantities can be recognized significantly more correct and faster than unsorted quantities. The results also showed that there is a positive correlation between structured quantities (finger patterns & dots of dice) and the later performance in addition tasks. In conclusion the association with structured and unstructured quantities during the time of preschool can be seen as important early arithmetic skills which have an intense effect on following mathematical abilities. Especially the handling of structured quantities is associated with arithmetic competencies in first grade.

FACE ADAPTATION EFFECTS ON LOCAL INFORMATION

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Previously inspected faces can affect the perception of faces seen subsequently. The underlying mechanisms of these face adaptation effects have been considered to be based on sensory adaptation processes. More recent studies however also suggest a high level effect and an adaptation on a rather representational, memory basis. Although research on adaptation effects in faces seems to be well-advanced, it still lacks a systematic analysis of its generalizability to different types of face information since most research have focused on configural (i.e., spatial, mostly 2nd-order relations) information. Here, we investigated the mostly neglected adaptation effects on local face information by employing color alterations, actually saturation and brightness manipulations. Results of our studies indicate adaptation effects. We further investigate and discuss these face adaptation aftereffects in the context of pure color adaptation aftereffects using non-face adaptors.

SIZE MATTERS: VERGENCE MOVEMENTS ARE INFLUENCED BY FAMILIAR SIZE REBEKKA

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Vergence movements are thought to be mainly driven by binocular disparity. However, a number of studies have shown that vergence can be influenced by other depth cues as well as, for example, linear perspective or familiar form. We conducted an experiment to examine whether the depth cue familiar size is used for planning and executing vergence movements. 25 participants (14 female) aged between 19 and 40 years participated. Six different everyday objects were stereoscopically presented one at a time. The distance to the objects as specified by binocular disparity and the distance as specified by familiar size were manipulated. Participants made vergence movements, followed by reaching movements towards the objects. Eye tracking data showed that when familiar size and binocular disparity specified the same distance, participants fairly accurately converged to that distance. When familiar size-specified distance was in conflict with disparity-specified distance, vergence movements largely followed the distance as specified by binocular disparity. However, vergence distance was slightly, but significantly deviated towards the conflicting distance as specified by familiar size. Thus, while vergence is mainly driven by binocular disparity, this is the first experiment to show that familiar size also influences vergence movements - at least to some extent.

THE INFLUENCE OF INTERSTIMULUS-INTERVAL TYPES IN THE RESPONSE TIME-BASED CONCEALED INFORMATION TEST

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The response time (RT)-based Concealed Information Test allows the detection of a detail concealed by the examinee based on slower RTs and lower accuracy rate to this potentially concealed detail compared to other, irrelevant details. In our experiment ($n = 29$; all conditions within-subject), we explored whether the parameters of interstimulus-interval may influence these differences. Specifically, we examined two factors: The length of the interval (100-300 ms vs. 300-800 ms) and the mode of the transition between two stimuli (clear blank screen vs. gradual fading of the first stimulus). We found that neither factor influences the RT differences, and that the length of the interval does not, but the transition mode does significantly influence accuracy rate differences: Gradual fading, as implemented in several previous studies, decreases accuracy rate differences. We conclude that (1) shorter intervals may be preferred because they do not influence the outcome but shorten the duration of the test, and (2) clear, non-gradual transition may be preferred because it provides larger accuracy rate differences, which in turn may be used for the detection of the concealed detail.

ACTIVATION OF TASK REPRESENTATIONS AT THE GLOBAL LEVEL OF DUAL-TASK PROCESSING

Patricia Hirsch, Iring Koch
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According to the task-pair switching logic, at least three tasks (e.g., A, B, C) are combined to task-pairs consisting of two tasks that are performed in a temporal overlap (e.g., task-pair 1: A as Task 1 [T1] and C as Task 2 [T2]; task-pair 2: B as T1 and C as T2). Typically, performance is worse in task-pair switch trials than in task-pair repetition trials, resulting in task-pair switch costs. This cost indicates that the identity of the individual tasks performed in a dual task is jointly represented in a single mental representation, termed task-pair set. To explore when the task-pair set is available during dual-task processing, we combined the task-pair switching logic with a Go/NoGo paradigm and tested 24 subjects. We found comparable task-pair switch costs after Go trials and NoGo trials. This suggests that cues activate the appropriate representation before the subtask-specific task sets are selected. Thus, a task-pair set is not only available after performing a dual-task trial which would indicate that subjects adopted an episodic representation of the specific task-pair of the previous trial.

LEARNING OF ACROSS-TASK-CONTINGENCIES MODULATES PARTIAL REPETITION COSTS IN DUAL-TASKING

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Robert Gaschler (University of Hagen, Germany)
Eva Röttger (University of Cologne, Germany)

Numerous studies investigated dual-task performance and found reaction time costs whenever only one of the task stimuli is repeated from trial t-1 to trial t. These partial repetition costs might occur due to unsuccessful across-task predictions when there is no knowledge about any reliable contingency between the two tasks. Yet, the empirical support for this across-task prediction is rather sparse. Here, we tested whether learning of built-in across-task contingencies could modulate the partial repetition costs. The underlying assumption was that across-task contingencies can substitute t-1-based predictions and by this reduce the partial repetition costs. The study consisted of a dual-task paradigm concurrently presenting a visual-manual and an auditory-vocal task. In the former task, participants had to respond to the location of a cross presented at one of three positions on a screen. In the latter, they had to vocally respond to a randomly presented high or low pitched tone. Across-task contingency was manipulated within-participants by pairing the position either consistently (contingency condition) or randomly (random condition) with one respective tone. We tested a sample of N=30 who completed six dual-task blocks in one single session. The results showed significant learning of the across-task contingencies and a decrease of partial repetition costs with time. These findings support the assumption that in dual-task settings learning of built-in across-task contingencies can substitute t1-based predictions or binding effects. This is in accord with the work on the dissociation between binding effects and learning in single tasking (i.e. Moeller & Frings, 2017).

GRASPING AND PERCEPTION ARE BOTH AFFECTED BY IRRELEVANT INFORMATION AND SECONDARY TASKS

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Constanze Hesse (University of Aberdeen, UK)

Goodale & Milner (1992) proposed a model assuming functionally independent and encapsulated processing of visual information for action and perception, called the Perception-Action Model (PAM). The PAM assumes that visual input for action is processed in an automatized as well as analytic fashion, rendering visuomotor behaviour immune to perceptual interferences or dual-task costs. In the present study, we investigate the Garner Interference (GI) effect under dual- and single-task conditions employing a perceptual button-press task as well as grasping. GI arises when stimuli are classified along a relevant dimension (e.g., their length), while another irrelevant dimension (e.g., their width) has to be neglected. Here, participants were presented with differently sized rectangular objects and either grasped them ($N = 24$) or classified them as long or short ($N = 24$). We found classical GI effects in perception as reflected in prolonged reaction times when variations occurred also in the irrelevant object dimension. While reaction times in grasping were not susceptible to GI, effects were observed in several measures for grasping accuracy (worse adjustment of grip aperture to object size, prolonged adjustment times, and increased variability of the maximum grip aperture in conditions where irrelevant object dimensions varied). Furthermore, dual-task costs occurred in perceptual as well as in action tasks. In summary, our findings undermine the assumption of automaticity in visuomotor behaviour as proposed by the PAM.

INVESTIGATING THE IMPACT OF VISUAL AND AUDITIVE TASK ENVIRONMENTS ON COGNITIVE LOAD BIOMARKERS

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The purpose of this study is to design and validate a robust paradigm capable of identifying granular levels of cognitive load. This paradigm will be used to identify optimal levels of cognitive load in industrial work environments to avoid overload and underload of workers. As a first step to achieve this end, the current study examines whether visual and auditory stimuli influence cognitive load markers differently. A classic cognitive load paradigm is adapted to investigate whether pupil size and other biomarkers of cognitive load such as heartrate and skin conductance depend on presentation modality. A 2x2x5 Within-subjects design is employed, which induces cognitive load by presenting participants with strings of numbers or German pseudowords one digit or letter at a time, with string length ranging from 4-8. Auditory stimuli are presented as sounds generated by text-to-speech software. Visual stimuli are presented in black font on a grey background. The pseudowords are adapted in part from prior research (Klatte et al., 2017) and partly generated using the Wuggy software, version 0.2.0b2 (Keuleers & Brysbaert, 2010). We expect to replicate classic results in cognitive load research such as an increase in load biomarker values and pupil size due to increased word/string length (Baddeley & Hitch, 1974) but expect no significant differences between the auditory and visual presentation modes under the assumption that task difficulty is comparable in a within-subjects design. First results of this ongoing research will be presented and discussed.

THE ROLE OF SEMANTIC PROCESSING AND RESPONSE LATENCY IN THE SNARC EFFECT

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Relatively small numbers elicit faster left-sided responses and large numbers faster right-sided responses. This Spatial-Numerical Association of Response Codes (SNARC) effect has been traditionally ascribed to the spatial organization of the mental number line (MNL). The MNL is a semantic representation in which numbers are horizontally organized from left (small numbers) to right (large numbers). According to the MNL account, a congruent mapping (small numbers and left-sided responses) generates faster RTs compared to an incongruent mapping (small numbers and right-sided responses), and vice versa for large numbers. This study aimed to test whether, as predicted by the MNL account, the amount of semantic processing required by a task affects the strength of the SNARC effect. Thirty-two participants (22 female; mean age (SD) = 26.7 (4.4)) performed two tasks requiring semantic processing (magnitude classification task and parity judgement task) and two tasks requiring the processing of non-semantic features of the number (phoneme detection task and colour judgement task). According to the MNL account, a stronger SNARC effect should be expected for the semantic tasks compared to the non-semantic tasks. Results showed that the SNARC effect was not modulated by the amount of semantic processing, but was proportional to response latency (RTs). The results provide evidence against the idea that deeper semantic processing generates a stronger SNARC effect, as predicted by the MNL account, and in favour of alternative accounts (dual-route model, working memory account).

CONFLICT ADAPTATION EFFECT ON N - 4 UNDER DUAL-TASKING

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According to the conflict-monitoring model (cf. Mayr, Awh & Laurey, 2003), conflict-adaptation effect can be observed by looking at the congruency effect on the previous trial (trial $n - 1$). Two experiments ($N1 = 20$; $N2 = 26$) using a four-choice serial reaction time task (SRTT) accompanied by a random two-choice RT task investigated whether the conflict adaptation effect can be observed in $n - 4$ under dual-tasking. Under the dual task sequence learning setup, we observed the conflict-adaptation effect on the current trial, which are analogous to the last fourth trial $n - 4$. CC (was congruent - is congruent) was the fastest compared to CI (was congruent - was incongruent), IC and II. It suggests that the conflict on trial $n - 4$ tighten the cognitive control, and can reduce the susceptibility to conflict on trial n . As only congruency-level repetitions trigger the quick responses, it also suggests that SRTT and the two-choice RT task can be integrated.

“HOW CAN I NOT REMEMBER FIVE COLOURS? THAT MAKES ME ANGRY!” – EMOTIONAL EXPERIENCES DURING A VISUAL WORKING MEMORY TASK

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Previous research has demonstrated that emotions, which are induced prior to a visual working memory (VWM) task, can lead to individual differences in VWM performance (e.g. Spachtholz et al., 2014). In a qualitative study, we explored whether the VWM task itself evokes emotions. Specifically, we hypothesised that VWM tasks are viewed as competence-relevant activities, in which one can either fail or succeed (Pekrun et al., 2007), that lead to participants experiencing different achievement emotions. Nineteen participants performed a colour wheel VWM task on which they received no feedback. The task was divided into one practice block and two test blocks. During the last test block of the task participants were required to think aloud, that is verbalise any thoughts and feelings they were having during the task. Qualitative content analysis revealed that participants experienced an array of different achievement emotions, such as anger towards subjective task failure, indicating that participants appraised the VWM task as a performance situation. Further analysis revealed that some participants experienced epistemic emotions, such as frustration about the lack of cognitive skill enhancement during the task. These participants appraised the VWM task as an opportunity for gaining new insights rather than a success vs. failure activity. We conclude that performing a VWM task in itself induces different emotional experiences in participants, which stem from participants' appraisal of the task situation. This task intrinsic emotion induction may need to be controlled for in future VWM research, as it may lead to individual differences in VWM performance.

VISUAL SEARCH IN X-RAYED HAND LUGGAGE NOT HARMED BY WORKING MEMORY LOAD

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Airport security checking x-rayed hand luggage need to keep information about prior items in mind while searching for potentially dangerous equipment. The difficulty of finding a second target has been studied in work on the subsequent search misses effect (SSM; Adamo, Cain & Mitroff, 2013). One theory (resource depletion account) suggests that the target found first is stored in working memory and this is what compromises finding the second target. This suggests that even keeping in mind the identity and position of an unrelated (not dangerous) item should harm visual search. However, no general load effect on search time and accuracy was obtained in the current eye tracking experiment with N=20 participants. Thus, content specific processes (rather than general resources) seem to account for the SSM.

DIFFICULTY: HARD! WHAT WE CAN LEARN FROM TRIPLE-TASKS

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In most cases, multitasking research focus on interference between two (simultaneous) tasks. But evidence from dual-task performance with and without practice is always restricted to “only” two tasks. Furthermore, a single cognitive models can still not clear each aspect in research. Thus, we introduce a triple-task which is built upon an established simple dual-task from Schumacher and colleagues (2001). 30 participants (Mage= 22.2) from Bundeswehr University München were trained in up to 18 sessions in single-, dual, and triple-tasks, whereas trained and untrained participants were compared at different training sections. The triple-task consisted of one auditory-vocal (voice) and two visual-manual (hand and foot) two-choice tasks. After dual-task training, participants showed significant faster RTs and could eliminate dual-task-costs. In triple-task training, trained participants got worse in RTs but were still faster than untrained participants. Thus, participants didn't accomplish the RT level reached after dual-task training in trained modalities. Furthermore, the expected bottleneck in motor stage was still there after training. Our results indicated that training in dual-task causes strong stimulus-response bindings which are also beneficial for triple-tasks. Our results fit into Wickens et. al's (1982) multiple resource theory and are discussed within this context.

DISRUPTION OF SPATIAL WORKING MEMORY PERFORMANCE DEPENDS ON THE FRACTION OF MOTOR RE-PLANNING

Christoph Schütz, Thomas Schack (Bielefeld University, Germany)

In a sequential motor task, we reuse and modify the previous motor plan to reduce the cognitive cost of planning. This results in a persistence to the previous posture (hysteresis), which is a proxy for the fraction of motor re-planning (FoMR). Motor re-planning has been shown to interfere with spatial memory tasks, as motor and memory tasks seem to share common WM resources. We asked whether disruption of spatial memory performance would depend on the FoMR. Twenty-eight participants (12 male, mean age 23.8 years, right-handed) executed a sequential drawer opening task with a concurrent spatial memory task (memorise one symbol per drawer in a 4x4 matrix). Nine drawers were opened either in an ordered (a/descending) or a randomised sequence. The FoMR in the randomised task (98.0%) was significantly higher than in the ordered task (80.0%), $t(27) = 5.967$, $p < .001$. Accordingly, spatial recall performance in the randomised task (32.9%) was significantly worse than in the ordered task (35.8%), $t(27) = 2.203$, $p = .036$. The results confirm previous findings that (A) motor plans are partially reused in ordered tasks and that (B) the FoMR in randomised tasks is higher than in ordered tasks. More importantly, our findings imply that a higher FoMR takes up a larger fraction of the available resources in spatial working memory.

THE INTER-RELATION OF PROCESSING AND STORAGE IN WORKING MEMORY CANNOT BE EXPLAINED BY COGNITIVE LOAD

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Current theories of working memory (WM) such as the Time-Based-Resource-Sharing-Model (Barrouillet & Camos, 2007) assume that the storage and processing (e.g. updating) of memory items in WM are inter-related processes. Specifically, the TBRS-Model assumes that both maintenance of memory items and concurrent processing rely on the same attentional resource, which can only be utilized consecutively. This inter-relation is specified by cognitive load (CL), the ratio of specific task time t -alpha to total time T of a task. Thus, if CL is held constant, there should be no main effect of additional processing steps and no interactions between memory demands. Memory items shouldn't suffer from temporal decay, because there is sufficient freetime for attentional refreshing. To test this hypothesis, we conducted an experiment with $N = 39$ subjects who had to memorize 3 to 7 letters with concurrent working memory updating at a constant CL. We found decreasing accuracies (ACC) and increasing reaction times (RT) for additional processing steps and significant interactions on both measures. To validate the results, we estimated parameters of a Drift-Diffusion-Model (DDM). The most parsimonious model only varied the drift parameter v . According to the results on ACC and RT, there was a significant decrease of drift-rates v for additional processing steps and memory load. We conclude that CL suggested by the TBRS-Model does not describe the interaction between processing and storage sufficiently.

REDUCED $n - 2$ REPETITION COSTS BY INCLUSION OF TASK REPETITIONS ARE DUE TO INCREASED TASK SHIELDING

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Previous research has shown that $n - 2$ repetition costs, a marker of inhibitory processes in task switching, are reduced when task repetitions are present. The present study aimed at further investigating processes underlying this interaction. For this purpose, two task switching experiments were conducted in which task repetition proportion was varied for each task separately. In the first experiment ($n = 44$), the overall amount of task repetitions was held constant while task-specific proportions varied between two groups. Results showed that repetition proportion had a larger effect when specific proportions were easy to detect. Therefore, it seems to be the specific and not the overall repetition proportion that affects $n - 2$ repetition costs. To examine the hypothesis that this effect is due to differences in task specific preparation, the cue-target interval was varied block-wise in the second experiment ($n = 30$). However, this factor had no influence on $n - 2$ repetition costs. Instead, additional combined analyses of both experiments revealed an influence of stimulus congruency: $n - 2$ repetition costs were highest when repetitions were precluded and the task stimulus was incongruent, whereas no effect of stimulus congruency on $n - 2$ repetition costs was observed with tasks that possibly repeated. This result is interpreted in terms of task shielding which is reduced for tasks without repetitions, making these tasks more vulnerable to crosstalk from competing tasks when they are still in an inhibited state.

INVESTIGATING PAIRED-WORD RECOGNITION: A COMPARISON OF CONTINUOUS AND DISCRETE-STATE MODELS

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In a typical recognition-memory task, individuals learn a list of words and, subsequently, have to categorize test items as previously studied or not. Past research has shown that performance decreases in a setting in which people have to classify two words at the same time. However, the source of this performance difference remains uncertain. In the present study, we investigate this research question using two different model classes: threshold models (Snodgrass & Corwin, 1988) and a version of general recognition theory (GRT; Ashby & Soto, 2015), a multidimensional signal detection theory. We tested 80 participants in a recognition task, presenting both trials with single words and trials with paired words in the recognition test. Behaviourally, we replicated the previous findings and found that both model classes allocate an overall performance difference between single and paired-words to processes of detection and discrimination based on memory evidence. More important, dependencies in recognition decisions observed for paired words are allocated to different sources. According to GRT, the dependencies are attributed to a process influencing the familiarity of the item and thereby to the structure of memory evidence. In contrast, an extended version of the two-high thresholds model locates the dependencies in guessing processes. A final comparison between these models and the results of a validation study ($N = 80$) will be presented.

WAKEFUL RESTING AND MEMORY RETENTION: TESTING INDIVIDUAL DIFFERENCES IN CHILDREN AGED 13-14 YEARS

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Evidence exists that a brief period of wakeful rest after encoding verbal information supports the retention of newly acquired information over shorter and longer temporal intervals, while interference induced through task-related cognition has detrimental memory effects. Less is known about this so-called resting effect in children and whether individual differences in the impact of a brief period of wakeful rest exists. In the present study, children encoded a list of words, immediately recalled the word list, and wakefully rested for 10 minutes. Next, children encoded another list of words, recalled the word list, and solved visuospatial problems for 10 minutes. After 7 days, a not instructed free recall test for both word lists took place. For the analysis of individual differences, we calculated a mean immediate memory score and classified children as high, middle or low memory performers. Our results showed that over a period of 7 days only low memory performers retained significantly more words in the wakeful rest compared to the problem-solving condition. No differences in the retention scores between the two conditions were found in high and middle memory performers. These results suggest that labile memory representations in children with a low immediate memory performance profit from a brief period of wakeful rest.

REVISITING THE PRIORITIZATION OF EMOTIONAL INFORMATION IN ICONIC MEMORY: A PRE-REGISTERED REPLICATION STUDY

Alexandra Clausen (TU Darmstadt, Germany)
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It has been reported that the read-out of information from iconic memory depends on the emotional significance, with enhanced availability of negative stimuli (Kuhbandner, Spitzer, & Pekrun, 2011). In this replication study (N = 50), we investigated the effect of emotional valence on recall from iconic memory in terms of both the initial availability of information in the iconic memory and the subsequent decay of information. The task, stimuli and experimental design were close to the original study measuring recall from iconic memory as a function of (a) the valence of the target stimulus and (b) the valence of the distractor stimuli (with a neutral target). We found reliable evidence for enhanced initial availability of negative stimuli in iconic memory. In contrast to the original study, read-out from iconic memory was enhanced also for positive targets, as compared to neutral targets. In addition, there was some indication of slower decay for negative information, as compared to both neutral and positive targets. Moreover, emotional distractors of either valence interfered with the read-out of neutral targets. Taken together, the results are consistent with the assumption that both the initial availability and the decay of information in iconic memory are susceptible to emotional semantics.

BENEFITS OF MEMORY OFFLOADING FOR SUBSEQUENT COGNITIVE PERFORMANCE

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Tobias Tempel (Ludwigsburg University of Education, Germany)

Using digital devices as our external memory store helps us to deal with the huge amount of information surrounding us at our workplace and at home. Temporarily irrelevant information can be saved and stored on our computer or smartphone and can be accessed at any time, whenever getting relevant again. Storm and Stone (2015) could show that such memory offloading can be beneficial for subsequent memory performance, in a way that saving already encoded items can enhance recall of items encoded after the saving. We examined whether this benefit effect can be generalized to unrelated arithmetic tasks ($N = 96$). After having learned a first list of words, participants could either offload this list or not. Afterwards they had to solve blocks of arithmetic problems, before and after learning a second list of words. Results showed that participants solved significantly more arithmetic problems after offloading the first word list, compared to trials without offloading possibility. Besides they recalled more words of the second lists in save trials than in no-save trials. In conclusion we did not only replicate saving-enhanced memory but found saving-enhanced performance for unrelated arithmetic tasks. Saving of recently encoded items entailed a general benefit on subsequent cognitive performance, beyond encoding and retrieving word lists. We assume that offloading freed working memory from the need to rehearse and maintain offloaded items. Gained working memory capacity then can be used for subsequent tasks with high cognitive demands.

THE UNEQUAL VARIANCE SIGNAL-DETECTION MODEL OF RECOGNITION MEMORY: INVESTIGATING THE ENCODING VARIABILITY HYPOTHESIS

Rory Spanton, Christopher Berry (University of Plymouth, UK)

Despite the unequal variance signal-detection (UVSD) model's prominence as a model of recognition memory, a psychological explanation for the unequal variance assumption has yet to be established. According to the encoding variability hypothesis, old item memory strength variance (σ_o) is greater than that of new items because items are incremented by variable, rather than fixed, amounts of memory strength at encoding. Conditions that increase encoding variability should therefore result in greater estimates of σ_o . We conducted two experiments to test this prediction ($N = 40$ in each). In Experiment 1, encoding variability was manipulated by presenting items for a fixed or variable duration (sampled from a normal distribution) at study. In Experiment 2, we used an attentional manipulation whereby participants studied items while performing an auditory one-back task in which distractors were presented at fixed or variable intervals. No evidence for the encoding variability hypothesis was found in either experiment; estimates of σ_o were not greater in any of the conditions designed to increase encoding variability. In contrast, estimates of σ_o were greater in the fixed than variable condition in Experiment 2, which seems at odds with the hypothesis. Our results suggest that study duration and attention are not suitable proxies for encoding variability, highlighting the issues in testing the hypothesis. Instead, old item variance tended to be linked to overall memory strength in each experiment.

POSTER SESSION 2: EMOTION, AGENCY, AND LEARNING

EMOTION RECOGNITION IN MULTIPLE PERSONS SITUATION

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During communication, we perceive and express emotional information through many different channels in an interpersonal situation. Although historically the human emotion expression studied on faces without social context. In recent study we investigated the emotion recognition process with multiple persons visual scenes. Our aim was to examine how the partner's whole body expression as social context influences the way of perceiving a person's facial expression. In the experiments participants (N=40) saw either body dyads facing each other (seemingly interacting) and nonfacing body dyads (noninteracting) expressing the same or different emotion. Participants were required to categorize facial expressions. Results indicate the recognition of facial expression was influenced by the partner's bodily expression, when the subjects saw the scene where actors facing each others, recognised faster and more accurately the emotions comparing to the noninteracting condition. A significant interaction was also found between facial expressions and the emotional content of bodily expression, showing a response advantage for facial expressions accompanied by congruent (same) bodily expression. Taken together, the findings illustrate the importance of emotional whole-body expression as contextual information in communication process.

THE PAST IS IN THE PAST BUT THE FUTURE IS BRIGHT: ASSOCIATING POSITIVE AFFECTS WITH THE FUTURE AND NEGATIVE AFFECTS WITH THE PAST

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Based on the assumption of a multi-conceptual association of the abstract concept of time, the present study examines if time is associated with other concepts, apart from the concrete concept of space. The study follows the assumption that affects are an important source of experience that can also structure the concept of time, similar to sensory-motor spatial experiences. The Implicit Association Test was used to examine the direct association of time and affect. The participants were asked to allocate affect-related (i.e., happy, sad) and time-related words (i.e., tomorrow, yesterday) to affective categories (positive vs. negative), time-related categories (future vs. past) and to categories combining the two afore-mentioned categories (compatible: future-positive and past-negative vs. incompatible: future-negative and past-positive). It was assumed that the categorisation is easier within the compatible combination of categories than within the incompatible combination. Accordingly, the participants allocated words to the combinations future-positive and past-negative more quickly than to the combinations future-negative and past-positive. Specifically, the results indicate an association of time and affect; the future is associated with positive and the past with negative affect. This association is in line with former findings, showing that people tend to positively view and idealise the future and to avoid negative thoughts about the future.

LEARNING DEFICITS IN PSYCHOPATHIC INDIVIDUALS: A PROBLEM OF ATTENTIONAL FOCUS OR EMOTION PROCESSING?

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Hedwig Eisenbarth (Victoria University of Wellington, New Zealand)

Psychopathic personality (PP) is characterized by a deficit in learning from negative experiences and by low emotional reactivity. Two theoretical accounts aim to explain these impairments: One assumption is that high PP is associated with a specific deficiency in emotion processing. The other explanation assumes a more general attentional deficit leading to neglecting non-goal-relevant information. To differentiate these two assumptions, we manipulated the focus of attention by asking participants (N=400) to either rate the emotional value or the age of the persons shown in a set of 80 different scenes. Second, we manipulated whether the attended or the non-attended dimension (emotion or age) predicted a subsequent stimulus category (object or animal) shown after each scene. Furthermore, we manipulated whether participants were instructed to search for a relation between the scenes and the subsequent stimulus category or whether no specific information about any relation was given (explicit vs. implicit learning situation). Psychopathic personality was assessed with the PPI-R-40. The results show an emotion processing deficit under implicit learning conditions: Associations between age and subsequent stimuli were learned by individuals high on PP when age was the attended dimension. This learning effect was not found for high PP individuals when the emotional value was the attended and predictive dimension. However, under explicit learning conditions, high PP individuals acquired knowledge to the same extent as low PP individuals. The latter result suggests that learning deficits in PP can be bypassed by intentional cognitive control processes.

THE ROLE OF SOCIAL ANXIETY, PSYCHOPATHIC TENDENCIES AND HORMONES IN APPROACH-AVOIDANCE BEHAVIOR TOWARDS EMOTIONAL FACES

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Social anxiety and high levels of psychopathic traits could be conceptualized as the opposing ends of one continuous trait i.e. the extent of caring about social evaluation. Indeed, research found that individuals with clinical social anxiety and psychopathic traits show different automatic social action tendencies, respectively. Besides that, also hormonal levels are involved in both, social anxiety and psychopathy, as well as automatic social action tendencies. The current research examined: 1) the relationship between social anxiety, psychopathic tendencies, cortisol and testosterone and 2) its interactive role in social action tendencies in a non-clinical, female sample. In order to answer these questions, the Liebowitz Social Anxiety Scale, the Psychopathic Personality Inventory, pre-experimental levels of cortisol and testosterone, as well as the Approach-Avoidance task using emotional faces has been assessed. Indeed, a negative correlation between social anxiety and psychopathic tendencies has been found supporting the continuous approach of caring about social evaluation. Furthermore, by using Structural Equation Modelling significant main effects of psychopathic tendencies, testosterone, and cortisol, and an interaction between cortisol and social anxiety on approach-avoidance tendencies has been found. Most interestingly, individuals with higher psychopathic traits were faster in approaching angry faces. Besides that, individuals with both, higher social anxiety and higher levels of cortisol were slower in approaching happy faces. These results stress the importance of taking both personality and biology, into account when studying automatic social action tendencies.

LIBRARY FOR UNIVERSAL VIRTUAL REALITY EXPERIMENTS: LuVRE

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VR-based paradigms could substantially increase the ecological validity of psychological research as VR allows submerging into real-life experiences under controlled laboratory conditions. LuVRe is a video database designed to provide a standardized set of virtual reality (VR) clips. Our goal is to provide a growing set of 3D-360° clips enabling researchers to study emotional and cognitive processes under realistic conditions while maintaining experimental control. LuVRe comprises 300 videos and pictures covering a large variety of emotionally-evocative themes. Watching these videos with a head mounted display results in an immersive experience. The preset study systematically investigates differences in emotional experiences between immersive VR experiences (3D-360°) and conventional laboratory experiments (2D). We investigated subjective as well as objective reactions, i.e. electropsychophysiological correlates of the motivational systems and heart rate. As a result, experiences in virtual reality differ from laboratory conditions with respect to heart rate and frontal alpha asymmetries (FAA), but not subjective ratings, indicating a higher emotional saliency of virtual reality. Realistic VR conditions, as well as laboratory conditions, might thus elicit effects which are specific to their domain. We argue that VR allows for a better approximation of real life regarding and thereby bridges the gap between laboratory and real-life conditions.

ALTERING EMOTIONS NEAR THE HAND: APPROACH-AVOIDANCE SWIPE INTERACTIONS MODULATE EMOTIONAL IMAGES JUDGMENTS

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Approaching positive objects and avoiding negative ones are general tendencies in human behaviour. Interestingly, arm positions connoting approach (arm flexion) or avoidance (arm extension) have been also shown to influence how the valence of stimuli is processed. However, such bodily influence on valence processing has been typically examined within experimental paradigms that do not involve acting upon objects (e.g., touching and moving them directly by hand). Accordingly, our study attempts to integrate such paradigms with findings suggesting that the hand proximity to visual stimuli modulates their cognitive processing. Sixty participants judged the valence of twenty positive and twenty negative images twice; firstly after observing them on a monitor screen (i.e. baseline) and secondly after swiping them on a touchscreen monitor, either closer to their body or further away. We expected that congruent interactions (approaching positive images – avoiding negative) would raise more positive judgments than incongruent interactions (avoiding positive images – approaching negative). Valence judgments post-interaction (adjusted for baseline) and valence change (valence judgments post-interaction minus baseline judgments) were analyzed with linear mixed models (LMM). Results indicate that swiping positive images closer (vs. away) tended to reinforce more their perceived positive valence but swiping negative images away (vs. closer) attenuated more their perceived negative valence. Indeed, swiping positive images away and negative images closer did not significantly change their perceived valence. We conclude that swiping affective images closer or away might highlight valence-processing asymmetries wherein interactions leading to more desirable effects are better attended (approaching positive and avoiding negative images).

DISCRETE EMOTIONS IN GRADING SITUATIONS: DIFFERENTIATED EFFECTS OF ANGER, ENJOYMENT, AND BOREDOM ON GRADES

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We aimed to test if naturally elicited teacher emotions influence grading, a task that takes up a considerable portion of teachers' professional lives (OECD, 2014). Previous research showed that externally induced emotions influence grading in emotion congruent ways, that is negative emotions lead to lower and positive emotions lead to higher grades for the same essays (Brackett et al., 2010). We sought to show that a material-inherent cue (handwriting) naturally elicits discrete emotions (anger, enjoyment, and boredom), which influence grades in differentiated ways. Our experiment which involved 74 teacher students (62 female) to grade two essays of similar content quality in varied handwriting quality was supportive of these claims: In two-condition within-participant mediation analyses (Montoya & Hayes, 2017) the unstandardized effect of handwriting on grades was 0.32 (CI [0.03, 0.61]), which equals one third of a letter grade. The relationship was mediated via anger (0.44, CI[0.21, 0.67]) and enjoyment (0.26, CI[0.06, 0.43]) in emotion congruent ways, but not via boredom (0.02, CI[- 0.04, 0.10]). That is, good handwriting predicted a lower level of anger and a higher level of enjoyment, whereas it did not predict boredom. A higher level of anger and enjoyment in turn predicted lower and higher grades, respectively, whereas boredom did not predict grades. Results imply that it is important to further investigate grading as an emotional task, in order to prevent negative consequences for teachers' well-being on the one hand and students' future careers through biased grades on the other hand.

CHILDREN SHOW A BETTER EMPATHIC ACCURACY IN THE PRESENCE OF THEIR MENTOR

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Ute Kunzmann (Universität Leipzig, Germany)
Timo von Oertzen (Universität der Bundeswehr München, Germany)

Past evaluations of youth mentoring programs were based nearly exclusively on questionnaires. This led to the neglect of constructs which cannot be investigated properly in this manner, like empathic accuracy. We predicted that the physical presence of the mentor would enhance the mentee's empathic accuracy in comparison to the mentor's absence. Further, we explore the effect of mentoring duration on the empathic accuracy of children. 17 mentoring dyads participated in this study. Mentees ranged in age between 7 and 19 years. The mentees watched short film clips in which a person describes an emotional experience. Afterwards, the mentees were asked to rate the protagonists feelings based on 12 adjectives. These scores were then compared to the original scores of the protagonists, using an intra-class-correlation. The results support our hypothesis, as the mentees reached significantly higher scores when their mentor was present than when he was absent. In the absence of their mentor, mentees showed a marginally higher score of empathic accuracy the longer they have been matched with a mentor when age of the mentee was controlled. This extends our knowledge on how children profit from youth mentoring programs. Further, it shows the necessity to investigate mentoring dyads in a laboratory and not solely rely on survey studies.

EMOTIONAL RESPONSES TO TOUCHED MATERIALS IN YOUNG FEMALE AND MALE ADULTS

Knut Drewing (Giessen University, Germany)

In everyday interaction we touch a number of different materials, which can elicit distinctive emotional responses: For instances, touching soft fur feels highly pleasant for most of us, whereas sandpaper typically feels unpleasant. In a recent study (Drewing, Weyel, Celebi, & Kaya, 2018) participants manually explored a representative set of 47 solid, fluid and granular materials and rated them according to 52 sensory and emotional adjectives. Emotional responses were made along three dimensions: Valence (positive, negative), Arousal (arousing - boring), and Dominance (being controlled - controlling), and they were systematically correlated with values on sensory dimensions. Here, we developed a short variant of the task in order to compare sensory-emotional associations for young females and males. 30 participants (18-29 years, half females) explored 25 materials using 18 sensory and 9 emotional adjectives. In covariance-based principal component analyses on the individual emotional and sensory ratings, we extracted 3 emotional (Valence, Arousal, Dominance, explaining 72% variance) and 6 sensory dimensions (Roughness, Fluidity/Stickiness, Granularity, Heaviness, Fibrousness, Deformability, explaining 75% variance). Similar sensory-emotional correlations were significant for young females and males: Less rough and more fibrous (fluffy) materials came along with more positive Valence, more fluid/sticky materials elicited more Arousal, and heavier, less deformable materials with more Dominance. Overall, we replicated the previous results on sensory and emotional dimensions of touched materials using a shorter task, and demonstrated a high consistency in the sensory-emotional associations of young female and male adults.

UNDERSTANDING CHILDREN. PARENTS VERSUS NON-PARENTS

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Lina-Nel Christiansen (Universität Potsdam, Germany)

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Using social competencies to socially understand children is vital for parenting. They not only allow adequate reactions to a child's behaviour but since parents are important role models, they are also passed on to the children (Kluczniok et al. 2016). Although there are tasks available to measure social understanding of children in adults (e.g. MET-KE; Lemme, 2012), none have different age groups or enough stimuli for multiple test points. Similar to the MET-KE, we measure affective aspects of social understanding (empathy and compassion) by showing either emotional or neutral pictures and asking participants to rate the valence of their feelings and compassion. However, we developed a separate task to measure cognitive aspects of social understanding (affect recognition and affective theory of mind). It uses morphed videos of a neutral face taking on an affect and has been proven to be sensitive with adult stimuli (see Domes et al., 2008). Therefore, the main goal of our study is to develop and evaluate tasks measuring different aspects of social understanding of several age groups of children in adults. We aim for enough stimuli for multiple test points. We want to use the developed tasks to evaluate the effects of mentalisation-based intervention in parents on social understanding of children. Currently, our task to measure cognitive aspects of social understanding works well, however, the task to measure affective aspects needs to be improved before it can be used.

NEGATIVE AFFECT, EMOTION PROCESSING AND DISTRUST – A DAILY LIFE STUDY

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Previous research has demonstrated that inducing negative mood in individuals lead to a biased processing of facial emotional stimuli. The purpose of the present study was to explore this association in the daily life of individuals. Ambulatory Assessment (AA) was used to test whether momentary negative affect contributes to (i) a negatively biased evaluation of emotional faces and (ii) heightened distrust. To this end, self-reports regarding momentary affect were combined with behavioral tasks on emotion processing (evaluation of emotional facial expressions) and distrust (hypothetical Distrust Game). Using multivariate multilevel modeling, we tested relations between those variables in a sample of 42 healthy individuals at six time points over 7 days. Results revealed that there was an effect of tense arousal on distrust ratings. More specifically, momentary tense affect was associated with higher levels of distrust in the Distrust Game. This was in line with our assumption that being in an aversive emotional state goes along with more distrust, which might lead to subsequent interpersonal difficulties. However, there was no effect of momentary negative affect on the emotion evaluation task. Results are discussed, especially regarding the behavioral tasks that we newly implemented in AA.

DEPRESSIVE EMOTIONALITY MODERATES THE INFLUENCE OF THE BDNF Val66Met POLYMORPHISM ON UNCONSCIOUS SEMANTIC PRIMING

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Automatic semantic processing can be assessed using semantic priming paradigms. Interindividual differences in semantic priming have been associated with differences in prefrontal functionality. Additionally, the BDNF Val66Met polymorphism has been shown being associated with altered prefrontal functionality as well as with depression. Depression associated variables like depressed mood moderated the relationship between BDNF Val66Met and prefrontal functionality. In this study, we aimed to investigate whether BDNF Val66Met genotype affects masked and unmasked semantic priming and whether sadness is a moderator of the associations between BDNF Val66Met and semantic priming. We collected data of $N = 155$ participants measuring reaction times (RT) as well as error rates (ER) in masked and unmasked semantic priming paradigms using a lexical decision task. Moreover, we assessed the primary emotion SADNESS using the Affective Neuroscience Personality Scale (ANPS). Carriers of at least one 66Met allele showed reduced RT priming and increased ER priming in the masked priming paradigm. Further, SADNESS significantly moderated the association between BDNF Val66Met and masked RT priming. Low SADNESS 66Met carriers showed close to no priming, while high SADNESS in 66Met individuals coincided with increased RT priming. These results indicate a more superficial processing style in 66Met individuals, in particular when depressive tendencies were low. Our study thus demonstrates how emotional and molecular genetic factors exert an interacting influence on higher-level cognition.

LEARNING FROM DIGITAL EDUCATIONAL VIDEOS: THE IMPACT OF THE SOURCE PROFESSION ON ATTITUDE, EXPECTATION, AND KNOWLEDGE

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Digital learning videos are widely used for educational purposes, for example, for conveying health-related information. Videos that present information about particular diseases can be provided by various professions. Information on obesity and depression, for example, can be presented by physicians as well as by psychologists. To what extent has the perceived profession of an expert an impact on how people process the information and what factors influence this process? In four between-subject online experiments we tested the hypotheses that people's knowledge acquisition depends on the perceived profession of the expert shown in a video (physician vs. psychologist) and that knowledge acquisition is influenced by the people's attitude and expectation toward the profession. Two experiments were conducted with obesity as stimulus material, two other experiments dealt with depression. Using analysis of variance we found that participants learned more about obesity the information was given by an expert labeled as a physician than when the identical information was provided by an expert labeled as a psychologist. For depression the effect was the other way round. Ongoing analysis will shed light on the role of people's attitude and expectation toward the profession for explaining this effect.

MINIMAL ART MUSEUMS HAVE RESTORATIVE EFFECTS

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Previous research has shown that museums can, like natural environments, have restorative effects on visitors. The presented study we aimed at investigating whether a small minimal art museum can also be restorative, and whether its restorative effects are affected by visit duration or preference for minimal art. We hypothesized that the museum would be restorative, that this effect would be amplified by preference for minimal art, and that restoration would be optimal with a medium relative to a short or a long visit duration. In a between-subjects design with 66 participants in total, participants stayed either 10, 45, or 110 min in the museum. Immediately before and after their visit they completed a restoration questionnaire. After the visit they completed a preference questionnaire as well. We found that the museum had overall a profound restorative effect, and that this effect was stronger when participants had a preference for minimal art museums. The effect of visit duration was not significant, but showed a marginal tendency towards stronger restoration with the medium duration relative to both other durations. We conclude that minimal art museums can have a restorative effect and that this effect is modulated by museum preference.

THE EFFECTS OF PERFORMANCE (NON-)CONTINGENT REWARD ON METACONTROL POLICIES

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Previous research has shown that the prospect of a reward can modulate the trade-off between persistence and flexibility (two opposite metacontrol policies), and that the direction of these effects varies as a function of the type of reward. Specifically, while performance contingent reward seems to increase persistence at the expense of flexibility, performance non-contingent reward seems to increase flexibility at the expense of persistence. The present study aimed at extending previous observations by testing the effects of (non-)contingent reward on performance of two cognitive tasks that call for persistence and flexibility, respectively: namely, the Simon task and the Attentional Blink task. Participants (N=180) were randomly and equally assigned to one of three groups differing for the type of reward (i.e., performance contingent reward, performance non-contingent reward, and no reward) and asked to perform the two cognitive tasks, whose order was counterbalanced across participants. Consistent with our expectations, we observed better Simon task performance in the group of participants who received performance contingent reward, whereas a less pronounced attentional blink effect was observed in the group of participants who received performance non-contingent reward. Taken together, these results corroborate and extend previous observations suggesting a relationship between performance (non-)contingent reward and metacontrol policies.

MOTIVATION DRIVES CONFLICT ADAPTATION

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When facing difficulties, most people have the remarkable ability to persist and overcome obstacles. But how do people cope with deterrents in goal pursuit? Theoretical accounts have suggested that it is indeed the difficulty of an action which motivates additional investment of effort in the near future. People often expend more effort and get better at overcoming obstacles in situations where they face difficulties. For instance, the conflict monitoring model predicts that conflict between incompatible responses reduces susceptibility to future conflict. This conflict-adaptation effect has been explained in terms of motivational control: Conflict in the past triggers negative affect, which can be reduced by increasing control – as a consequence future and accompanying negative affect is reduced. While evidence supports that conflict-adaptation serves a motivational purpose (e.g., affect regulation), it remains to be shown that conflict-adaptation is actually triggered by motivational mechanisms. Therefore, the present research tested the hypothesis of a motivational conflict-adaptation effect. Continuous finger movements towards target stimuli and away from distractor stimuli were recorded. Motivational conflict was instigated by assigning reward and penalty to targets or distractors, respectively. To index motivational vigor and increased precision due to motivation, we measured initiation times and movement deviation from the shortest path to the target. Both a re-analysis of published data and data from a new replication study established a motivational conflict-adaptation effect. Together, the results extend a motivational control framework, showing that motivational dynamics (i.e., motivational conflicts) can be the driving force of control.

DEVELOPING PODCASTS TO TEACH PSYCHOLOGY: TEACHER ENTHUSIASM INCREASES STUDENTS' EXCITEMENT, INTEREST, ENJOYMENT, AND LEARNING MOTIVATION

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Teacher enthusiasm can be defined as the occurrence of distinct behavioral expressions, such as nonverbal (e.g., gestures) and verbal (e.g., tone of voice) behaviors. It has been shown that teacher enthusiasm is linked to various positive outcomes: It is linked to students' enjoyment, interest, achievement, motivation and vitality. However, most teacher enthusiasm research is based on correlational data and therefore no causal inferences can be drawn. To overcome this limitation, a between-subject experimental design was used to analyze the effects of teacher enthusiasm on instructional quality. Two versions of an evolutionary psychology podcast were developed: A neutral and an enthusiastic version. While the wording was kept identical between both versions, the speaker was instructed to read the podcast script either in a neutral or in an enthusiastic manner. It was hypothesized that listening to the enthusiastic version would result in more positive instructional quality ratings. 163 university students with diverse majors listened to the podcast. To test the hypothesis, independent sample t-tests were conducted. Overall, the results show that listening to the enthusiastic version resulted in more positive instructional quality ratings: Participants who listened to the enthusiastic version of the podcast rated it as more interesting and exiting; they enjoyed the listening process more; had a higher motivation to learn more about the topic; evaluated the podcast host as more trustworthy; and gave the podcast a higher overall rating. The results demonstrate that teacher enthusiasm can be a powerful instructional tool when developing educational podcasts.

ABOLISHED ASSOCIATIVE LEARNING IN STATES OF LUST

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Being able to react to environmental cues in an adequate way is indispensable in everyday life. To do so we heavily rely on sequential information, which informs us about the chronological order of events, allowing us to predict future occurrences of similar events, thus enabling us to act with foresight. This contrasts with simple stimulus-response learning, which only enables us react to the last preceding cue. Based on recent findings on the impact of increased arousal on cognitive processes and hippocampal activity, we aimed to assess whether experimentally induced positive arousal restrains associative context processing. We designed a 2 (arousal state) \times 3 (predictive associations) factorial experiment, expecting restricted associative learning abilities in the arousal condition as compared to a control group. A sample of $N = 56$ participants completed the Learned Irrelevance Paradigm as a measure of their ability to process sequential context, after either being exposed to a neutral or a sexually arousing stimulus video. Our results show a decreased sensitivity for predictive cues, indicating a disruption of implicit sequential learning. This finding yields evidence for a perseveration of cognitive resources by a switch to less demanding stimulus-response learning.

ATTENTION OR TEMPORAL LEARNING: WHAT EXPLAINS THE PCE?

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In experimental conflict protocols, participants typically respond more slowly and less accurately if the learned response associations for target and distractor stimuli are incongruent (i.e. contradictory) than when they are congruent. This congruency effect is weaker the more the frequency ratio of congruent to incongruent trials is skewed towards the latter. This proportion congruency effect (PCE) has often been explained in terms of a more selective attentional setting under conditions of frequent interference by distractor information (attentional account). However, temporal learning can account for the data just as well. It assumes that performance benefits from a match between the expected and actual time of response execution. Therefore, performance in trials featuring the more frequent, and therefore more expected, congruency level benefits - which is a different but equally valid description of the data constituting the PCE. We demonstrate two ways to address this issue. Firstly, we illustrate a general experimental approach which allows for a direct juxtaposition of the attentional and the temporal learning account. By experimentally introducing a simple contextual manipulation it is possible to derive exactly opposing predictions for two outcomes: While the attentional account predicts a PCE under Condition A but no PCE under Condition B, the temporal learning account predicts exactly the opposite pattern. Secondly, we introduce a new and flexible way to quantify potential temporal expectations. We show how these expectations can be statistically controlled in a mixed-effects model and thus how a more "pure" PCE can be derived.

AUTOMATIC RESPONSE ACTIVATION IN THE AVATAR COMPATIBILITY TASK

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When people are forced to take the perspective of an avatar to complete a stimulus-response compatibility task, they generally show the same compatibility effects that we would expect from the avatar's position instead of their own. In this study, we investigated if these effects are caused by the automatic activation of responses that are spatially corresponding from the avatar's perspective. We asked 24 participants to perform a compatibility task from the avatar's point of view but contrary to similar experiments in the past, we introduced a delay (0 vs. 750 ms) between the stimulus and avatar presentation. As a result, the participants had to wait until the avatar appeared to select the correct response in the delayed condition. Because the automatic response activation is known to decay quickly, we aimed to eliminate its influence with this delay. Well-known theories of stimulus-response compatibility argue that the automatic activation of spatially corresponding responses is a key factor in stimulus-response compatibility. Based on this, we expected a reduction of the compatibility effects in the 750 ms condition compared to the 0 ms condition. However, in contrast to these predictions, we observed a slightly larger compatibility effect from the avatar's point of view in the delayed condition. We believe that this calls the role of automatic response activation for perspective-based compatibility effects into question and could underline the importance of general mapping advantages instead.

TOP-DOWN MODULATION OF EXPERIENCE-BASED AND INSTRUCTION-BASED STIMULUS-CATEGORY AND STIMULUS-RESPONSE ASSOCIATIONS

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Responding to a stimulus according to the current task demands is often a two-staged process, involving semantic categorization (e.g., small/large) followed by category-specific response selection (e.g., small-left; large-right). This leads to the formation of stimulus-category associations (e.g. car-large) as well as stimulus-response associations (e.g. car-right; see e.g., Pfeuffer, Moutsopoulou, Pfister, Waszak, & Kiesel, 2017). When stimuli are presented twice and the stimulus-category (size vs. mechanism categorization) and stimulus-response (right vs. left) mappings orthogonally repeat or switch between the first (prime) and second (probe) stimulus presentation, participants respond slower in the probe when mappings switched rather than repeated. This seems to be the case both after active execution as well as after passively listening to verbal instructions (e.g., car: “large-right”) in the prime. We tested whether such item-specific priming effects are under voluntary control by manipulating participants’ expectations regarding the probability with which a specific stimulus would require same or different categorization or response in subsequent probe trials (N=73). In reality, however, actual probe trial probabilities were constant at .5. We hypothesize that expectation of low / high prime-probe consistency should lead to weaker / stronger priming effects due to less efficient prime encoding and/or probe retrieval of stimulus-category or stimulus-response associations. The basic results of the original studies were replicated (e.g., Pfeuffer et al., 2017). More importantly, the retrieval of stimulus-response and stimulus-category associations was differently affected by the expectancy manipulation. Stimulus-response but not stimulus-category retrieval was modulated by participants’ expectations, suggesting a complex interplay of automatic and controlled processes.

DISSOCIATING THE ROLE OF COMPATIBILITY AND PREDICTABILITY OF ACTION-EFFECT RELATIONS FOR EXPLICIT MEASURES OF THE ACTIVE SELF

Marvin Liesner (Julius Maximilians University of Würzburg, Germany)

Events that are perceived as being predictably affected by one's own actions can become integrated into the self-representation in terms of experienced agency and ownership. An agent's actions typically lead to body related perceptions, so called resident effects, but also to the perception of changes in the environment, so called remote effects. These two different sources of information can however contradict each other, for example when hand movements produce tool movements in opposite directions. The influence of such incompatible action-effects on explicit measures of agency and body ownership had been studied before, however (in)compatible action effects were in these studies never produced in a perfectly predictable manner. Therefore, in the present study we manipulated predictability and compatibility of action effects independently in a sample of 32 participants. Our results showed reduced experience of agency and ownership with unpredictable relative to predictable, and incompatible relative to compatible action effects, but also larger reductions in ratings for incompatible compared to compatible trials when action effects were not predictable. Thus, compatibility of actions and their effects is a way more important cue for experienced agency and ownership, when these effects are actually not controllable (unpredictable) than when they are controllable (predictable) suggesting predictability as having the more pronounced impact on those measures. Future research should extend this research to more implicit measures of agency and ownership as well as performance measures which might help to shed light on the mechanisms agents use to deal with incompatible action effects.

CONSIDERING COMFORT IN A SOCIAL CONTEXT: HOW CHILDREN GIVE DIFFERENT TOOLS TO CONFEDERATES

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When adults are asked to hand over a tool to another person, they take into account the other person's starting comfort, e.g. by orienting the handle towards the other person. In contrast, first studies suggest that children might consider other people's comfort to a much lesser degree or even not at all, even though being able to consider their own comfort. The present study tested to what extent 5- to 7-year-old children are able to consider another person's comfort when handing over different tools and in how far the type of tool (novel or habitually used) has a differential impact on their grasp choices. 32 children (18 girls) were first required to use each one of three tools (bar, brush, hammer) themselves, and subsequently to pass the tools to a collaborator for his use. The tools were presented either with the handle facing towards or away from the child. In order to enable their own or the collaborator's comfort, children had to adapt their grip postures flexibly. For analysis, children's rates of comfortable and uncomfortable grips in the different conditions were calculated. The analyses indicate that the extent to which own comfort was considered was much higher than the extent to which the collaborator's comfort was considered. Furthermore, in both conditions, significant effects of tool identity on grip choice were found. This speaks in favor of the assumption that efficient planning is no all-or none phenomenon but context-dependent, and that habitual tool-use affects grasp planning

THE IMPACT OF ACTION FREQUENCY ON CAUSAL JUDGEMENTS

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The frequency with which we engage in actions in our daily actions can vary greatly: Some things we do very often, while we do other things only rarely. How do we perceive the causal contribution of frequent vs. infrequent actions? Literature in causal cognition has suggested that infrequent, atypical or unlikely actions are seen as more causal for an outcome than actions that have been performed frequently (Hart & Honoré, 1959; Kahneman & Miller, 1986; Hitchcock & Knobe, 2009). In contrast, others have argued that a frequently acting agent will be judged more causal if their actions increase the likelihood of the outcome to occur (Systema et al., 2015). In this paper, we will present a systematic set of experiments that investigates how the frequency of an action shapes our perception of the agent's causal contribution to an outcome. In three online experiments, participants watched animated video clips in which agents jointly cause an outcome (conjunctive causation), but differ in how often they have performed this action before. Experiment 1 (N=133) shows that people judge the infrequently acting agent as more causal and responsible for the jointly caused outcome. Experiment 2 (N=156) shows that this is also the case when the agents have no knowledge about each other's behaviour. Experiment 3 (N=137) shows that people stop preferring the 'abnormally' acting agent if the action is 'token' abnormal, but not 'type' abnormal. We conclude by suggesting the integration of action frequency into current models of causality and responsibility.

IMPLICIT AND EXPLICIT MEASURES CAPTURE DISTINCT FACETS OF HUMAN AGENCY

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The sense of agency, i.e., the feeling of control over one's own actions and their consequences in the environment, is an integral and crucial part of action taking. In experimental studies, agency is most commonly measured either directly via explicit agency ratings or indirectly via implicit measures, e.g., relating to temporal binding (or intentional binding). Indeed, both types of measures, explicit and implicit, are often discussed synonymously and inferences about the participants' explicit sense of agency are regularly made on the basis of implicit measures alone. However, recent evidence suggests that both measures might not be directly related. To shed further light on this question, in this study, we employed a high-powered classic temporal binding paradigm with free and forced choice conditions in combination with agency ratings (N = 90). We found no evidence of a relation between agency ratings and temporal binding, neither in the free nor in the forced choice condition, and even trial-wise correlations revealed only small effect sizes. This suggests that both explicit agency ratings and temporal binding measures are not as strongly interlinked as previously thought.

NONE OF MY BUSINESS: REDUCED AGENCY FOR THE CONSEQUENCES OF LIES

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People tell lies for the sake of anticipated benefits, risking harmful consequences of their dishonest actions elsewhere. An open question is how much agents feel responsible for the consequences of their dishonest actions. Although lying is an integral part of the behavioral repertoire, truthful responding is predominant in human interactions and an obstacle that has to be overcome to respond dishonestly. We hypothesized that this inherent conflict and mental effort would diminish the feeling of responsibility (i.e., agency) for the consequences of dishonest compared to honest responses. We employed a paradigm with temporal binding as an implicit agency measure of (dis)honesty, i.e., interval estimates between an honest vs. dishonest response and their sensory effects. The data of forty participants supports the assumption of reduced agency for lies and their consequences as dishonest compared to honest responses produced longer estimates of response-effect intervals. This can only be a first step toward understanding agency in lying. Future endeavors should explore agency for different instances of lies or in the presence of affective consequences.

LATERALISATION OF SENSE OF BODY OWNERSHIP

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A growing body of the research shows that the body ownership has mainly been linked to the right hemisphere and larger interhemispheric connectivity. However recent findings of the laterality effect of rubber hand illusions (RHI) are controversial. The objective of our study was to determine the weighting of right and left hemispheric contributions to individual differences in susceptibility to body illusory percepts such as the RHI. Sinistrals-, dextrals-, and mixed- handed individuals ($n = 90$) were participated in RHI which was elicited at both the left and the right hand, in randomized order. Immediately after each trial, a visual line bisection task was also conducted to investigate the shifting the subjective body midline (bisection bias). Additional questionnaire measured which interoceptive abilities affect the integration of multiple source of sensory information about the body. It was found that individuals with a lower degree of lateralization and less interoceptive awareness were more susceptible to the RHI. However performance on left and right hand did not differ in strength of the illusion. Furthermore, the line bisection performance was also unaffected by the RHI induction. The results will be discussed in relation to factors that influence the RHI and hemispheric differences.

THE ROLE OF COGNITIVE FLEXIBILITY IN THE EMERGENCE OF EXPLICIT KNOWLEDGE IN A SERIAL REACTION TIME TASK

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Implicit knowledge results from an unconscious and effortless experience and internalization of statistical regularities inherent to the learned material (implicit learning). Despite a wide range of approaches to evoke implicit learning, one commonality among them is that a subset of participants develops explicit knowledge about the regularities inherent to the task. However, it remains unclear which factors actually contribute to these inter-individual differences. The Unexpected Event Hypothesis assumes explicit knowledge to result from detecting changes in response fluency while performing implicit learning tasks. These detection processes may depend on the ability to incorporate environmental cues into one's current mental set (cognitive flexibility). However, thus far this link has not been empirically verified. A total of $N = 60$ healthy university students, participated in this study. Spontaneous eye blink rate (sEBR) - commonly used as a proxy for baseline central dopaminergic functioning- was recorded, followed by a Number-Letter Task, assessing cognitive flexibility via switch-costs. Lastly, six blocks of a Serial Reaction Time Task, with an inherent motor sequence, followed by a block including Post Decision Wagering trials, were employed as measures of implicit and explicit knowledge. Results will be discussed in light of the underlying cognitive mechanisms implicated in the emergence of explicit knowledge in implicit learning paradigms and their possible neurobiological underpinnings. To our knowledge, this is the first experimental investigation assessing the relationship between inter-individual differences in shifting abilities and declarative knowledge.

MULTIMODAL SEQUENCE LEARNING

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Learning is multimodal, guided by a multisensory environment. Nevertheless, the different influences that sensory modalities (e.g., vision and sound) may have upon sequence learning have largely been neglected, as have the mechanisms behind learning multimodal action sequences. Thus, at present we know very little about multimodal aspects of sequence learning. The idea our studies was to examine the effects of multimodal sequence learning by implementing multisensory stimulation (i.e., visual and auditory) on the one hand, and by using multimodal actions (i.e., manual and vocal) on the other hand. Our experiments demonstrate the important influence of modality-specific mechanisms in sequence learning. Specifically, we will show the beneficial effect of employing multisensory stimulation and multimodal actions for sequence learning. The presented research could contribute to the field of learning research by demonstrating optimized conditions for the acquisition of novel motor skills.

STAGE-WISE VERSUS PARALLEL ACQUISITION OF LANDMARK, ROUTE AND SURVEY KNOWLEDGE IN A VIRTUAL CITY

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Acquisition of spatial knowledge has been explained by two conflicting accounts. One posits the existence of three sequential stages: first landmark knowledge, then route knowledge, then survey knowledge. The other account posits parallel development of the three types of knowledge. The present study was conducted to distinguish between these two alternatives ($n = 60$). A virtual city was displayed on three wide-angle screens in front of a passive treadmill. Participants progressed forwards through the city by walking on the treadmill, and turned left or right by clicking a left or right button. They had to explore three routes through the city (= one experimental block) ten times. After each block, participants carried out four tests of landmark knowledge, route knowledge and survey knowledge. We found that performance on all tests improved continuously from the first block on. One-way ANOVA with repeated-measures on "block" revealed significant effects and significant linear trends. Factor analysis of learning rates in the four tests yielded one single factor explaining 53.3% of total variance. Our findings support parallel rather than stage-wise acquisition of spatial knowledge.

A "PSYCHOPHYSICAL" PREFERENTIAL CHOICE STUDY OF CONTEXT EFFECTS WITH REAL CONSEQUENCES

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Context effects are changes of choice probabilities due to changes of choice set composition. Three such effects, similarity, attraction, and compromise effects, have been originally observed after adding a third alternative to a two-option set. Explaining the three effects simultaneously has become a benchmark for computational cognitive process models of multi-alternative multi-attribute preferential choice. However, very few experiments actually study them simultaneously. And if so, different variants of the effects are used or data are averaged across subjects. We propose a preferential choice paradigm with real consequences that allows for many repetitions of the same choice problem with the same subject ("psychophysical" approach). Choice alternatives are described by three common attributes: (1) The number of points to be won or lost that determine the final monetary payoff (5 levels), (2) the loudness of an annoying sound that subjects hear over headphones after making their choice (5 levels), and (3) the waiting time before the next trial starts (5 levels), which affects the overall duration of the experimental session. Uncertainty or risk are added to the task by drawing the attribute values from distributions that are either learned from experience prior to the decision task or presented to the subjects in the form of pie charts. We show first results using this within-subject design with four experimental factors.

CUE-BASED PREPARATION OF NON-PERCEPTUAL STIMULUS-RESPONSE TRANSLATION PROCESSES: EVIDENCE FROM A PROBE TASK APPROACH

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Imke Gillich, Thomas Jacobsen
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Various processes have been suggested to account for preparation benefits in task switching situations, including attentional tuning to perceptual stimulus attributes or enhancing the readiness of task-specific stimulus-response (S-R) translation. To investigate preparation of non-perceptual S-R translation we asked participants to switch between responding to a stimulus digit by applying one of two S-R mapping rules, which were exact reversals of each other, and added trials of another (probe) task. On each trial, a cue preceded the stimulus digit by 800 ms. It indicated which of the two reversed S-R mapping rules had to be applied. On probe task trials, this cue was “overruled” by another cue. The probe task required a different stimulus categorization (and, thus, the application of a third S-R mapping rule) and occurred occasionally instead of the task indicated by the cue. Using the same set of motor responses for all tasks allowed us to assess response congruency effects. Because the cued S-R mappings were reversals of each other each stimulus presented in the probe task was congruent regarding one of the rules and incongruent regarding the other one. In two experiments, involving different stimulus categorizations (i.e., magnitude vs. parity judgements), probe task performance was facilitated if the stimulus was congruent with the S-R mapping rule indicated by the cue/incongruent with the reversed rule. Since application of the two cued S-R mappings did not differ in terms of perceptual processing these findings provide evidence for cue-based preparation of S-R translation processes unrelated to stimulus selection.

IMPLICIT SEQUENCE LEARNING AS AN INDICATOR OF THE ADOPTED DUAL-TASK PROCESSING MODE?

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Many findings suggest that implicit sequence learning is impaired when a serial reaction time task (SRTT; Nissen & Bullemer, 1987) is presented simultaneously with a random secondary task. However, learning is preserved with long SOAs (Schumacher & Schwarb, 2009) – potentially due to serial- instead of parallel processing. Thus, the amount of implicit sequence learning could serve as an indicator of the dual-task processing mode participants adopt when experiencing varying SOAs. Evidence suggests that only one processing mode is globally preferred: serial processing (Israel & Cohen, 2011) or parallel processing (Lehle & Hübner, 2009). Sequence learning should be preserved in the former case and hampered in the latter. In three experiments, we paired a SRTT with a random tone-discrimination task. In Experiment 1 (N=50), we trained participants with either consistently short or long SOAs (0ms / 800ms) and found sequence learning only in the SOAlong condition. In Experiment 2 (N=50), short vs. long SOAs were associated with certain SRTT-positions within-blocks (75%). We found an overall significant learning effect suggesting that the tasks were indeed processed generally serially – or that a minimum of 25% long SOAs sufficed to learn both position-types. Experiment 3 (N=25), implementing 100% SRTT-SOA contingencies, revealed that the (again) overall significant learning effect resulted exclusively from SRTT-positions consistently paired with long SOAs. The findings suggest that the experience of mixed SOAs does not result in generalized (serial) processing – but rather indicate some kind of switching between processing modes that will be further investigated in future research.

DIFFERENCES OF EXPERIENCED FLUENCY IN IMPLICIT SEQUENCE LEARNING

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An important question in the field of implicit learning is whether explicit knowledge about a task results from strengthening the representation of the acquired knowledge (e.g., Cleeremans & Jiménez, 2002). Alternatively, Frensch et al. (2003) proposed that explicit knowledge results from experiencing an unexpected event. This event triggers an attribution process, whose content becomes consciously aware. In previous experiments, we found that participants develop a feeling of fluency within the serial reaction time task (Nissen & Bullemer, 1987) when trained with short blocks of either regular or random trials. Here, we tested whether this feeling triggers the development of explicit sequence knowledge. For this purpose, participants were trained with Stroop-like material. In the experimental group (n=30), all blocks contained 50% congruent stroop-trials. In the control group (n=30), the regular blocks contained 50% and the random blocks 70% congruent trials. Thus, strengthening between the conditions was identical, but the chance of experiencing differences in fluency differed. In a subsequent test-phase, all participants received two additional regular blocks with 50% congruent trials. Explicit sequence knowledge was assessed by using the post decision wagering task. Results: During training, the two conditions did not differ. In the test-phase, participants in the experimental group developed significantly more sequence knowledge than participants in the control group. Thus, the differences of experienced fluency as an unexpected event might have triggered the development of sequence knowledge.

NOW CATEGORIZE AGAIN! - FORCED STRATEGY CHANGE DOES NOT HELP TO DISCOVER THE CATEGORY STRUCTURE IN UNSUPERVISED CATEGORIZATION

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Real-world tasks, such as sorting emails, often demand people to create their own classification system without getting feedback. It has been argued that people prefer to categorize natural objects based on familiarity in real-world unsupervised categorization tasks (Rosch). However, studies in unsupervised categorization rarely find evidence that people detect more complex patterns or use categorization strategies other than unidimensional sorting when not receiving feedback. This study investigated to what degree asking participants to change their categorization strategy facilitates the detection of category structures that are more difficult to learn: an information integration structure and a high within-category variance structure. We hypothesized that participants first employ unidimensional strategies and later develop two-dimensional strategies. To test this prediction, participants repeatedly categorized stimuli either following an information integration or a high within-category variance structure and had to change their strategy after every 90 trials. In a final test block, participants had to categorize the objects in a manner that “fits the underlying structure best”. Although the proportion of participants considering two-dimensional strategies was high, the number of participants who considered two dimensions in their categorization did not increase in later blocks. However, many participants were also classified as guessing. In the final test block, only 4 participants categorized the stimuli based on the relevant dimension in the high-within category variance structure; no participant used an optimal strategy in the information integration structure. Without feedback, participants were not able to detect the underlying structure even when familiarized with the stimulus set during repeated categorization.

ACQUIRING A COVARIATION AND CONTROLLING WHEN TO APPLY IT

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Whenever two stimulus features are presented together, containing equivalent information, responses can be based on either feature. For example, at a traffic light the feature color (red = stop) co-varies systematically with the feature position (upper light = stop). Yet, many everyday covariations are not perfect. People might at the same time acquire the covariation and learn when (not) to apply this knowledge. For instance, in trials in which the instructed feature cannot be discriminated, the best strategy is to select a response based on what the covarying feature suggests. Yet, on trials where the link between the uninstructed feature and the responses is broken, the instructed feature should be used. We studied the race between covariation learning and learning to control when (not) to use it in an online study with N=70 participants (two sessions per day, ten days). This allowed to study learning as well as comparing interindividual variability (persons differing in how well they control application of covariation knowledge) and intraindividual variability (i.e., good vs bad days within person). Despite instructions on the imperfect covariation, with practice participants increasingly used the covariation in trials where this was valid as well as in trials where this led to an error.

THE MORE OPTIONS, THE BETTER WE LEARN? THE INFLUENCE OF CHOICE OPTIONS ON LEARNING WITH DIGITAL MEDIA

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Previous studies showed that an increase in choice options foster learning by an increase in the perception of autonomy and intrinsic motivation, whereby three to five choice options are assumed to be optimal. In contrast, too many choice options might lead to a choice overload effect, which could reverse learning-enhancing effects. However, such an effect was not yet experimentally analyzed. In detail, this study examined the effects of an increasing number of choice options on the learners' retention and transfer performance as well as autonomy and intrinsic motivation. Beneficial effects of choice were supposed to end when more than three to five options are shown in a digital learning material. Overall, 208 secondary students ($M = 13.66$ years, $SD = 1.01$, 61.1 % male) from class 7 to 9 were assigned to one group of a one-factorial, between subject design with six groups (one to six choice options), while linear and quadratic regression models were compared in the analyses. Results showed that the number of choice options has a significant impact on the learners' perceptions of autonomy and intrinsic motivation as well as their learning performance. Both learning scores, retention and transfer, revealed an optimum of three to five choice options (preference of the quadratic model). While perceptions of autonomy linearly increased with a higher number of choice options, perceptions of intrinsic motivation did not increase when at least two choice options were given.

POSTER SESSION 3: ATTENTION

DOES THE FREQUENCY OF VIDEO GAME PLAY AFFECT PERFORMANCE IN VISUAL ATTENTION TASKS?

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Previous research has shown that video game players perform better on a multitude of visual attention tasks than non-video game players. However, more recent research questioned these findings, showing no or only a limited benefit of video game playing. The aim of this study was to further investigate this discrepancy with four different attention tasks: The Attention Network Task (ANT), the visual marking task, the enumeration task, and the emotional Stroop task. A total of eighty participants completed each task before filling in a questionnaire about their past video game experience. For the analysis, participants were divided into three groups depending on whether they played never/rarely, occasionally, or frequently. The results showed that participants playing frequently had overall faster response times than those playing only occasionally or never/rarely. Those playing never/rarely had a much stronger alerting effect in the ANT than those playing occasionally or frequently. All three groups had the same preview benefit in the visual marking task and the same interference effect in the emotional Stroop task. In the enumeration task no difference was found between the three groups in the deflection points, but differences occurred in the error rates (those playing never/rarely did more error). The groups were also equivalent in terms of other control measures, such as personality. We conclude that the conflicting results in previous research can be partially attributed to the type of task used to measure visual attention.

SEEING THE WORLD THROUGH THE EYES OF AN AVATAR? COMPARING PERSPECTIVE TAKING AND REFERENTIAL CODING.

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Previous studies have shown that users spontaneously take the position of a virtual avatar and solve spatial tasks from avatar's perspective. The common impression is that users develop a spatial representation that allows them to "see" the world through the eyes of the avatar, that is, from its virtual perspective. In the present paper, this perspective taking assumption is contrasted with the referential coding assumption that allows the users to act on the basis of changed reference points. Using a spatial compatibility task, Experiment 1 ($n = 24$) demonstrates that the visual perspective of the avatar is not the determining factor for taking avatar's spatial position, but that its hand position (as the reference point) is decisive for the spatial coding of objects. However, participant's own hand positions can overwrite this referencing (Experiment 2, $n = 48$).

POST-CONFLICT AND POST-ERROR ADJUSTMENTS IN THE JOINT SIMON TASK

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To optimize goal-directed behavior, it is pivotal to flexibly adjust behavior if response conflicts or errors occur. Here, we used the Joint Simon task to investigate whether adjustments following conflict and errors depend on whether oneself or a partner in a shared task has experienced the conflict or committed the error. Pairs of participants sat side by side in front of one computer screen. One partner responded to one of two possible target colors, while the other responded to the other target color. Targets could either appear on the left or on the right of the screen center. Across three experiments, RT and error rates were lower if the location of the stimulus and the side of the respective actor corresponded than if they did not correspond indicating response conflict. Conflict adaptation was stronger following the partners' responses than following one's own responses indicating stronger control of task-irrelevant spatial information following high conflict. Post-error adjustments showed a different picture. Following one's own responses, post-error slowing of correct responses and post-error decrease of error rates were observed. Following the partners' responses, post-error speeding and post-error increase of error rates were observed. Although the Joint Simon effect was increased in a cooperative setting as compared to a competitive setting, neither conflict adaptation nor post-error adjustments were modulated by the type of setting. These results show that post-conflict adjustments and post-error adjustments are flexibly and differentially implemented according to the context in which conflicts and errors occur.

DISENTANGLING SALIENCY, VALUE ASSOCIATION AND VALENCE OF A STIMULUS ON ITS ABILITY TO CAPTURE ATTENTION

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The aim of the present study was to disentangle the different influences of saliency, value association, and valence of a stimulus on its power to capture attention. To address this issue, we used a modified Simon task. Participants ($N = 25$) had to respond to a target stimulus, presented on the left or right side of the display, by pressing either a left or a right key under time pressure depending on a specific feature of the target. Simultaneously, a distractor stimulus was presented on the opposite side. Crucially, the distractor was presented either in grey or in one of three colors to manipulate its saliency. The color also indicated, whether a participant could win, lose or get no money in the current trial, thus manipulating distractor value (money vs. no money) and valence (positive vs. negative). As a result, responses were faster for colored distractors compared to grey distractors. There was, however, no difference in response time between distractors associated with monetary gains or losses, and distractors associated with no monetary gains / losses. Regarding valence, for gain-associated distractors, participants were slower in the congruent conditions (target and response on the same side), and faster in the incongruent condition (target and response on opposite sides) compared to loss-associated distractors. These results suggest, that task-irrelevant positive and negative stimuli distract attention differently. The inverse saliency effect and the lack of a value effect can be accounted for by participants' strategies in dealing with the time pressure.

PERCEIVED DURATION OF COGNITIVELY DEMANDING TASKS: THE ROLE OF COGNITIVE LOAD AND TIME-ON-TASK

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Perceived duration of periods spent with cognitively demanding activities might depend on several factors including motivation, fatigue, and the required cognitive effort. Consequently, subjective duration of cognitive tasks assessed in experimental studies might be considerably varied across the levels of cognitive load and type of cognitive operations required. However, there is a little knowledge about the associations of task-specific cognitive operations and perceived duration of prolonged tasks. We addressed this issue in three studies. We investigated how participants estimate the time passed in prolonged – Time-on-Task – experiments demanding working memory ($N = 20$, Study 1), attentional switch ($N = 23$, Study 2), and time-loaded cognitive responses ($N = 20$, Study 3). In Study 1 and Study 2, participants performed a bimodal 2-back, and a bimodal task-switching task, respectively, for 1.5 hours without rest. In Study 3 participants performed a prolonged dual task under two different time-load conditions. In each study, reaction time, error rates, and electrocardiogram were continuously recorded. In addition, participants estimated task duration, and reported subjective fatigue. Duration of each task was significantly underestimated by 57% (Study 1), 36.8% (Study 2) and 26.8% (Study 3). Each study showed increasing heart-rate variability (HRV) and fatigue as a function of Time-on-Task whereas performance was compromised. In Study 1 higher increment in HRV associated with higher underestimation of time. Our results suggest that task duration is consistently underestimated in various cognitive tasks, but it also depends on the type of cognitive operations.

ATTENTIONAL BIASES TOWARDS THREATENING STIMULI IN SOCIAL ANXIETY AND THE ROLE OF EMPATHY

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Many studies have claimed that when individuals observed threatening stimuli, they would demonstrate some attentional biases, such as attention maintenance or avoidance, which might be either a useful emotion regulation strategy or a cause of increased anxiety. In the current study, it was hypothesized that people with social anxiety would demonstrate a longer viewing time to angry face than other faces and an avoidance behavior which would lead them to look faster away from the threat. We used a face recognition task to reveal different attentional biases in participants viewing threatening (e.g., angry) and non-threatening (e.g., happy, sad and neutral) face photographs. Since the attentional biases and expression recognition processes are affected by social anxiety and empathy level of individuals, participants were grouped by these measures. Seventy participants were asked to find a target face in a 2 x 2 display while they could view only one face at a time. Their viewing time to each face was used as an index of attention maintenance and the gap duration between faces were analysed to reveal attentional avoidance after viewing threatening or non-threatening stimuli. Social anxiety and empathy levels of the participants were measured with questionnaires. The results indicated that individuals viewed non-threatening faces longer than angry face and showed shorter gap duration after viewing angry face regardless of their anxiety level. These findings are discussed in terms of the effects of the severity of social anxiety and/or emotional stimuli on individuals' attentional processes.

CULTURAL INFLUENCES ON SPATIAL COGNITION: EVIDENCE FROM EGOCENTRIC AND ALLOCENTRIC SIMON EFFECTS

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Christina Bermeitinger (University of Hildesheim, Germany)

We recently developed a variant of the Simon task using multiple reference frames (Baess & Bermeitinger, submitted). Stick-figure manikins were used holding a colored ball on either hand (allocentric reference frame). Stimuli occurred on the left or right side of the screen's center (egocentric reference frame). Moreover, the amount of stimuli simultaneously shown on the screen varied between blocks introducing a non-spatial, perceptual reference frame. In the 1-manikin condition, one stimulus was shown on different spatial positions. In contrast, in the 9-manikin condition, a set of nine identical manikins was shown. In the current study, we used this paradigm in a German and Malaysian sample. Both countries differ in some spatial aspects in daily life, e.g., their side of driving on the road (right vs. left side) or their experience with other reading directions (only left/right vs. also up/down). By comparing these two cultures, the influence of environment is assessed. Differences between the Malaysian and German group were found in the formation of the allocentric Simon Effects (SE) based on the manikin's ball position. Larger allocentric SE was obtained in the 9-manikin condition in the Malaysian sample compared to the 1-manikin condition. No such difference in allocentric SE was yielded for the German sample. Taken together, the results show that the allocentric reference frame is particularly shaped by the different culture of the participants.

STUDYING THE DYNAMICS OF VISUAL SEARCH BEHAVIOR USING RT HAZARD AND MICRO-LEVEL SPEED-ACCURACY TRADEOFF FUNCTIONS: A ROLE FOR RECURRENT OBJECT RECOGNITION AND COGNITIVE CONTROL PROCESSES

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Rani Moran (University College London, UK)

Maximilian Wolkersdorfer, Thomas Schmidt
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When testing quantitative predictions of cognitive models of the processes underlying behavior such as visual search, measures like mean correct response time (RT) and percent error do not suffice to select between different models. Recently, to move beyond mean performance measures in visual search, RT histograms have been plotted, theoretical waiting time distributions have been fitted, and cognitive models have been developed that can simulate whole RT and error distributions. Here we promote and illustrate the general application of discrete-time hazard analysis to response times, and micro-level speed-accuracy tradeoff analysis to timed response accuracies. The results of an analysis of published benchmark search data from feature, conjunction, and spatial configuration search tasks reveal new features of visual search behavior, such as a relatively flat hazard function in the right tail of the RT distributions for all tasks, and individual differences in the presence of a systematic pattern of early errors. Furthermore, we illustrate that previous fits of two state-of-the-art cognitive search models – the competitive guided search model and a flexible parallel race model – fail to account for certain qualitative patterns in the shapes of the empirical RT and accuracy distributions. Our findings strongly suggest that the temporal dynamics of visual search behavior is resulting from recurrent object recognition and cognitive control processes.

TEMPORAL PREPARATION FACILITATES BOTTOM-UP PROCESSES IN SPATIAL SELECTION

Janina Balke, Verena Seibold (University of Tübingen, Germany)

Temporal preparation improves our perception by helping us to bundle our resources on a specific future event. This holds also true for visual search where temporal preparation has been shown to facilitate spatial selection of targets. The question how temporal preparation improves spatial selection is still open: It could operate in a bottom-up manner by accelerating perceptual processing speed or raising local feature contrast non-selectively. Otherwise, it could operate top-down by selectively preactivating known target features. These two hypotheses were tested in a visual search experiment ($N = 32$): Participants searched for a pop-out target defined by a unique feature (color or shape). We manipulated temporal preparation by presenting a warning signal before each search display and varying the duration of the preparatory interval (blocked foreperiods of 800 and 2,400 ms). Furthermore, to separate bottom-up from top-down effects, we manipulated local feature contrast (high or low contrast via a setsize manipulation) and we manipulated the degree of prior knowledge (by informing participants about the target-defining pop-out feature or not). We observed that reaction times to targets were accelerated by temporal preparation and that this preparatory effect was larger when local feature contrast was low. In contrast, prior knowledge about the target-defining feature did not modulate the effect of temporal preparation. These results indicate that temporal preparation facilitates bottom-up processes in spatial selection, presumably by increasing local feature contrast if it is initially low.

ATTENTIONAL PROCESSES IN MULTIPLE-CUE JUDGMENTS

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To make accurate judgments, individuals need to distinguish between aspects that are relevant for the task at hand and aspects that can be ignored. This study addresses the question of how attention interacts with the importance people assign to different aspects and thereby allows individuals to detect and adapt to changes in the features' importance. Past research suggests that individuals pay more attention to salient information, when no prior knowledge is available, but learning shifts attention towards more predictive features. However, it is still unclear if individuals adjust their hypotheses about each features' importance because new, salient information is introduced or previously learned information becomes irrelevant. To contrast these two attentional mechanisms, 50 participants learned to predict in an initial learning phase which feature was important for making a correct judgment. In two subsequent relearning phases, the feature that best predicted the judgment changed, while at the same time another feature became salient. We manipulated salience by increasing the dispersion on the respective feature. After each judgment, participants rated how important each feature was for their judgment. As predicted, judgment accuracy declined after the predictive feature changed. However, people still rated the previously important feature as important for their judgment, but neglected salient new information. The importance weights inferred from participants' judgments matched the explicit importance ratings remarkably well. These findings suggest that people attribute judgments errors more strongly to a previously important feature than a currently more salient one.

DOES ALERTNESS BIAS ATTENTION TOWARDS SALIENT STIMULI? EVIDENCE FROM STIMULUS-DRIVEN ATTENTIONAL CAPTURE

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Alertness is known for having a paradoxical effect in cognitive control tasks such as the Flanker task and the Global-Local task: It reduces overall reaction time, yet it increases congruency effects. According to one hypothesis, this increase in congruency effects arises because alertness biases attention towards salient stimuli. In two experiments ($N = 20$ and $N = 24$), I tested the scope of this salience hypothesis by investigating whether alertness also increases stimulus-driven attentional capture. Participants performed a visual search task in which they had to search for a singleton target defined by a unique feature (shape in Exp. 1; color in Exp. 2). To induce alertness, I presented an auditory alerting signal before the search display in half of the trials. To induce attentional capture, I presented an additional singleton (color singleton in Exp. 1; onset singleton in Exp. 2) within the search display in half of the trials. This additional singleton was completely task-irrelevant so that it should capture attention solely due to its salience. I observed that responses to targets were indeed slower in the presence of the additional singleton, suggesting that it captured attention. Yet, this effect was not increased by alertness as I would have expected on grounds of the salience hypothesis. These results suggest that alertness does not necessarily bias attention towards salient stimuli. Instead, this effect may depend on the type of conflict and on whether the salient stimuli are completely task-irrelevant or not.

FROM EYE TO ARROW: INFLUENCES OF NONSOCIAL AND SOCIAL CUES ON ATTENTION CAPTURE

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Previous research suggests that direct eye contact and motion are two independent and powerful cues for attention capture. In the present study, we investigated whether the direct gaze effect varies in relation to the level of social information represented by the stimuli. The task was to classify a target letter that appeared on one of four simultaneously presented stimuli. Initially, two of the stimuli directly addressed the participant (direct), while the other two stimuli pointed away from the participant (averted). One direct stimulus changed to averted and one averted stimulus changed to direct (motion) at the same time the target was presented, while the other two stimuli remained static (no motion). Stimuli were real eyes looking at or away from participants (experiment 1), comic eyes (experiment 2), real hands pointing at or away from participants (experiment 3), comic hands (experiment 4), or arrows pointing at or away from participants (experiment 5; $N = 20$ for each experiment). We hypothesized that the effect of being addressed (approach effect) is stronger for social cues, i.e. strongest in experiment 1 and weakest in experiment 5. This pattern would indicate that the approach effect relies on the available level of social information.

ATTENTIONAL CAPACITY IN MULTIMODAL CHANGE

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Merim Bilalić
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Previous research on inattention blindness has focused almost entirely on the visual modality. This study extends the paradigm by pairing visual with auditory stimuli. New visual and auditory stimuli were created to investigate the phenomenon of inattention in visual, auditory and paired modality. The goal of the study was to investigate to what extent paired visual and auditory stimuli influence the detection of change. The results show that the inattention blindness and inattention deafness occur in about 40 percent of participants while the attention is engaged by a difficult (auditory) counting task. Most significantly, the results demonstrate that the inattention blindness is significantly reduced when the change has been presented visually and auditorily. One possible reason for the drastic reduction of inattention changes in a multimodal context is that attention of the various sensory modalities is processed separately. If this assumption applies, then we can assume that the capacity of attention multiplies in different modalities.

MEDITATION AND ATTENTION

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The experiment researched the influence of eight weeks of a short daily meditation on attentional processes. Research showed that meditation enhances attentional processes (Bilican, 2016; Hodgins & Adair, 2010; Lippelt, Hommel & Colzato, 2014; Lutz, Slagter, Dunne & Davidson, 2008; Tang et al., 2007; Zanesco et al., 2016). The efficient allocation of attention is especially important given the restricted capacity of the attentional system. One paradigm which relies on the restricted visual attentional system is the change blindness paradigm. Change blindness is the relative inability to detect changes between scenes if the change signal is occluded (Rensink, 2005; Simons, 2000). The detection of changes highly depends on the allocation of attention to the object or spatial position which is changing (Shankin, Bergmann, Schubert, & Hagemann, 2016). It is thus hypothesized that meditation enhances the detection of changes and reduces the time to do so. 50 subjects completed two change blindness tasks. The experimental group (25 subjects) meditated in the eight weeks between the two change blindness test, whereas the control group (25 subjects) did not. The repeated measures ANOVAs showed that meditation significantly increases change detection and decreases reaction times. This seems to be the effect of the training of the monitoring and focussing aspect of attention through meditation (Lippelt et al., 2014, Lutz et al., 2008).

IMPACT OF CONTINUOUS, LATERALIZED AUDITORY STIMULATION ON VISUAL SPATIAL ATTENTION

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Sounds in our environment can easily capture our 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. listening to a person next to you while driving a car) impacts visual spatial attention (e.g. detection of critical events in traffic). Here, we investigated whether a continuous auditory stream presented from one side biases visual spatial attention toward that side. In four experiments, participants (each experiment $N = 16$), had to detect targets within a stream of lateralized visual stimuli. At the same time, a continuous auditory stream was presented via loudspeakers in a lateralized fashion. Auditory stimuli were either tone-pips, requiring a target detection response, or a spoken story, followed by a comprehension questionnaire. During a passive condition, auditory stimuli were presented from one side only. During an active condition, auditory stimuli were presented bilaterally, while participants had to actively listen to one target relevant side and ignore the other. We observed a small but significant cross-modal bias from auditory to visual spatial attention, which depending on the condition, encompassed decreases in response time and/ or increases in hit-rate for visual targets presented spatially congruent with the relevant auditory stream. Our results indicate that the presence of or attention toward a continuous auditory stimulus biases visuospatial processing. However, this effect is not as substantial as the previously reported impact of brief auditory stimuli upon immediately following visual stimuli.

INTEGRATION OR SEPARATION? EFFECTS OF VISUAL ATTENTION ON TEMPORAL AND SPATIAL PROCESSING OF WHOLE-BODY MOVEMENT SEQUENCES

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Temporal information of human movements, such as rhythm, is physically conveyed through spatial information, i.e., trajectory. However, whether the temporal and the spatial information are integrated during action observation or are processed separately as individual features remains unclear. To address this issue, we used a dual-task paradigm, in which participants ($n = 31$) performed a change detection task on whole-body movement sequences with three foci of attention: (a) temporal-only, (b) spatial-only and (c) both. Movement sequences, all without action semantics, could be different in either temporal (rhythm) or spatial (trajectory) domain in accordance with respective attention requirements of each condition. The results showed that participants' performance was significantly impaired when both temporal and spatial information were attended to as compared to only temporal or spatial information was in focus. Furthermore, a comparable dual-task cost in temporal and spatial domains, respectively, indicated that there was no trade-off or prioritization between the processing of temporal and spatial information. In conclusion, although temporal processing may rely on a certain level of spatial processing during action observation, no further integration was observed in the current study. A mutual interference suggests that these two information streams are processed separately and compete for a common pool of cognitive resources.

RECENT FINDINGS FROM EXPERIMENTAL STUDIES ON THE RE-OCCURRENCE OF REPETITIVE NEGATIVE THOUGHTS (SYMPOSIUM)

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Karina Wahl

(University of Basel, Switzerland)

The experience of getting stuck in one's own negative thoughts is extremely common and its pathological forms have been discussed as maintaining factors in several mental disorders. In this symposium, repetitive negative thoughts (RNT) is an umbrella term for negative, repetitive, and uncontrollable thoughts, images or memories that are intrusive and difficult to disengage from. Five presentations address either factors that influence RNT, such as negative appraisals, or factors that are influenced by RNT, such as positive affect. The first study investigates whether rumination – in comparison to distraction – has an imminent effect on unwanted intrusive thoughts about a car accident of a beloved person in undergraduate students. The second presentation addresses the question whether in high worriers, a positive interpretation training reduces levels of worry, compared to an active control group. The third study predicts that mode of rumination (abstract vs. concrete) and type of emotion (sadness vs. anger) have an interactive effect on affect. The fourth presentation shows that positive reappraisal training results in lower intrusion distress from negative autobiographical events than negative reappraisal training. Finally, the last presentation addresses the influence of positive memory elaboration training compared to control training on repetitive negative thoughts in daily life and concludes that positive memory elaborations are helpful in reducing RNT.

EFFECTS OF RUMINATION ON UNWANTED INTRUSIVE THOUGHTS: A REPLICATION AND EXTENSION

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Recent studies indicate that rumination might play a role in obsessive-compulsive disorder. In a previous experimental study, rumination about unwanted intrusive thoughts (UITs) maintained the urge to neutralize these thoughts and affected the perceived likelihood of UIT coming true. It did not, however, affect distress, depressed mood, or UIT frequency. Our aim was to replicate the results of the previous study and to extend them by including measures of behavioral and mental neutralizing. We activated the UIT by asking students ($N = 105$) to write down a sentence stating that they wished a loved person would die in a horrible car accident. Participants were then randomly allocated either to rumination about UIT, rumination about negative mood, or distraction. Manipulation checks indicated that we successfully induced either rumination or distraction. However, our experimental manipulation did not lead to two distinct types of rumination. We therefore combined the rumination groups for the analyses. Rumination lessened the decrease of urge to neutralize the UIT when compared to distraction, but did not affect the perceived likelihood of UIT coming true. Surprisingly, rumination also maintained distress and depressed mood. There was no change in UIT frequency. Regarding behavioral neutralizing, we detected a trend with participants who ruminated showing a neutralizing behavior more often than those who were distracted. There was no effect of rumination on mental neutralizing. The present findings support the view that rumination might indirectly contribute to the UIT maintenance.

UNDERSTANDING THE INTERPRETATION BIAS IN WORRY AND THE EFFECT OF COGNITIVE BIAS MODIFICATION FOR INTERPRETATION (CBM-I) ON REDUCING WORRY.

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Worry is a stream of negative thoughts about future events and can be maintained by the consistent tendency to generate interpretations (i.e. interpretation bias). Interpretations can be generated at the moment the ambiguity is first encountered (online) or later on reflection (offline). At present, it is unclear which specific types of interpretation are related to worry, and which can be modified by cognitive bias modification for interpretation (CBM-I) and therefore reduce the levels of worry. To address these questions, high worriers ($n=28$) and low worriers ($n=27$) were compared on different interpretation bias measures. "Offline" tasks assessed interpretations after the opportunity of reflection; while "online" tasks assessed initial interpretations when encountering ambiguity. Event-related potentials were also employed to examine neural activity when encountering ambiguous information. In line with our prediction, high worriers lacked benign interpretation biases that can be found in low worriers across different types of interpretation. In our second study, we investigated whether enabling high worriers to generate more positive interpretations can reduce the levels of worry. High worriers were randomly allocated into single session CBM-I training ($n=35$) or an active control group ($n=31$). Both online and offline interpretation biases were assessed post CBM-I. Consistent with our predictions, the training group showed greater online and offline benign interpretation biases and lower levels of worry compared to the control group. However, only the offline interpretation bias mediated the relationship between groups and levels of worry. These studies show that the benign interpretations high worriers lack can be promoted by CBM-I.

EFFECTS OF MODE OF RUMINATION AND TYPE OF EMOTION ON NEGATIVE AFFECT AFTER RECALL OF A SADNESS OR AN ANGER PROVOKING SOCIAL SITUATION

Carlotta V. Heinzel, Martin Mazanec, Roselind Lieb, Karina Wahl
(University of Basel, Switzerland)

In the context of depression, concrete rumination is seen as a more adaptive mode of rumination than abstract rumination. However, opposing findings have been reported in the context of anger. The aim of the present study was to investigate the differential effects of ruminative modes on two different types of emotion in an experimental study. We predicted an interaction between rumination mode and type of emotion. $N = 101$ participants were asked to recall either a sadness- or an anger-provoking social situation (between-subjects factor, random allocation). Subsequently, they were instructed to ruminate about this event in a concrete and abstract mode (within-subjects factor, order randomly allocated). Self-reported positive and negative affect (PANAS) and hostility (MAACL) were measured before and after rumination. Order effects resulted in an analysis focus on the first rumination period. We did not find the predicted interactions of rumination mode and type of emotion on negative affect. However, for participants recalling an anger-provoking social event, concrete rumination led to a stronger increase in hostility than abstract rumination. Our findings partially support the notion that rumination mode has differential effects on the emotion it is applied to. Further research directions are discussed.

EFFECTS OF RE-APPRAISAL TRAINING ON RESPONSES TO A DISTRESSING AUTOBIOGRAPHICAL EVENT

Marcella Woud, Felix Würtz (Ruhr-Universität Bochum, Germany)

Negative appraisals are a key factor suggested to be involved in the development and maintenance of PTSD. Research has shown that experimental induction of a positive or negative appraisal style before or after a laboratory stressor affects analogue posttraumatic stress symptoms such as intrusions and distress arising from experiencing intrusions. The present study aimed to extend previous findings by investigating the effects of experimentally induced re-appraisals on reactions to a naturally occurring analogue trauma. We expected that positive training, compared to negative training, would lead to a greater reduction in negative appraisals of the negative autobiographical event from pre to post-training, and lower intrusiveness of the memory over the subsequent week. Further, we hypothesized that positive training would lead to a greater reduction in implicit negative appraisals from pre to post-training, compared to negative training. Participants who had experienced a distressing life event ($N=65$) were asked to imagine themselves in the most distressing moment of that event and then received either positive or negative re-appraisal training. Results showed that the training indeed induced training-congruent appraisals, but group differences in changes in appraisals over training were only seen for explicit and not implicit appraisals. However, participants trained positively reported less intrusion distress over the subsequent week than those trained negatively, and lower levels of overall posttraumatic stress symptoms. These data support the causal relationship between appraisals and trauma distress, and further illuminate the mechanisms linking the two.

RECENT FINDINGS FROM EXPERIMENTAL STUDIES ON THE RE-OCCURENCE OF REPETITIVE NEGATIVE THOUGHTS

Michelle Moulds

(The University of New South Wales (UNSW Sydney), Australia)

The experience of getting stuck in one's own negative thoughts is extremely common and its pathological forms have been discussed as maintaining factors in several mental disorders. In this symposium, repetitive negative thoughts (RNT) is an umbrella term for negative, repetitive, and uncontrollable thoughts, images or memories that are intrusive and difficult to disengage from. Five presentations address either factors that influence RNT, such as negative appraisals, or factors that are influenced by RNT, such as positive affect. The first study investigates whether rumination – in comparison to distraction – has an imminent effect on unwanted intrusive thoughts about a car accident of a beloved person in undergraduate students. The second presentation addresses the question whether in high worriers, a positive interpretation training reduces levels of worry, compared to an active control group. The third study predicts that mode of rumination (abstract vs. concrete) and type of emotion (sadness vs. anger) have an interactive effect on affect. The fourth presentation shows that positive reappraisal training results in lower intrusion distress from negative autobiographical events than negative reappraisal training. Finally, the last presentation addresses the influence of positive memory elaboration training compared to control training on repetitive negative thoughts in daily life and concludes that positive memory elaborations are helpful in reducing RNT.

NEURO-COGNITIVE CONTROL MECHANISMS IN HUMAN MULTI-TASKING (SYMPOSIUM)

Sebastian Kübler
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Christine Stelzel
(International Psychoanalytic University, Berlin, Germany)

Multitasking, i.e. performing more than one task concurrently, has become an ubiquitous and inevitable aspect of our modern life. Although it might seem that we do not have any difficulties with performing temporally overlapping tasks, usually severe performance decrements emerge in these multitasking situations. In the last decades, a vast body of theories from behavioral research has explained the persistent occurrence of performance decrements in multitasking and the role of cognitive control mechanisms in dealing with these. Based on these profound conceptions, in this symposium we aim to further advance the understanding of the neural mechanisms involved in specific aspects of human multitasking, focusing on neuro-cognitive control mechanisms involved in concurrent task processing. For this purpose, a series of empirical studies employing various neuroscientific research methods will be presented. These studies cover the role of different brain regions such as the basal ganglia or the lateral prefrontal cortex for enabling multitasking performance. Furthermore, the studies address how structural as well as functional brain differences can account for individual differences in cognitive as well as cognitive-motor multitasking performance. Also, they will shed light on neuro-cognitive subprocesses that are required for multitasking, such as executive control or error-monitoring. In addition to these studies, in a concluding discussion we will integrate the findings and provide perspectives for future research.

THE RELEVANCE OF STRIATAL AND WHITE MATTER ANATOMICAL MICROSTRUCTURE FOR MULTI-TASKING AND RELATED FUNCTIONS

Christian Beste (TU Dresden, Germany)

Multitasking and related processes play an essential role to achieve long-term goals. However, we are currently only at the beginning to understand the neural mechanisms underlying these processes. This is particularly the case for the role of subcortical structures showing close connections to prefrontal regions that have traditionally been implicated in action control. Yet, the basal ganglia play an essential role in these processes. I present a series of studies detailing the role of the GABAergic striatal system and the structural aspects of the basal ganglia for multi-tasking. I show that efficient multi-tasking critically depends on striatal function. A high level of GABAergic tone and a high integrity of even small microstructural elements of the basal ganglia (i.e. the striosomes) is essential for efficient multi-tasking. The same is the case for seemingly miniscule variations in white matter integrity as measured using novel single-molecule immune-assay approached. I show how these grey and white matter neuroanatomical aspects have clear-cut effects on distinct physiological (EEG) correlates of cognitive subprocesses involved in multi-tasking.

COGNITIVE-MOTOR MULTITASKING – INDIVIDUAL DIFFERENCES IN LATERAL FRONTAL CONTROL

Hannah Bohle (International Psychoanalytic University, Germany)
Gesche Schauenburg (Universität Potsdam, Germany)
Henrik Walter (Charité – Universitätsmedizin Berlin, Germany)
Urs Granacher (Universität Potsdam, Germany)
Stephan Heinzel (Freie Universität Berlin, Germany)
Michael Rapp (Universität Potsdam, Germany)
Christine Stelzel (International Psychoanalytic University, Germany)

Dual-task decrements in concurrent working memory and balance performance have critical outcomes such as falls. Concurrent performance of two cognitive tasks is associated with additional processing demands in the lateral prefrontal cortex (IPFC; D'Esposito et al., 1995; Schubert and Szameitat, 2003). Also postural control seems to involve higher cortical processes (Jacobs and Horak, 2007; Papegaaij, 2014), particularly in old adults. However, little is known about the role of the IPFC in the concurrent processing of cognitive-postural tasks. Twenty-nine young adults (age 19-30 years, $M = 24.8$) and 21 old adults (age 63-83, $M = 72.04$) performed single- and dual one-back tasks during fMRI. In addition, they performed these tasks on a force plate in semi-tandem stance outside the scanner (postural task), resulting in cognitive-postural dual and triple tasks. Individual differences in postural control ('center of pressure displacements') were then used as covariates in the fMRI analysis. Behavioral performance costs in postural sway during dual-one back performance differed largely between and within age groups and so did IPFC recruitment during cognitive dual-tasking. Most importantly, even young individuals who recruited the right mid-IPFC to a larger degree also showed greater postural sway. The findings suggest a crucial role of the right IPFC in allocating resources during cognitive-motor interference and provide further insight into the mechanisms underlying cognitive-motor multitasking.

INVESTIGATING THE CAUSAL ROLE OF THE LATERAL PREFRONTAL CORTEX FOR TASK-ORDER COORDINATION IN DUAL-TASK SITUATIONS

Sebastian Kübler (Humboldt-Universität Berlin, Germany)

Alexander Soutschek (University of Zurich, Switzerland)

Tilo Strobach (MSH Medical School Hamburg, Germany)

Torsten Schubert (Martin-Luther-Universität Halle-Wittenberg, Germany)

Dual-tasks are characterized by the requirement for additional task-order coordination processes that schedule the processing order of two temporally overlapping tasks. Data from functional imaging studies suggest that lateral prefrontal cortex (LPFC) may be recruited for implementing these task-order coordination processes. So far, however, it is unclear whether the LPFC is indeed causally involved in coordinating task-order in dual-task situations. We addressed this open issue by applying online transcranial magnetic stimulation (TMS) during dual-task performance. Participants performed a dual-task consisting of two choice reaction time tasks in fixed-order blocks with a constant order of both component tasks, and in random-order blocks, in which the order of tasks varied randomly and, thus, demands on task-order coordination were increased. While in fixed-order blocks stimulation had no effect on dual-task performance, TMS of the LPFC slowed reaction times compared to two control conditions in random-order blocks when demands on task-order coordination were increased. These results provide evidence for the causal involvement of the LPFC in task-order coordination during dual-task situations.

ADAPTIVE RESCHEDULING OF ERROR AWARENESS IN DUAL-TASKING

Robert Steinhauser, Marco Steinhauser

(Catholic University of Eichstätt-Ingolstadt, Germany)

The concurrent execution of two temporally overlapping tasks leads to considerable interference between the subtasks, which is overcome by a bottleneck mechanism that establishes central processing of only one task at a time. Here, we show that such a serialization mechanism can also be found on the level of response monitoring. In the present study, a psychological refractory period (PRP) paradigm was used, in which we compared neural correlates of error monitoring to errors in Task 1 in a dual-task condition (stimulus onset asynchrony, SOA = 300 ms) and a baseline condition with sufficient time for separated task execution (SOA = 1200 ms). While we found the error-related negativity (ERN), an early correlate of preconscious error processing, to be unaffected in the dual-task condition, the error positivity (Pe), a correlate of conscious error awareness, was considerably reduced immediately after the erroneous response in Task 1. However, a distinct Pe emerged after the response to Task 2 although the response to this second task itself was correct. Single-trial analysis showed a negative correlation of the amplitudes of the immediate and the deferred Pe. The occurrence of such a deferred Pe was confirmed in a second experiment, which furthermore showed that the deferred Pe did not result from Task 1 errors being falsely assigned to Task 2. We interpret this finding as an adaptive mechanism that defers conscious error processing until both tasks have been completed to reduce interference.

DOES THE CENTRAL ATTENTIONAL BOTTLENECK IN MULTITASKING DEMAND EXECUTIVE FUNCTIONS OF WORKING MEMORY? AN fMRI STUDY.

Andre Szameitat, Pauldy Otermans
(Brunel University, UK)

When two speeded choice response tasks have to be performed simultaneously or in close succession (paradigm of the psychological refractory period, PRP) the second task is usually severely deferred (PRP effect), indicating a central attentional bottleneck. There is growing evidence that such a bottleneck demands additional mental processes, such as inhibition, switching, updating, and monitoring. Interestingly, these are the same processes typically used to describe executive functions of working memory, such as the Central Executive System of Baddeley and Hitch's model. However, currently it is unclear whether just the nomenclature is the same, or whether the control of simultaneous choice response tasks actually demands the executive functions of working memory. To test this, participants underwent fMRI scanning while performing (a) a PRP dual-task and (b) a complex working memory span task. We proposed that additional (i.e., over-additive as compared to the summed component tasks) activation in (a) would be linked to bottleneck coordination and in (b) to executive functions of working memory. Imaging results showed that both tasks activated virtually identical areas in lateral-prefrontal cortices, suggesting that the underlying mental processes are similar as well. We conclude that coordination of task processing at a central attentional bottleneck demands the executive functions of working memory.

ADVANCES IN AUDITORY DISTRACTION RESEARCH (SYMPOSIUM)

Raoul Bell

(Heinrich Heine University Düsseldorf, Germany)

Jan Philipp Rörer

(Universität Witten/Herdecke, Germany)

It is a well-established finding that working memory processes are disrupted by distractor speech. Different theories have been proposed about the mechanisms that are responsible for the disruptive effect. The symposium will bring together researchers with divergent theoretical positions who will present novel findings about the acoustic and semantic properties that cause auditory distraction and the types of processes that are susceptible to it. The talks will broaden our knowledge about why it is so difficult to ignore irrelevant speech and provide new insights on how cognitive processing can be shielded from its detrimental effects. These advances in auditory distraction research are not least driven by methodological improvements such as rigorous power analyses, preregistered replications, Bayesian meta-analyses and precise (mathematical) formulations of hypotheses.

SEMANTIC PROCESSING OF AUDITORY DISTRACTOR SPEECH: WHAT WE KNOW AND WHAT WE STILL NEED TO FIND OUT

Jan Philipp Röer
(Witten/Herdecke University, Germany)

Raoul Bell, Axel Buchner
(Heinrich Heine University Düsseldorf, Germany)

In this talk, I will give an overview of our research program on the semantic mismatch effect which refers to the finding that auditory distractor sentences with semantically unexpected endings (e.g., “In autumn, the leaves change colour and fall from the bed.”) are more disruptive to serial recall than sentences with semantically expected endings (e.g., “In autumn, the leaves change colour and fall from the trees.”), suggesting that to-be-ignored words are not only processed at the level of individual word meanings, but also at the level of their match to the preceding semantic context. I will present data from experiments that have explored the roles of attentional capture, foreknowledge, and individual differences in working memory capacity, and conclude with a discussion of theoretical implications and avenues for future research.

WHAT DETERMINES AUDITORY DISTRACTION? EVIDENCE FROM THE TOKEN SET SIZE EFFECT

Raoul Bell (Heinrich Heine University Düsseldorf, Germany)
Jan Philipp Röer (Witten/Herdecke University, Germany)
Axel Buchner (Heinrich Heine University Düsseldorf, Germany)

Serial recall is disrupted by to-be ignored auditory distractor sequences consisting of one-syllable words or brief instrumental sounds. The dominant theoretical explanation of this effect implies that distraction is determined by mismatches between immediately successive auditory distractor objects. The token set size effect is a label for the claim that one-token distractor sequences consisting of a single repeated distractor object (e.g., AAAAAAAA) disrupt recall less than two-token distractor sequences consisting of alternating distractor objects (e.g., ABABABAB) whereas there is no further increase in disruption when token set size is further increased to more than two (e.g., ABCDEFGH). Furthermore, one-token sequences should cause no disruption relative to quiet. As yet, the evidence seemed to support these predictions, but conclusions were based on studies with insufficient sample sizes. With sufficient statistical power, distraction increases not only when the token set size is increased from one to two, but also when it is increased from two to eight, and there is also robust disruption by one-token sequences relative to quiet. These findings are consistent with a graded attentional model according to which auditory distraction increases monotonically as a function of token set size.

AUDITORY DISTRACTION AS A CASE STUDY IN DOMAIN-GENERAL VS DOMAIN-SPECIFIC COGNITION. WHAT HAVE WE LEARNED?

Philip Beaman (University of Reading, UK)

Theories of the “irrelevant sound effect” can be broadly divided into domain-general accounts making reference to divided attention and/or orienting and habituation (Bell et al. 2012; Cowan, 1995; Neath, 2000) and domain-specific accounts positing interference between the distractors and specific cognitive processes or representations (Jones, 1993; Page & Norris, 2003; Salamé & Baddeley, 1982). To date, such theories have generated only qualitative predictions – e.g., effect X should be present or not – and domain-general accounts in particular suffer from logical circularities in their application (Allport, 1980). A failing of all accounts is a lack of specificity and the degrees of freedom they allow researchers when deriving specific predictions. Here the mathematical function a particular quantitative manipulation – the token set-size effect (Tremblay & Jones, 1998) – might be expected to take (given particular implementations of domain-general and domain-specific accounts) is considered. A Bayesian meta-analysis is then applied to the results of published studies identified as examining token set-sizes of three or more and the likelihood ratios calculated for hypotheses labelled “strong changing-state”, “token-saturation” and “orienting-hypothesis”. These hypotheses are considered to predict auditory distraction as a mathematical function of token set-size in the following three ways: thresholded, a broken power-law and a linear function. As per Newell (1973) it is concluded that if researchers wish to “play 20 questions with nature and win”, they must first define what they regard as a “correct answer”.

IRRELEVANT BACKGROUND SPEECH DISRUPTS SERIAL SHORT-TERM MEMORY FOR VERBAL BUT NOT FOR SPATIAL INFORMATION: A PRE-REGISTERED REPLICATION STUDY

Tatiana Kvetnaya (Goethe University Frankfurt, Germany)

Kristina Schopf, Florian Wickelmaier (University of Tübingen, Germany)

The irrelevant speech effect (ISE)—the phenomenon that background speech impairs serial recall of visually presented material—has been widely used for examining the structure of short-term memory. Jones, Farrand, Stuart, and Morris (1995) employed the ISE paradigm to challenge modularity as a fundamental principle of working memory. In Experiment 4, they observed an ISE in both verbal and spatial serial memory tasks, thereby demonstrating that changing-state characteristics of the material, rather than its modality of origin, may determine the impairment of memory performance. The present study constitutes a cumulative, pre-registered replication of Experiment 4 with 80 German participants ($n = 40$ per memory task condition). In line with Jones et al. (1995), a main effect of sound condition was observed for the verbal domain ($F(2, 78) = 20.66, p < .001, \eta^2p = .35$), with disruption being more marked for a changing sequence of spoken syllables than for a steady sequence. However, no such cross-modal effect was replicated for the spatial domain ($F(2, 78) = 0.81, p = .450, \eta^2p = .02$). Contrary to the original findings, this resulted in an interaction of sound condition and task domain ($F(2, 156) = 8.96, p < .001, \eta^2p = .10$). These results do not support a model of functional equivalence of verbal and spatial information in serial short-term memory.

DOES TRAINING IN AUDITORY FILTERING REDUCE THE IRRELEVANT SPEECH EFFECT ON SERIAL RECALL?

Florian Kattner

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Wolfgang Ellermeier

(TU Darmstadt, Germany)

Task-irrelevant speech is known to interfere with the short-term retention of verbal information in serial order. While this phenomenon is usually very robust, there is evidence that blind individuals (who are more efficient at auditory processing) are resistant to the irrelevant speech effect, and that other forms of auditory distraction can be reduced via cognitive control. In the present study, we test whether the interference produced by irrelevant speech can be reduced by enhancing auditory filtering abilities via training. Therefore, we developed a dichotic filtering task in which participants practiced to memorize verbal information presented to one ear and by a particular speaker (male or female) while auditory distractors were presented simultaneously both to the other ear and by a different speaker. The memory span was increased with the participant's performance throughout five training sessions, indicating enhanced filtering of the task-irrelevant verbal information in a dichotic listening situation. More importantly, the disrupting effects of irrelevant free-running speech on the serial recall of both visually and acoustically presented digits was reduced from pre- to post-test, whereas no decrease in the irrelevant speech effect was found in an active control group that was trained in an auditory duration discrimination task (using non-speech stimuli). The results suggest that training-related enhancement of the filtering mechanism of verbal short-term memory may help to reduce the interference produced by irrelevant speech, which is typically assumed to gain obligatory access to verbal short-term memory.

CAN BACKGROUND SPEECH PRIME SOLUTIONS TO VERBAL PROBLEMS?

John E. Marsh

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Jan Philipp Rörer

(Witten/Herdecke University, Germany)

Emma Threadgold, Linden J. Ball

(University of Central Lancashire, UK)

Research has shown that background speech reaches semantic levels of analysis, despite instructions to ignore it. Words presented as auditory distracters during serial recall, are subsequently produced more frequently than non-primed words (Rörer, Körner, Buchner, & Bell, 2017). We investigate if priming could manifest in the context of compound remote associate (CRA) (Experiments 1 & 3) and anagram problem solving (Experiment 2). We presented solution words to problems within streams of to-be-ignored auditory distracters while participants memorised visual targets for serial recall. In Experiments 1 and 2, solution words were either embedded within streams of changing (e.g., g, q, cheese, v, l, m) or repeated distracters (e.g., g, g, cheese, g, g, g). In Experiment 3, solution words were embedded within streams of other words. In Experiments 1 – 3 this was contrasted with streams of distracters presented without solution words. Participants were then required to solve CRAs (Experiments 1 and 3) or anagrams of CRA solutions (Experiment 2), pitched as a ‘norming’ study. When the solution words had been previously presented as distracters, they were solved with higher probability than problems from a parallel non-presented set. This priming effect was contingent on the distracter sequence context. Priming occurred for solution words embedded within streams of changing but not repeated distracters or sequences of other words, and for CRAs (Experiment 1), but not anagrams (Experiment 2). Findings are discussed in terms of the fate of unattended speech, and processes underpinning problem solving.

MOTIVATION AND INTEREST (INDIVIDUAL TALKS)

CONFIDENCE GUIDES SPONTANEOUS COGNITIVE OFFLOADING

Annika Boldt, Sam Gilbert (University College London, UK)

Recent research into prospective memory has begun to acknowledge the important role reminders play when fulfilling delayed intentions. Here, we study under which circumstances such 'cognitive offloading' can be observed. Most previous studies that investigate offloading explicitly instruct participants to set reminders and then allow them to freely choose whether or not to adopt this strategy. This procedure makes it difficult to determine whether people would have spontaneously adopted similar offloading strategies or whether they are just compliant with the instructions. We developed a paradigm that is sensitive to a more spontaneous form of offloading: People were instructed to move disks to the bottom of the screen in a certain order. In addition, they had to remember to move a subset of the circles elsewhere. Half of the participants were instructed about an offloading strategy, whereas the others had to generate this strategy spontaneously. We find that both the instructed and the spontaneous group set reminders, but that the instructed group showed a higher propensity to offload their intentions. Reminder setting improved performance in both groups compared to unaided memory performance. Critically, in both groups offloading was guided by metacognition, that is people's insight into their own performance: People set more reminders when they were less confident. Taken together, our findings have important implications for the development of interventions to improve fulfilment of delayed intentions by targeting metacognitive insight.

FROM PRE-TRAINING EVALUATIONS TO MOTIVATIONAL STATES - DETERMINANTS OF THE EFFECTIVENESS OF APPROACH-AVOIDANCE TRAINING

Anand Krishna, Andreas B. Eder
(Julius-Maximilians-Universität Würzburg, Germany)

Although approach-avoidance training (AAT) has been suggested by previous research as an intervention to help limit problematic consumption, its effects have not always proven easy to replicate. We present research that attempts to address this problem by: (a) systematically testing methodological influences on the effect; (b) improving our theoretical understanding of AAT by identifying circumstances in which differing theoretical accounts might be empirically distinguished; and (c) presenting the results of exploratory moderator analyses. Four studies (N = 300) failed to show an AAT effect on consumption or attitudes with unfamiliar soft drink targets despite varying the induction of the approach/avoidance goal, the order of dependent measurement and despite obtaining a modification of the response tendency towards the drinks. A further two studies (N = 132) obtained a moderation of the AAT effect on post-training implicit liking towards familiar soft drinks by pre-training implicit liking. The pattern of results implied that AAT effects may be driven by the congruency of the approach/avoidance response to the evaluation of the target. Finally, exploratory analyses conducted on the latter studies suggest that target-relevant motivational states may influence the encoding of training effects and that trait reactance and attitude ambivalence may play an important role in determining explicit judgments of AAT targets.

THE INFLUENCE OF DECORATIVE PICTURES ON LEARNING, INTEREST, AND METACOGNITION

Demian Scherer, Annika Verkühlen, Stephan Dutke
(University of Münster, Germany)

Decorative pictures are frequently incorporated in schoolbooks, science magazines, and instruction materials. Recent research on decorative pictures and seductive details mainly addressed effects on immediate learning outcomes. However, in educational settings, effects on learners' interest and metacognition are also of importance. Therefore, in two experiments, we assessed (besides retention and transfer performance) measures of triggered situational interest, maintained interest, and metacognitive measurements (based on the correctness of confidence judgments). Experiment 1 was conducted with a sample of pre-service teachers and demonstrated that materials with decorative pictures facilitated retention performance (but not transfer performance), although decorative pictures did not increase interest. Results further indicated that decorative pictures fostered metacognition. Materials with decorative pictures enhanced confidence in the correctness of answers to retention items (but not to transfers items) compared to materials without decorative pictures. Participants who learned with decorative pictures discriminated better between correct and incorrect answers. Experiment 2 was conducted in a school setting with 13 to 15 year old students. Again, decorative pictures did not increase interest. As the overall learning performance was comparably low, the planned analyses did not show any effects of decorative pictures on retention, transfer or metacognition measures. However, explorative analyses indicated that more successful learners benefited from decorative pictures with regard to their metacognitive performance. Beneficial effects of decorative pictures on retention and metamemory (but not on transfer and interest) can be explained by the use of the pictures as retrieval cues or by passive maintenance processes.

CONTAGIOUS STRESS: EFFECTS OF SOCIAL IDENTIFICATION

Valerie A. Erkens (Justus-Liebig Universität Gießen, Germany)

Urs M. Nater (Universität Wien, Austria)

Jan A. Häusser (Justus-Liebig Universität Gießen, Germany)

Contagious stress describes the transmission of a physiological stress response in an individual observing a target who is undergoing a stressful situation, while the observer is merely watching the situation. Following previous research, we expected to find a physiologically significant increase in salivary cortisol levels after observing a target in a stressful situation. Additionally, building on the social identity approach, we hypothesize that a shared social identity moderates contagious stress reactions, that is, contagious stress reactions should occur with greater likelihood when an ingroup member is observed as compared to an outgroup member. We used a 2-factorial mixed design (between subject factor identity salience: social vs. personal) and repeated measurements (six times, within-subject factor) of cortisol and subjective stress. Participants attended the experiment in groups of four or five. After inducing either a shared social or a personal identity, one participant was randomly chosen to undergo the Trier Social Stress Test (TSST) (targets: $n = 27$) while being observed by the rest of the group in a face-to-face situation (observer: $n = 89$). Salivary cortisol and affective stress were assessed multiple times before and after the observation of the TSST. A total of 16% of all observers showed a physiologically significant increase in cortisol levels higher than 1.5 nmol/l. As predicted, the ratio of physiologically significant contagious stress reactions was higher in the social identity condition (25%) as compared to the personal identity condition (7%) ($\chi^2 = 5.64$, $p = .018$).

SOMETHING FROM NOTHING: AGENCY FOR DELIBERATE NON-ACTIONS

Roland Pfister, Wilfried Kunde, Katharina Schwarz, Lisa Weller
(University of Würzburg, Germany)

Several law systems punish non-actions such as failures to render assistance, although it is unknown if and how people spontaneously experience agency and responsibility for the consequences of their not acting. We will present evidence that events caused by deliberate choices not to act indeed give rise to a vivid sense of agency. This was true not only for subjective judgments (Exp. 1: $n = 34$) but also for implicit measures of temporal binding (Exp. 2: $n = 34$), indicating that sense of agency is not confined to overt body movements. These results replicated in two follow-up studies (Exp. 3: $n = 34$; Exp. 4: $n = 40$). At the same time, agency was more pronounced when the same event resulted from an action rather than being the consequence of a non-action, highlighting the importance of ascribing different degrees of responsibility for the consequences of acting and not acting.

BOTH SHIELDING AND RELAXATION CONTRIBUTE TO CONFLICT ADAPTATION

Anja Berger
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Rico Fischer
(University of Greifswald, Germany)

Gesine Dreisbach
(University of Regensburg, Germany)

According to the prominent conflict monitoring theory (CMT), exertion of cognitive control is triggered by the detection of conflicting response tendencies. Recent research has challenged this widely supported notion and has partly come to different conclusions on whether shielding after incongruent or relaxation after congruent trials mainly drive sequential adaptation of control. To further investigate the rarely commented role of congruent trials, we conducted two experiments using a visual (Experiment 1, N=31) and an auditory (Experiment 2, N=31, preregistered) number-Simon task with digits presented laterally to the left or right (creating response congruent and incongruent trials) or without any particular spatial information (creating neutral trials). We hypothesized that the Simon effect after incongruent and after congruent trials should differ in size from the Simon effect after neutral trials. Both experiments showed converging results: In errors and reaction times, the Simon effect was small following incongruent trials, large following congruent trials, and it was in-between after neutral trials. This suggests that sequential control adaptations in this task origin from two processes: Increased shielding in response to incongruent trials and relaxation in response to congruent trials. With congruent trials obtaining more importance for control adaptation theoretically, we suggest a more general way of fluency monitoring instead of mere conflict monitoring. This extension of the CMT provides answers to the hitherto open questions of how control is relaxed again in response conflict tasks and might be insightful and important impulse for future research on behavioral or even psychophysiological and neural levels.

IT'S ALL IN THE SMILE – THE EFFECT OF REDUCED ANTHROPOMORPHIZED PRODUCT PRESENTATION

Robert Schorn

(UMIT – Private University for Health Sciences, Medical Informatics and Technology, Austria)

Dagmar Abfalter

(University of Music and Performing Arts Vienna, Austria)

Anthropomorphizing products and brands is frequently used to induce automatic behavioral effects in response to brand or product exposure. Our research focuses on the question whether the type of anthropomorphized presentation (positive or negative) on a) the product itself and b) the environment of the product has an influence on consumers' preferences of the product. In an experimental study, we presented variants of a chocolate bar in anthropomorphized packaging as well as watch straps with an empty anthropomorphized clock face to 208 students. Anthropomorphizing was reduced to a convex (positive) or concave (negative) swoosh resembling a mouth which was represented by the curved lettering or gradients on the chocolate packaging and drawing on the clock faces as the periphery to the watch straps. Results of between-subjects comparisons showed that participants preferred positively anthropomorphized products, both on the product packaging and more peripheral elements of the products. In a second study these results were further tested and confirmed in a real-life environment where participants actively chose between drinks whose anthropomorphized billboard announcements alternated weekly between positively and negatively curved lettering of the brand names. We conclude that anthropomorphized presentation, even when perceived unconsciously, influences consumers in their consumption decisions.

CONDITIONING (INDIVIDUAL TALKS)

IS THERE EVIDENCE FOR UNAWARE EVALUATIVE CONDITIONING IN A VALENCE CONTINGENCY LEARNING TASK?

Anne Gast, Jasmin Richter, Borys Ruzsipel
(University of Cologne, Germany)

In this talk, I present three experiments from a project on unaware learning in the valence contingency task. In this task, participants respond to the valence of a target word that is preceded by a nonword that is mostly paired with positive or mostly paired with negative targets. Schmidt and De Houwer (2012) showed that participants are faster and more likely correct on trials that conform to this contingency. In addition, they showed an EC effect on ratings in line with the contingency (i.e., participants indicate that they like nonwords mainly paired with positive words more than nonword mainly paired with negative words). The authors found no moderation of these effects by contingency memory. In Experiments 1a and 1b we replicated the findings on RT and errors but showed no EC effect on ratings. To test whether this dissociation was due to differences in the measurement tasks or due to the different phases, we designed for Experiment 2 a DV based on responses on neutral targets that was included in both learning and measurement phases. This measure showed an unaware learning effect, but the role of phase was inconclusive. Again, no memory-independent rating effect was found. To conclude, our findings show implicit learning effects in a valence contingency task. We found, however, no unaware EC effect on ratings. We discuss the discrepancies between our results and those of Schmidt and De Houwer and the implications for theories of EC.

DOES IMPLICIT MISATTRIBUTION OCCUR DURING EVALUATIVE CONDITIONING?

Jasmin Richter, Anne Gast (University of Cologne, Germany)

Evaluative conditioning describes a change in valence of a stimulus (CS) by pairing it with a valent stimulus. Multiple theories revolve around the processes that may underly this effect. According to the Implicit Misattribution Model (IMM; Jones, Fazio, & Olson, 2009), an evaluative response elicited by the US is mistakenly attributed to the CS. However, whether misattribution occurs during conditioning has not yet been investigated. In the current studies, CSs were evaluated directly after being paired with a US in a task similar to an Affect Misattribution Procedure (AMP; Payne et al., 2005). To control for mere priming effects, a stimulus that was never paired was evaluated instead for half of the pairs. We hypothesized that CSs should be evaluated according to the valence of the preceding US and this effect should exceed a mere priming effect. In two studies (N1=60, N2=97), US valence (marginally and significantly) affected CS evaluation directly after each pairing. In Study1, however, this effect tended to be opposite to the preceding US valence. In both studies, this effect was (marginally and significantly) larger for CSs compared to stimuli that were never paired. Changes of CS ratings (pre-post conditioning) were predicted by CS evaluations during conditioning rather than the valence of the paired US. Taken together, we found mixed support for misattribution during conditioning: The contrast effect in Study1 contradicts misattribution, whereas results of higher-powered analyses in Study2 are in line with our hypothesis and the IMM. Possible explanations and open questions will be discussed.

WHAT IS A PAIRING IN EVALUATIVE CONDITIONING?

Lea Sperlich, Christian Unkelbach
(University of Cologne, Germany)

Evaluative Conditioning (EC) is defined as the change in the liking of a neutral stimulus (CS) due to its pairing with a positive or negative stimulus (US; De Houwer, 2007). An EC effect usually occurs when the US (e.g. the picture of a kitten) is presented with a CS (e.g. a Kanji). A so far neglected question in EC research is what constitutes a pairing. We hypothesized the pairings constitute mental episodes that are marked by various internal or external factors. For example, judging a stimulus might close mental episodes, while withholding judgments keeps them open (Zeigarnik, 1927). In three experiments, we investigated such judgments as a means to parse the stream of potential CSs and USs into a sequence of pairings (Radvansky, 2012). Results showed that judgments of the US in the middle of a pairing prevent the transfer of US valence to the CS, even though judging the US valence validates US valence, which should in turn lead to stronger EC effects. However, according to our reasoning, the judgment closes the mental episode and CS and US are no longer seen as a pairing.

RELATIONAL INFORMATION AFFECTS ATTRIBUTE CONDITIONING

Fabia Högden, Christian Unkelbach
(University of Cologne, Germany)

Attributes can be ascribed to persons through attribute conditioning (AC): the mere co-occurrence of a person (CS) and another person possessing that attribute (US). AC has procedural and theoretical similarities to evaluative conditioning (EC), which is the phenomenon that neutral stimuli's evaluations assimilate to positive or negative stimuli they co-occurred with. We aimed to distinguish AC from EC on the level of mental processes by introducing a like/dislike relation between CS and US in four experiments. In EC, this relational qualifier has been shown to affect CSs' evaluation which was interpreted as evidence for the contribution of propositional processes. In AC, however, from a propositional perspective, judgments on an attribute dimension should be unaffected by whether CS and US like each other. Our results from 808 participants in total, however, showed that it did: when the CSs liked each other, we observed a standard AC effect; whereas, when they disliked each other, AC effects were reduced or reversed. In Experiment 4, we measured the degree to which participants interpret the like/dislike relation as similarity between CS and US and tested whether this proposition mediates the effect. We discuss the theoretical implications for AC.

THE INFLUENCE OF AVERSIVE UNCONDITIONED STIMULI IN EVALUATIVE CONDITIONING

Taylor Benedict, Anne Gast (University of Cologne, Germany)

Evaluative conditioning (EC) is a change in the liking or preference of a stimulus (conditioned stimulus or CS) due to its previous pairings with another stimulus (unconditioned stimulus or US). In three preregistered experiments, we conditioned CSs with aversive USs commonly used in fear conditioning, where explicit memory for the pairings may not always be necessary to produce a conditioned fear response. We therefore tested the hypothesis that if CSs paired with negative USs are aversive rather than non-aversive, there will be a larger unaware contribution to the EC effect. Experiment 1 used a between-participants design to manipulate US aversiveness with images, Experiment 2 used a within-participants design to manipulate US aversiveness with auditory stimuli, and Experiment 3 used a variety of US images and auditory stimuli in a design where multiple USs were paired with each CS. All experiments failed to provide evidence that aversive USs lead to larger unaware EC effects than non-aversive USs. Furthermore, we did not find evidence of unaware EC in general. The result patterns of all three studies are in line with the assumption that the found EC effects are based on declarative memory. The results contribute to the larger goal in EC research of determining which conditions contribute to unaware EC effects.

CONFLICT MONITORING DURING REINFORCEMENT LEARNING: INDIVIDUAL DIFFERENCES OF MOCK SUSPECT AND NON-SUSPECT DIFFERENTIATION

Anja Leue, Katharina Nieden (University of Kiel, Germany)
Vera Scheuble, André Beauducel (University of Bonn, Germany)

The present study aims at elucidating the neural processes and the corresponding individual differences that are activated when information about mock suspects and mock non-suspects is processed. In this respect, we investigate individual differences of conflict monitoring and reinforcement learning (i.e., learning that is facilitated by feedback). We report data on $N = 100$ participants (30 male, mean age: 24.06 years) who performed a go/nogo learning task consisting of 16 face pictures (8 mock suspect vs. 8 non-suspect faces). Performing growth models based on a-priori hypotheses, our data reveal a significant decrease of the frontal N2 amplitude across task blocks (mean $\beta = .56$, $p < .01$, two-tailed) indicating highest conflict monitoring intensity in the initial task block when participants learned by trial-and-error which faces were pre-defined as mock suspects vs. non-suspects. The Block slope effects demonstrated that individuals with higher Trait-BAS and higher Reasoning sum scores invested more conflict monitoring in the initial vs. latter two task blocks ($\beta = -.20$, $p < .05$, two-tailed). Individuals with higher Trait-BIS and higher Reasoning sum scores revealed a more intense learning from correct feedback (i.e., more negative Feedback-Negativity) in the initial vs. latter two task blocks ($\beta = -.26$, $p < .05$, two-tailed). Sensitivity d' was higher for individuals with higher vs. lower Reasoning scores ($\beta = .33$, $p < .05$, two-tailed). The interaction of reinforcement-related personality traits and higher Reasoning ability reactively facilitates the investment of conflict monitoring and reinforcement learning in a forensic context.

EFFECTS OF GOAL-FRAMING AND ADDITIONAL INFORMATION ON PERCEIVED INFORMATION QUALITY, USEFULNESS AND BEHAVIOURAL INTENTION IN THE CONTEXT OF ENERGY SAVING TIPS

Maria Pankrath, Cristina Massen
(Bonn-Rhein-Sieg University of Applied Science, Germany)

To curb global warming and climate change, it is necessary to reduce energy-related emissions. Energy saving tips inform consumers about energy-saving behaviours and products, and thus can contribute to energy savings. To formulate effective tips this study explores, how additions to CO₂ savings in kg (framing of currency) and variations in framing of consequences (gain or loss) influence perceived information quality, usefulness and behavioural intention. The study also examines if there are differences between behaviour-oriented and investment-oriented tips. For this purpose, a 4 x 4 x 2 online experiment (N=352) was conducted - framing of currency (no addition, additional abstract information, comparison with car use, comparison with laptop use) and framing of consequence (obtained saving, forgone saving, avoided emission, caused emission) as between-subject factors and kind of tip (behaviour-oriented vs. investment-oriented) as within-subject factor. The analysis revealed that the behaviour-oriented tip was evaluated more positive than the investment-oriented tip, and that behaviour-related additions to CO₂-savings in kg lead to a higher perceived usefulness and behavioural intention. Framing of consequences had no effect. The results also indicate the relevance to differentiate between behaviour-oriented and investment-oriented tips as well as to consider adding information beyond CO₂-savings in kg.

VIRTUAL REALITY, SIMULATIONS AND GAMES (INDIVIDUAL TALKS)

VIRTUAL REALITY: A PARADIGM SHIFT TO ASSESS COGNITIVE AND SOCIAL FUNCTIONING

Roberta Sellaro, Bernhard Hommel (Leiden University, Netherlands)

Recent developments in virtual reality (VR) technologies have led scientists to consider VR as a fruitful tool for carrying out experimental studies in several fields of psychology and neuroscience. Such a proliferation in the use of VR technology in psychological research is mainly due to the limitless advantages that this tool offers over traditional experimental settings such as high control of the environment, the possibility of creating ecologically valid research protocols, and of subtly manipulating features of the environment and/or of the participant to assess their influence on people's behaviors and decisions. In this talk I will present some recent findings from our lab replicating well-established effects of cognitive and social psychology in immersive VR. Furthermore, I will discuss the unique opportunities and additional advantages that this technology provides over standard lab settings to improve the quality of our research protocols.

ARE YOU REALLY UP THERE? THE INFLUENCE OF AMBIENT SOUND AND SIMULATED HEIGHT ON EXPERIENCED 'PRESENCE' IN VR EXPOSURE TO HIGH ALTITUDE

Angelika C. Kern, Wolfgang Ellermeier, Sandra Baum, Aziza Khodjaeva, Hatice Kübra Özcan
(TU Darmstadt, Germany)

Presence, the feeling of "being there" in a virtual environment, is essential for virtual realities to achieve close-to-natural user reactions, e.g. in exposure therapy when curing fear of heights. Our goal was to assess the influence of the soundscape presented with the virtual reality (VR) and the effect of the altitude at which observers were placed. Participants wore a head-mounted display rendering a visual environment (Glomberg, Vogel & Geiger, Univ. of Applied Sciences, Düsseldorf) in which they could walk onto a plank extending from a skyscraper rooftop. The study was designed as a 2x3 mixed design: All in all, 110 participants (78 female, age 18 to 56 years, $M = 26.18$) experienced the VR in three trials involving different building heights (low/ medium/ high) in random order, with half of the subjects being exposed to the soundscape (wind and distant traffic noise). As dependent variables, we measured presence (ITC-SOPI; Lessiter et al., 2001), physiological arousal (EDA and heart rate) and the number of observed fearful behaviors. The results showed that the soundscape enhanced spatial presence while the simulated height only influenced engagement. All presence subscales (spatial presence, engagement, naturalness, and negative effects) and the indicator of fearful behaviors tended to habituate with the progression of trials. That suggests that sound enhances the feeling of actually being in the scene, while multiple exposures reduce the feeling of presence. The physiological indicators, did not show any significant differences in tonic (exposure minus baseline) levels between experimental conditions.

KEEP YOUR DISTANCE! DISTANCE BEHAVIOR AFTER SEMI-AUTOMATED TRUCK PLATOON DRIVING UNDER REAL TRAFFIC CONDITIONS

Sarah-Maria Goerlitz, Patric Schubert, Christoph Dietz, Johanna Möller, Sabine Hammer, Simone Siedler, Christian T. Haas
(Hochschule Fresenius, University of Applied Sciences, Germany)

Platoon driving is a current branch in the development of automated driving in which two or more vehicles build a convoy. The lead vehicle is controlled manually, while following vehicles are electronically coupled and drive semi-automated with small gaps in order to achieve a better traffic flow and potential fuel savings. The research questions are (1) how different gap sizes are perceived by professional truck drivers under real traffic conditions and (2) whether semi-automated platoon driving leads to changes in distance behavior of subsequent manual driving. In a real road experiment $N=10$ trained professional truck drivers completed several test drives with a two-truck platoon on German highway A9 with a platoon gap size of either 15m or 21m. The course consisted of 20km manual pre-platoon driving, 80km semi-automated platoon driving and 20km manual post-platoon driving. The results show that (1) the drivers experienced both gap sizes as comfortable but preferred the smaller gap size of 15m. In general (2) both gap sizes led to smaller distance keepings in post- compared to pre-platoon driving for approximately ten minutes. Due to small sample size, only descriptive statistics are presented. Nevertheless, we found clear indications that drivers adapt to the small gaps and show reduced distance keeping in subsequent manual driving. This phenomenon could be eliminated by countermeasures like a distance feedback system or active cruise control usage, which should be further investigated.

PLAYING FOR SCIENCE! REAL-TIME STRATEGY GAMES AS A TOOL TO RESEARCH HUMAN MULTITASKING

Marian Sauter, Maximilian Stefani, Wolfgang Mack
(Bundeswehr University Munich, Germany)

Traditionally, human multitasking is investigated in so-called extremely simple paradigms. Participants usually 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. Therefore, they provide limited insight into how we multitask in natural environments. In the present studies, we investigated how people learn to coordinate up to four concurrent tasks in a stimulus-rich and challenging environment. Our participants played several rounds of the real-time strategy game StarCraft 2 in a scenario created specifically for this purpose. In particular, we were interested in the question of whether several sub-tasks are learned in parallel (slowly), or whether the participants focused on one sub-task and learn it faster before concentrating on the next sub-task to master. We found that participants prioritized mastering easy tasks over harder tasks and generally learned all tasks in parallel. Interestingly, although we found inter-individual differences in overall success, all participants generally followed the same strategy. Overall, we are sure that such specialized gaming environments can be truly beneficial to research capacities and strategies in human multitasking and bridge the gap between extremely simple paradigms and real-world task settings. In addition, such games provide an engaging research environment that can lead to highly motivated participants.

AN EXPERIMENTAL APPROACH FOR THE AGILE DEVELOPMENT OF A GAMIFIED STRESS MANAGEMENT APP

Alexandra Hoffmann, Corinna A. Faust-Christmann, Gregor Zolynski, Gabriele Bleser
(Technische Universität Kaiserslautern, Germany)

Although gamification has already been shown to increase user adherence in mobile health applications (apps), recent app reviews reveal that available stress management apps hardly make use of gamification approaches. To fill this gap in research, “Stress-Mentor”, a health app that teaches established stress management methods within an extensive gamification framework, has been developed. We present an experimental approach to assure the app’s quality during the iterative and incremental app development. The initial minimum viable product (MVP) of the app was a stress-related health diary. The gamified version of the MVP related diary entries to the appearance of an avatar. In study 1 (N = 47), the initial MVP was compared to the gamified version in a four week longitudinal study to assess user feedback and usage behavior. Based on the user feedback, additional stress management methods and a broader gamification framework were realized. The gamified and the non-gamified version of the extended app were compared in a second four week longitudinal study (N = 40). This approach allowed (a) revealing effects of the gamification framework upon app ratings and app usage (b) collecting feedback and proposed changes from the users to further enhance the app (c) revealing improvements in user ratings compared to the initial MVP. Our results underpin the usefulness of the gamification framework in “Stress-Mentor” and the app’s overall quality.

MOTOR CONTROL (INDIVIDUAL TALKS)

Motor Control (Individual Talks)

COGNITIVE AND MOTOR FUNCTION DEVELOPMENT IN EARLY CHILDHOOD

Christina Stuhr, Tino Stöckel (University of Rostock, Germany)

The development of executive functions is of critical importance for the success in many aspects of later life (e.g., school readiness, job success, mental health) as all goal-directed and planned behavior relies on the proficiency of these top-down mental processes. Research during the last decades indicated that sensorimotor and movement experiences may be key to the development of cognitive functions early in life. However, while broad evidence exists that cognitive and motor functions are functionally intertwined, only very few studies dealt with the factors constraining the motor-cognition link and even less work approached the assumed causality, both of which would help to increase our understanding of how to support cognitive development during childhood. Motivated by this gap in literature, in a first step we investigated potential factors (i.e., age, type of the motor task, and task difficulty) influencing the interrelation between cognitive and motor functions. We found that the link between the two domains is task-specific, variability-driven, and influenced by cognitive maturation. In a second step, we used these prior findings for an intervention study in 5- to 6-year-old children to address the assumed causality. Our data provided evidence that motor dexterity training may improve cognitive abilities. However, the positive effect was limited to working memory function. Considering previous and this work, in this talk we are going to present a model that describes the link between cognitive and motor development as a function of cognitive maturation.

BINDING EFFECTS IN ACTION PLANS

Wilfried Kunde, Lisa Weller (Julius-Maximilians-University Wuerzburg, Germany)

When we prepare a motor action, we temporarily bind features of the perceptual effects of a motor pattern to an action plan. While such binding has been demonstrated for body-related perceptual effects that relate to moving limbs, the evidence is less clear for body-external effects that occur somewhat remotely of the own body. We suggest that this apparent inconsistency can be reconciled by assuming different degrees of task-relevance of body-related and body-external action effects. In a first study we asked normal young adult participants ($n=25$) to prepare a certain Action A, which produced different body-external effects (cursor movements on a screen) and body-related effects (tactile/proprioceptive sensations), which were equally task-relevant. While keeping this action prepared, another Action B was requested. As a result, Action B was facilitated if it shared neither or all effect features with Action A as compared to partial feature overlap. A follow-up study ($n=25$) confirmed that these benefits of full feature repetition/alternation originate from features of the actions' effects, rather than from features of stimuli that were used to cue the corresponding actions. These results suggest that features of both, body-related and body-external effects can become part of action plans in a similar way.

THE ACTIONS TAKE IT ALL, VOLUNTARY ATTENTION STANDING SMALL: MOTOR PREPARATION OVERRIDES ENDOGENOUS ATTENTION

Nina M. Hanning, Heiner Deubel
Maximilian University of Munich, Germany)

During motor preparation, eye and hand movements bind visual attention to their targets. We recently demonstrated that the allocation of attention to one effector's motor goal is unaffected by the concurrent preparation of another effector's movement, indicating that eye and hand targets are represented in separate, effector-specific maps of action-relevant locations. Since eye movement preparation impairs the voluntary deployment of attention, it is often assumed that endogenous attention is coded in an eye-specific priority map. This raises the question of whether hand movements, presumably coded in a different map, likewise interact with voluntary attention. To investigate potential effector-specific influences of action preparation on endogenous attention, eight participants attended to a specific location while either fixating or preparing an eye-, hand-, or simultaneous eye-hand-movement to the attended location or elsewhere. Visual sensitivity at the motor target(s), and the attended location served as a proxy for the spatial distribution of attention. When no motor action was required, we found increased sensitivity at the attended compared to unattended control locations. However, this benefit sharply decreased whenever an eye- or hand-movement was planned away from the endogenously attended location, and completely vanished during the preparation of a simultaneous eye-hand movement elsewhere. Crucially, we did not observe attentional competition between the eye and hand motor target. These findings indicate that separate priority maps encoding eye and hand targets, though not interacting with each other, similarly affect endogenous attentional selection, with action-related attention overriding voluntary attempts to attend.

THE EFFECTS OF PERCEPTUAL UNCERTAINTY IN REACH AND GRASP MOVEMENTS.

William Chapman, Casimir Ludwig
(School of Psychological Science, University of Bristol, UK)

Detecting user uncertainty from overt actions is potentially highly useful for human performance monitoring; this requires understanding how decisions are made and enacted in ecologically valid contexts. Continuous measurement of effector trajectory (e.g. a mouse cursor on a screen) has proved a popular method for tracking the dynamics of the underlying decision variable. Previous work has shown that we can identify "changes of mind" in deviations of mouse-movement trajectories. Our research seeks to test whether similar effects are present in natural reaching movements. We conducted two experiments (N=32; N=29) using motion capture to record 3D reach and grasp movement trajectories (of hand, wrist orientation and finger aperture). In study 1 participants were requested to pick up the brighter or darker of one of two grey blocks either with a high contrast difference (low uncertainty condition) or a low contrast difference (high uncertainty condition). In study 2 a time limit for movement initiation was implemented. Results indicate increased changes of mind and trajectory deviation in conditions of high uncertainty, particularly when a time limit for movement onset is applied. This demonstrates that naturalistic movement dynamics can be affected by target uncertainty. Moreover, these results can be related to computational models of decision-making which account for movement dynamics.

GRASP PLANNING FOR OBJECT MANIPULATION WITHOUT SIMULATION OF THE OBJECT MANIPULATION ACTION

Oliver Herbolt, Wladimir Kirsch, Wilfried Kunde
(Julius-Maximilians-Universität Würzburg, Germany)

When an object is grasped, the grasp is usually adapted to the planned object manipulation. We tested the hypothesis that grasp planning for object manipulation is based on simulations of the body movements that could be used to realize the intended object manipulation. In five experiments, participants grasped a circular knob and rotated it to various targets. In Experiments 1-3 (total $n = 60+32+21$), we selectively manipulated the extents of arm movements associated with various knob rotations by means of a “virtual rotation task”. Although this manipulation should affect potential simulations of knob rotation actions, it did not affect grasp selections. In Experiment 4 ($n = 12$), we verified that our manipulation in principle sufficed to evoke substantial changes in grasp selections in the knob rotation task. In Experiment 5 ($n = 12$), we showed asserted that our manipulation affected the amplitude of open-loop knob rotations. Thus, information acquired during the virtual rotation task carried over to the knob rotation task but did not affect grasp selections. In summary, participants adapted their grasps to different intended pointer rotations on a trial-to-trial bases, thus showing the end-state comfort effect. However, whether an object manipulation was associated with a relatively far or short arm movement did not affect grasp selections. This suggests that anticipations of the body movements associated with specific object manipulation play no crucial role during grasp planning.

EXPLICIT PRIOR INFORMATION INTERFERES WITH IMPLICIT TUNING OF HAPTIC SOFTNESS EXPLORATION

Aaron C. Zoeller, Knut Drewing (Justus-Liebig-Universität Gießen, Germany)

In everyday life, humans often explore objects haptically. To effectively gather information through active touch, humans use prior information to adapt their exploratory behavior. A previous study (Zoeller et al., 2018) showed that in softness discrimination participants adapted initial exploratory peak forces to object compliance, but only when prior information was transmitted via specific channels. We hypothesize that only implicit prior information is used to adapt exploration, while explicit prior information interferes with this process. 24 participants performed a 2AFC discrimination task, judging which of two stimuli was softer. In each trial, both stimuli were either rather hard or rather soft. In the test condition participants performed blocks of trials with either hard or soft stimuli only (implicit prior information). In the control condition trials with hard and soft stimuli were presented in random order (no prior information). Participants were split into an implicit-only group, receiving only implicit prior information and an interference group, receiving additional explicit information before each block of the test condition (written: ‘the following stimuli will be hard/soft’). In the implicit only-group, participants adapted their initial peak forces to stimulus compliance when prior knowledge was given, using more force for rather hard stimuli. In the interference group no adaptation was found. We suggest that implicit prior information is used to adjust exploration behavior, while explicit information interferes with the implicit exploration process and inhibits behavior adaptation, even when implicit information is present.

ASSESSING THE INTEGRATION OF MOTOR RELATED COMPONENTS IN STIMULUS-RESPONSE COMPATIBILITY EFFECTS

Thomas Camus

(Department of Psychology, Julius-Maximilians-Universität Würzburg, Germany)

Lionel Brunel

(Epsilon Laboratory, Paul Valéry University-Montpellier 3, Montpellier, France)

This study addresses the relation between stimuli and responses when Stimulus-Response Compatibility effects are observed. We designed two experiments to test whether the integration of perceptive and motor components is underlying situations in which compatibility effects are found between an object and a particular type of grasp. In experiment 1 ($n = 16$), participants had to perform a semantic categorization task on object pictures using a foot pedal device. To trigger the presentation of the object picture, a grasp that could be compatible or incompatible with the object size had to be performed and held throughout the categorization task. Our predictions regarding the impact of the grasp compatibility on stimulus processing were confirmed by evidence of code occupation, which are clear-cut results in favor of an integration of the perceptive and motor components. The procedure in experiment 2 ($n = 16$) was similar, except that the grasp was no longer carried out while categorizing the stimuli; instead, releasing the grasp triggered the presentation of the stimuli, allowing measurement of the time duration between the grasp and the presentation of the object picture. The pattern of results observed in experiment 1 was found to decrease in experiment 2, as a function of the temporal distance between the grasp and the processing of the object, to the extent of shifting to a classical compatibility effect for the longest durations. Our results highlight the tight coupling between perceptive and motor components in Stimulus-Response Compatibility effects, which most likely result from a sensorimotor integration.

**KEYNOTE SPEAKER DAY 2 JUTTA MUELLER, UNIVERSITÄT
OSNABRÜCK 'ONTOGENETIC AND PHYLOGENETIC ROOTS OF GRAMMAR
LEARNING'**



We are now coming to the second keynote speaker of the TEAP 2019, Professor Jutta Mueller. She currently holds a Chair of Psycho- and Neurolinguistik at the University of Osnabrück. There is no permission for making the recording for this talk public.

Jutta studied Psychology and Cultural Anthropologie at Trier University and completed her PhD at Leipzig University on auditory sentence comprehension in the first and second language.

Jutta worked from 2002 at the Max Planck Institute for Cognitive and Brain Sciences in Leipzig until 2013 when she changed to Osnabrück where she is based for now. She is currently part of five ongoing research projects which are funded by the DFG German Research Foundation.

Also in 2013, she taught a language acquisition workshop at the Universidad del Pais Vasco which is the public university of the Basque Autonomous Community in Spain. In 2017, she taught a language acquisition workshop at Keio University in Tokyo, Japan. We now welcome Jutta to give the keynote lecture on the TEAP 2019 at the London Metropolitan University!

ABSTRACTS DAY 2

COGNITIVE PROCESSES IN CATEGORIZATION DECISIONS (SYMPOSIUM)

Agnes Rosner, René Schlegelmilch
(University of Zurich, Switzerland)

A growing theoretical diversity makes it increasingly difficult to meet the demands upon testing and interpreting theoretical assumptions on how people acquire knowledge about categories that form the basis for making decisions. To clarify the assumed processes requires testing the behavioural predictions of category learning models. At the same time, it is crucial to test basic assumptions on the underlying cognitive processes, for instance, on the role of similarity based generalization in category representations, or the distribution of attention during recall of category instances. The symposium congregates researchers presenting their recent advances in modelling and measuring the cognitive processes underlying category learning and decision making. A collection of six talks will provide insights and possible solutions through rigorous experimental designs, cognitive computational modelling and process tracing (eye-tracking). 1) Maarten Speekenbrink shows how outcome uncertainty in experience-based decisions guides the generalization and transfer of prior beliefs in exploration tasks. 2) Janina Hoffman presents a learning model that integrates knowledge abstraction with retrieval from memory to predict judgment accuracy and familiarity-based choices. 3) René Schlegelmilch will introduce a novel category learning model, which provides a powerful alternative to classical (problem-specific) approaches. 4) Andy Wills presents an open collaboration project making statistical tools accessible for concurrent model analyses, simulations, and hypotheses testing. 5) Agnes Rosner will show how eye-tracking methods can be used to test cognitive processes underlying memory-based categorization decisions. 6) The last talk by Emmanuel Pothos brings together both eye-tracking and cognitive modelling to describe information search during categorisation decision making.

UNCERTAINTY, EXPLORATION, AND GENERALIZATION IN EXPERIENCE-BASED DECISIONS

Maarten Speekenbrink (University College London, UK)

In many real-life decision problems, people need to experience the outcomes of their actions and learn which actions are most rewarding. This leads to an exploration-exploitation dilemma: do you choose the action which you currently think is most rewarding (exploitation), or a more uncertain action in order to learn more about it (exploration), potentially helping you obtain better outcomes in the future? Normatively, uncertainty should be a determinant of whether to explore or exploit. But whether this is the case for humans is still debated. We focus here on "contextual bandit" tasks, where there are noisy cues towards reward. In such tasks, clever exploration can help generalize prior experience to novel options, increasing the value of exploration. We propose a flexible Bayesian framework of function learning, called Gaussian process regression, to describe people's estimates of reward and the uncertainty associated to those estimates. To predict people's choices, we combine this with an uncertainty-guided decision rule. In three experiments ($n=81$, $n=80$, $n=80$), we find that exploration and generalization are indeed guided by uncertainty, consistent with our Bayesian account of learning and decision making.

DO PEOPLE SELECT AMONG TWO KINDS OF JUDGMENT STRATEGIES

Janina Hoffmann (University of Konstanz, Germany)
Rebecca Albrecht (University of Basel, Switzerland)
Bettina von Helversen (University of Switzerland, Switzerland)

When making a judgment it has been argued that people select among two kinds of judgment strategies: A knowledge abstraction strategy assumes that people learn to weigh over time which features reliably predict the judgment criterion, whereas a memory-based retrieval strategy proposes that people recall previous experiences from memory. To disentangle these strategies, past research has usually assumed that people consistently pursue the same strategy over time. The question of how strategies change as a function of learning has received less attention. In the current work, we formulate a learning model that develops a preference for one strategy over the other during learning by adjusting the relative importance of different features and past exemplars. Importantly, the learning model allows disentangling trial-by-trial strategy shifts from a global preference for integrating knowledge abstraction with memory retrieval. We test the models' distinct predictions for judgment accuracy and familiarity-based choices in a judgment task requiring knowledge abstraction and memory retrieval. In line with the idea that people develop a global preference for one strategy, we find that people learn to accurately judge objects consistent with feature-based knowledge, whereas objects similar to previously encountered instances are more difficult to judge. In particular, new instances requiring retrieval are not more familiar to participants than new instances requiring feature-based knowledge, ruling out the possibility that participants shifted between strategies on a trial-by-trial basis. In sum, a learning model integrating knowledge abstraction and memory retrieval may provide a suitable tool for understanding learning processes in human judgment.

CALM – A PROCESS MODEL OF CATEGORY GENERALIZATION

René Schlegelmilch
(University of Zurich, Switzerland)

Andy J. Wills
(Plymouth University, UK)

Bettina von Helversen
(University of Zurich, Switzerland)

CALM – A process model of category generalization, abstraction and problem-structuring CALM is a category learning model, which integrates strong assumptions about the interaction of attention, generalization, rule abstraction and knowledge partitioning. Simulations show how CALM successfully predicts a variety of behavioural phenomena in differently structured categorization tasks, which were so far unexplained, or only accounted by qualitatively different models. CALM implements four hypotheses in an associative learning mechanism. First, associative learning is mainly dimensional (not configural), including similarity-based generalization from observed, and dissimilarity-based (inverse) generalization from unobserved instances. Second, paying attention to subjectively predictive (diagnostic) dimensions reduces learning about non-predictive dimensions. Third, strong beliefs from the past are sustained, and categorization errors do not lead to a direct adjustment of represented dimension outcome-relationships (self-affirmation). Fourth, such ‘obstinate beliefs’, however, allow to detect whether consequent categorization errors systematically occur in different environmental contexts, leading to behavioural adaptation by augmenting contextual modulation on existing expectations. An empirical test of the fourth hypothesis is presented. In two conditions participants learned to categorize objects with three binary attributes, with one of the attributes being predictive of category membership. After some learning, the category structure changed without announcement to an ‘Exclusive-Or’ structure (identical in both conditions). However, the learned structure - before - the change either could (condition A) or could not (condition B) be applied conditional on a context cue after the change. As predicted, learning the second category structure was significantly faster in condition A, compared to condition B.

THE OPENMODELS PROJECT IN CATEGORY LEARNING: PROGRESS THROUGH DISTRIBUTED COLLABORATION

Andy Wills
(Plymouth University, UK)

Formal modelling in psychology is failing to live up to its potential due to a lack of effective collaboration. As a first step towards solving this problem, we have produced a set of freely-available tools for distributed collaboration. In this talk, I'll describe those tools, and the conceptual framework behind them. I'll also provide concrete examples of how these tools can be used within the study of category learning. The approach I propose enhances, rather than supplants, more traditional forms of publication. All the resources for this project are freely available from the catlearn website - <http://catlearn.r-forge.r-project.org>

TOP-DOWN AND BOTTOM-UP GUIDANCE OF VISUAL ATTENTION DURING CATEGORIZATION DECISION MAKING

Agnes Rosner, Bettina von Helversen
(University of Zurich, Switzerland)

When making categorization decisions, people look at spatial locations on a screen that have been associated with information about previous category members (exemplars), even when the exemplars are not visible anymore and have to be retrieved from memory. In this study, we systematically investigated the interaction of this so-called „looking at nothing“-phenomenon (LAN) with the accessibility of information stored in memory and with the presentation format during testing. In two experiments ($N_1 = 79$, $N_2 = 54$), participants repeatedly decided whether to invite job candidates for interviews in a multi-attribute categorization task. In one condition, participants learned the exemplars' attributes by heart before learning to classify the exemplars, in the other conditions, the exemplars' attributes were learned incidentally during the classification training. Additionally, we varied whether exemplars were presented visually or auditorily (Study 1) and how long the visual presentation lasted (Study 2). LAN during the categorisation of new test candidates occurred when exemplars were learned by heart and when they were only presented ten times on screen. LAN also occurred when presenting information auditorily and when removing visual information from the screen after 1.5 seconds. However, when visually presenting new test items without removing cue information, LAN did not occur. The results shed light on the interaction between visuospatial attention and attention to information in memory during categorization decision making as well as on the memory strength needed to elicit eye movements to emptied exemplar locations.

MODELLING EYE TRACKING DYNAMICS WITH QUANTUM THEORY

Emmanuel Pothos
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Agnes Rosner
(University of Zurich, Germany)

Irina Basieva, Albert Barque-Duran
(City, University of London, UK)

Andreas Gloeckner
(Max Planck Institute for Collective Goods, UK)

Bettina von Helversen
(University of Zurich, Switzerland)

Andrei Khrennikov
(University of Linnaeus, Sweden)

There have been several reports of how the structure of eye fixations leading to a simple (binary) decision can be predictive of the actual decision (e.g., the gaze cascade effect). However, there has been limited effort to directly model eye tracking curves. Part of the problem is that existing dynamical formalisms (such as multivariate decision field theory), which could be adapted for the modelling of eye tracking curves, provide limited scope for multiple reversals in weight for one vs. another option. We created binary decision task which is complex in the sense that the attributes/ advantages for each of the two options are not well-matched, with a view to foster multiple changes in attentional focus. We recorded eye fixations up to the decision point and confirmed the existence of multiple changes in attentional focus (which in itself is not surprising). We subsequently employed an open systems dynamical model from quantum theory, with a view to examine whether such a framework could describe eye-tracking curves. This was indeed the case and, moreover, there are indications that the quantum framework can reveal structure in the eye tracking dynamics predictive of the eventual decision of the participants. Finally, we consider the explanatory use of such a quantum framework for eye tracking dynamics.

EXPERIMENTAL AESTHETICS 1 (SYMPOSIUM)

Thomas Jacobsen

(Helmut Schmidt University / University of the Federal Armed Forces Hamburg, Germany)

Experimental Aesthetics is the second-oldest branch of Experimental Psychology. Subsequent to his Psychophysics, Gustav Theodor Fechner established the empirical, experimental study of aesthetics "from below", using empirical building blocks. Firmly grounded in the psychophysical and cognitive paradigms, the field continues to thrive. Our symposium convenes contributions investigating aesthetic domains ranging from dance, literature, music, visual arts, and more. Researchers engage in the quest for elucidating domain-general as well as highly domain-specific mental processing architecture.

EXECUTIVE PROCESSES IN THE AESTHETIC APPRECIATION OF PAINTINGS

Marcos Nadal, Sun Xiaolei, Jiajia Xe, Erick G Chuquichambi
(University of the Balearic Islands, Spain)

Executive processes in the aesthetic appreciation of paintings

In this study we sought to determine the role of visual working memory in the appreciation of paintings by employing a dual task computer-based paradigm. Participants were asked to rate their liking for 48 paintings on a 5- point Likert scale, while simultaneously performing a visual working memory task. Half of the paintings were simple, and half were complex, as defined based on a pre-study. In each trial, participants first saw a 4 x 4 grid containing 1, 3, or 5 dots for 750 ms. These corresponded to the low, intermediate, and high working memory conditions. Thereafter they were asked to rate how much they liked an artwork presented for 2000 ms, after which they could use the mouse to submit their rating. After the rating had been completed, participants saw an empty 4 x 4 grid and asked to use the mouse to click the cells that contained the dots they saw before the artwork. Each click produced a dot in the matrix. In order to control for individual differences, participants subsequently performed a visual working memory span task, and completed questionnaires on openness to experience, and art interest, knowledge and activities. Results showed that liking ratings for artworks in the intermediate and high working memory load conditions were significantly higher than the ratings in the low working memory condition, both for simple and complex images.

CROSS-CULTURAL EFFECTS IN AESTHETICS?

Chris McManus (University College London, UK)

Cross-cultural studies in aesthetics are relatively rare, but it is generally assumed that cross-cultural differences should exist since cultures so clearly differ, although there is much equivocation, and little solid empirical data. The 1997 Handbook of Cross-Cultural Psychology showed the problems when it said, "The existence of both substantial differences and substantial similarities in the aesthetic responses of different cultures is largely self-evident". Elsewhere in psychology there is currently a growing interest in cross-cultural cognitive differences, particularly following the influential work of Masuda and his colleagues, who have argued that 'East Asians' are more holistic and context-oriented in their perceptions than 'Westerners' who are more analytic and object oriented, resulting in preferences for different types of photographs and art works. In this paper I will describe two studies, the first of which used the method of paired comparisons to assess differences in preference for a wide range of aesthetic stimuli, with 170 participants from the UK, Thailand and Hong Kong. The second study, with 146 participants, used a more focussed set of stimuli, as well as some from the first study to allow assessment of the reliability of preferences. Overall there was little evidence for consistent cross-cultural differences, which raises a number of theoretical questions.

THE MULTIDIMENSIONAL NATURE OF THE PREFERENCE FOR SMOOTH CURVATURE

Letizia Palumbo (Liverpool Hope University, UK)

Marco Bertamini (University of Liverpool, UK)

The multidimensional nature of the preference for smooth curvature
The aesthetic appeal of curves has inspired experimental studies since the early 20th century. Up to nowadays, we report a consistent preference response for curvature (smooth vertices), as opposite to angularity (or “sharpness”). This has been found for a variety of visual stimuli: familiar and unfamiliar objects; abstract, irregular shapes; complex interior design environments and architectural façades. Recently, the origin of this phenomenon has been presented in relation to biological and culturally-based factors, hence suggesting its multidimensional facets. Using explicit tasks, we showed that type of response (rating scale vs. forced choice) did not modulate liking. The use of implicit tasks revealed an automatic association of curved shapes with positive (or “safe”) concepts and angular shapes with negative (or “dangerous”) concepts. However, angular shapes did not elicit any affective avoidance reaction, whereas curved shapes triggered approach. Beside the affective component, more recently, explicit preference for abstract curvature has been found in relation to art expertise and openness to experience. Taken together these results support the multidimensional character of preference for curvature, where the interrelation between bottom-up and top-down processes might be crucial.

POETIC SPEECH MELODY

Winfried Menninghaus

(Max Planck Institute of Empirical Aesthetics, Germany)

Research on the interface of music and poetic language has extensively investigated similarities and differences of musical meter, poetic meter, and the rhythm of ordinary speech, but not considered a potential counterpart of musical melody in the language of poetry. Moreover, linguistic research on melodic contours in natural language has remained limited to single phrases and specific speech acts, such as the rising prosodic contour of questions. Our study on poetic speech melody is the first to go beyond these limitations. We phonetically analyzed recitations of entire poems by multiple speakers to trace potentially converging contours of pitch and duration values across all stanzas that could be interpreted as inherent textual properties. Results show that stanzas of individual poems indeed feature—across a multitude of recitations—distinct recurrent pitch and duration contours, just like genuine songs and other pieces of music. Moreover, the higher the poem-specific autocorrelation score was for melodic recurrence across stanzas, the higher were also the ratings for subjectively perceived melodiousness as spontaneously reported by listeners. These ratings are also strongly predictive of beauty-attributions and overall liking.

THE AESTHETIC HOMUNCULUS: EMBODIMENT AND EXPERTISE EFFECTS IN AESTHETICS JUDGEMENTS

Beatriz Calvo-Merino (City University, UK)

The term ‘embodied aesthetics’ has recently been coined to describe internal processes relating our own body and the observation of art. Our brain holds multiple representations of our body, here we explore how the somatosensory cortices (that holds a detailed sensory representation of our body) participates in visual aesthetic judgment of performing arts/dance. We performed an event-related potential (ERPs) study to test for the influence of visual aesthetic perception on somatosensory evoked potentials (SEPs). We recorded EEG in two groups of participants (expert dancers, control non-dancers) during the observation of pairs of body dance postures and whilst performing two tasks: (a) an aesthetic preference task, (b) a perceptual control task. The results showed differences during the aesthetic and perceptual tasks started at an early stage of processing (P45, N80, P100), and likely originated in primary and secondary somatosensory cortex. This early processing in somatosensory cortex was also modulated by the level of experience that the observers had with the observed dance posture. Overall, these results provide direct evidence for a differential involvement of somatosensory areas in the two task, suggesting different levels of embodiment during visual aesthetic judgement and a control visual judgment of a dance posture.

DO PEOPLE LIKE WHAT THE BRAIN LIKES?

Marco Bertamini, Giulia Rampone, Alexis D.J. Makin
(University of Liverpool, UK)

Do people like what the brain likes? The case of visual symmetry Within the long history of empirical aesthetics, a recurring theme is to what extent we can explain human preferences in terms of what is most salient, what attracts attention, and what excites a strong activation in sensory areas of the brain. A visual property often mentioned in this context is symmetry. There is clear evidence that extrastriate visual areas are activated by the presence of symmetry in an image (for a review: Bertamini et al. 2018). Some types of symmetries are more salient and generate a stronger response. Reflection symmetry in particular is both more salient and preferred. We found good overall correlation between preference and brain activity and a robust pattern across cultures (comparing participants in Britain and in Egypt, Makin et al., 2017; Bode et al., 2017). However, there are also two aspects that do not support a direct link. The first is the extent by which rotation symmetry is liked. The second is the effect of density of elements, which does not affect neural responses but can affect preference. Overall, the evidence is that in general we can say that people like what is salient and is processed efficiently in the brain, but other factors also influence preference.

COGNITIVE MODELING IN EXPERIMENTAL PSYCHOLOGY (SYMPOSIUM)

Thorsten Pachur

(Max Planck Institute for Human Development, Germany)

Henrik Singmann

(University of Warwick, UK)

Cognitive modeling provides a powerful methodological tool in various domains of experimental psychology (e.g., memory, categorization, judgment and decision making). Despite its long tradition in psychology (e.g., Estes, 1950), it has become a more widespread approach only recently (e.g., Farrell & Lewandowsky, 2018; Busemeyer & Diederich, 2009; Lee & Wagenmakers, 2013). Recent technical advances (e.g., Bayesian estimation approaches, hierarchical modeling) and novel software tools have facilitated the application of cognitive modeling and enable an increasingly large number of researchers to incorporate cognitive modeling into their methodological arsenal. This symposium features recent applications of cognitive modeling in experimental psychology and has three goals. First, it will be shown how cognitive modeling can help disentangle and measure latent psychological processes that are not readily visible in observed data (e.g., learning processes, evaluation, memory and response processes). Second, the symposium demonstrates how formal models enable one to derive precise quantitative predictions of extant theoretical ideas that can then be compared to each other based on empirical data (e.g., heuristics vs. optimal models), and how the theoretical constructs of different models can be related to each other. The third goal of the symposium is to present and discuss novel methodological developments of cognitive modeling (implementation in meta-analysis, testing the robustness across estimation methods). The symposium will bring together researchers from various research groups in Europe, reflecting the increasing popularity and usefulness of cognitive modeling in experimental psychology.

COGNITIVE PROCESSES IN RISKY CHOICE UNDER REQUIREMENTS

Jana Jarecki, Jörg Rieskamp
(University of Basel, Switzerland)

Risky choice under requirements involves situations where people need to collect enough resources in a limited number of trials to meet a resource requirement. Each trial offers a low-risk and high-risk option with full description (risk as variance). Human decisions in such tasks partly follow the optimal dynamic programming solution to the problem (Houston & McNamara, 1988), which posits that the risky option becomes more preferable with harder requirements. This optimal solution, however, is computationally complex, considering every possible future state given every choice, outcome, and probability. We tested two cognitive models. The first model is a modified version of cumulative prospect theory; which has been proposed (McDermott, Fowler, & Smirnov, 2008) and criticized (Houston, Fawcett, Mallpress, & McNamara, 2014) in the recent theoretical literature. Our results, using predictive model tests, show that prospect theory predicts most participants' behavior better than the optimal model. The second model is a decision tree with less compensatory comparisons than prospect theory and more attention to outcome magnitudes. The heuristic-like tree also predicts participants' choices better than the optimal model. Comparing prospect theory to the decision tree reveals that prospect theory outperforms the tree in individual strategy classification, but not for the entire sample. Furthermore, a normative analysis revealed that prospect theory and the decision tree reach at least 80% of the optimal model's expected value, showing that both models can perform near-optimal. This work shows that humans use highly-performant cognitive strategies in risky choices under requirements.

PROBABILITY WEIGHTING: A REFLECTION OF OPTION-SPECIFIC ATTENTIONAL BIASES DURING EVIDENCE ACCUMULATION?

Thorsten Pachur, Veronika Zilker
(Max Planck Institute for Human Development, Germany)

An important theoretical concept for capturing phenomena in decisions under risk (e.g., certainty effect, fourfold pattern of risk attitude) is the notion of nonlinear probability weighting. The impact of the possible outcomes of a risky option on the decision can be described by assuming a systematic distortion of the outcomes' probabilities (such that, for instance, outcomes with small probabilities are over- and large probabilities underweighted). It is currently unclear, however, whether and how patterns in probability weighting reflect distinct characteristics of information processing. We demonstrate that patterns of probability weighting can arise from attentional biases in a drift diffusion process, where preferences are constructed in an evidence accumulation process, biased by attention to the different options. We first simulated choices between a safe and a risky option with the attentional drift diffusion model, systematically varying the asymmetric attention to the risky vs. the safe option. The choices were then modeled with cumulative prospect theory. Higher attention toward the safe option during evidence accumulation was reflected in a lower elevation of the weighting function. In addition, asymmetric attention—irrespective of whether favoring the risky or the safe option—increased the curvature of the weighting functions. These findings suggest that the apparent over- and underweighting of probabilities might reflect asymmetries in option-specific attention, rather than distortions in the processing or representation of probability information. Moreover, our analysis establishes the mapping between two influential but previously unconnected computational models of decision making under risk.

IT'S NEW, BUT IS IT GOOD? HOW GENERALIZATION AND UNCERTAINTY GUIDE THE EXPLORATION OF NOVEL OPTIONS

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Eric Schulz
(Harvard University, United States)

Pantelis P. Analytis
(University of Southern Denmark, Denmark)

Maarten Speekenbrink
(University College London, UK)

How do people decide whether to try out novel options as opposed to tried-and-tested ones? We argue that they infer a novel option's reward from contextual information learned from functional relations and take uncertainty into account when making a decision. We propose a Bayesian optimization model to describe their learning and decision making. This model relies on similarity-based learning of functional relationships between features and rewards, and a choice rule that balances exploration and exploitation by combining predicted rewards and the uncertainty of these predictions. Our model makes two main predictions. First, decision makers who learn functional relationships will generalize based on the learned reward function, choosing novel options only if their predicted reward is high. Second, they will take uncertainty about the function into account, and prefer novel options that can reduce this uncertainty. We test these predictions in two preregistered experiments ($N=320$ and $N=423$) in which we examine participants' preferences for novel options using a feature-based multi-armed bandit task in which rewards are a noisy function of observable features. Participants' expectations, confidence and choices reveal strong evidence for functional exploration and moderate evidence for uncertainty-guided exploration. In contrast to previous explanations, these results indicate that reactions toward novelty are guided largely by fine grained contextual knowledge, with uncertainty-guided exploration playing a smaller role.

REMEMBERING RETRIEVAL: EVIDENCE FROM REPEATED RECALL

Peter Shepherdson (University of Akureyri, Iceland)

Observations about the beneficial effects of retrieval for subsequent memory date as far back as the writings of Aristotle, and there is a large body of modern research investigating the impact of retrieval practice on successful recall. However, models of this phenomenon typically focus on what factors can explain retrieval probability, rather than whether and how memory representations themselves change. I conducted a series of experiments (total $N=231$) aimed at addressing these latter issues by asking participants to immediately and repeatedly recall colour information on a continuous response scale (i.e., a colour-wheel). Results showed a gradual, decelerating deterioration of recall performance, coupled with a reduction in recall variability, as participants made more recall attempts. This pattern was also present when the majority of retrievals did not require an overt response, suggesting it results from memory rather than response processes. Models in which recall attempts produce novel memory traces alongside the original memory provided a better account of the data than models in which traces overwrite their predecessors, or models in which old and new information is merged into a single memory trace. This is consistent with a recent theory of retrieval practice (Rickard & Pan, 2017), and suggests that retrieval from immediate and long-term memory has similar implications for memory representations.

AGE DIFFERENCES IN HINDSIGHT BIAS: A META-ANALYSIS WITH A BAYESIAN MULTINOMIAL PROCESSING TREE APPROACH

Julia Groß (University of Mannheim, Germany)

Thorsten Pachur (Max Planck Institute for Human Development, Berlin, Germany)

After people learned a fact or the outcome of an event, they often overestimate their ability to have known the correct answer beforehand. This hindsight bias has two sources: an impairment in direct recall of the original (i.e., uninformed) judgment after presentation of the correct answer (recollection bias) and a reconstruction of the original judgment that is biased towards the correct answer (reconstruction bias). Research on how cognitive aging affects the sources of hindsight bias produced mixed results. To synthesize available findings, we conducted a meta-analysis of nine studies ($N = 366$ young, $N = 368$ older adults). We isolated the probabilities of recollection, recollection bias, and reconstruction bias with a Bayesian, three-level hierarchical implementation of the multinomial processing tree model of hindsight bias (Erdfelder & Buchner, 1998). Additionally, we quantified the magnitude of bias in the reconstructed judgment. Overall, older adults were less likely to recollect their original judgment than young adults, and thus had to reconstruct it more frequently. Importantly, outcome knowledge impaired recollection of the original judgment (i.e., recollection bias) to a similar extent in both age groups, but outcome knowledge was more likely to distort reconstruction of the original judgment (i.e., reconstruction bias) in older adults. In addition, the magnitude of bias in the reconstructed judgments was slightly larger in older than in young adults. Our results provide the basis for a targeted investigation of the mechanisms driving these age differences.

A BAYESIAN AND FREQUENTIST MULTIVERSE PIPELINE FOR MPT MODELS – APPLICATIONS TO RECOGNITION MEMORY

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Daniel W. Heck
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Marius Barth
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Julia Groß
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Even with a clear hypothesis or cognitive model in mind, most statistical analyses contain several more or less arbitrary choices. In the case of a model-based analysis, these choices can concern the statistical framework, the aggregation-level, and which parameter restrictions to introduce. Usually one path through this ‘garden of forking paths’ (Gelman & Loken, 2013) is chosen and reported. However, it is unclear how much each choice affects the reported results. The multiverse approach (Steege, Tuerlinckx, Gelman, & Vanpaemel, 2016) offers a principled alternative in which results for all possible combinations of reasonable modeling choices are reported. We developed a software package for R that performs a model-based multiverse analysis for multinomial processing tree (MPT) models, *MPTmultiverse*. Our package estimates MPT models in a frequentist and Bayesian manner. In the frequentist case, it uses no pooling (with and without bootstrap) and complete pooling. In the Bayesian case, it uses no pooling, complete pooling, and three different variants of partial pooling. We applied our approach to a large confidence-rating recognition memory data corpus consisting of 12 studies with over 450 participants using a relatively unrestricted variant of the 2-high threshold model for confidence ratings (Bröder, Kellen, Schütz, & Rohrmeier, 2013). Our results show that even for some core parameters, the different analysis approaches reveal considerable variability in the parameter estimates across estimation methods. Our results suggest that researchers should adopt a multiverse approach when using cognitive models.

LEARNING (INDIVIDUAL TALKS)

INCIDENTAL LEARNING DURING NATURAL TASKS CREATES RELIABLE LONG-TERM MEMORY REPRESENTATIONS WHICH PROACTIVELY GUIDE BEHAVIOR

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Melissa Vo

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During natural behavior – in comparison to laboratory investigations – we rarely use cognitive subsystems (e.g. WM) to capacity or follow a strict top-down encoding protocol (e.g. explicit memorization). In fact, we often act short-term task-oriented, which results in a behaviorally optimal representation of our environment. In a series of computer-based, virtual-reality, and real-world experiments we investigated the role of sampling information during natural tasks (via eye movements and incidental exposure durations) for the generation of visual long-term memories (VLTMs). Even after incidental encounters with thousands of isolated objects, VLTm capacity for these objects is reliable, however, the detail of these representations is quite sparse and does not increase if the incidental encounters are longer (Study 1). When searching for objects in an actual real-world environment – where locomotion is necessary – fixation durations on objects predict subsequent location memory, as measured with surprise memory tests (Study 2). Incidental representations generated during search are more reliable than memories established after explicit memorization in a realistic virtual environment (Study 3). Further, in a real-world object-sorting task, eye movements used for minimizing WM load and instead gathering task-relevant information just before it is required, significantly predict long-term location memory of objects (Study4). Finally, in a virtual-reality paradigm (Study5), we show that spatial priors can be activated within the first fixation into a new environment in a one-shot manner. Together, this rich set of studies shows that incidental information acquisition during natural behavior establishes reliable VLTm representations, which can be used to guide ongoing behavior in a proactive fashion.

IMPLICIT LEARNING OF AN ARTIFICIAL MUSICAL STRUCTURE ON STABLE VS UNSTABLE PITCH SCALES

Joshua Lorenzen, Christian Kaernbach
(Kiel University, Germany)

In two experiments we investigated the effect of pitch scale stability on the implicit learning of an artificial musical structure. In a first experiment, participants (N=20) were exposed to melodies generated by an artificial grammar under incidental learning conditions. For one group of participants, the underlying pitch scales were always the same for each melodic realization (stable). In another group, each melody was realized on randomly detuned versions of an abstract target scale (unstable). In a subsequent test phase, grammatical melodies had to be distinguished from ungrammatical melodies. The melodies could be realized on a detuned or on the stable/target scale. Both groups of participants performed equally well on this task for test melodies stemming from the stable/target scale. However, discrimination performance of subjects who only learned with stable melodies was significantly impaired for detuned melodies. On the other hand, participants who were exposed to detuned melodies from the first moment performed equally good on detuned and stable melodies (drawn from their target scale). In a second experiment (N=20), we used randomly generated pitch scales instead of detuned versions of an abstract target scale. We obtained similar results for both groups albeit the overall performance for random scale melodies were much more impaired compared to the slightly detuned melodies from the first experiment. Since melodic interval information is no longer available here, subjects apparently use a coarser contour code to solve this task.

ADAPTIVE QUIZZING FURTHER INCREASES LEARNING OUTCOMES

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Axel Grund, Kirsten Berthold, Stefan Fries
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Julian Roelle
(Ruhr-Universität, Germany)

Quizzing has been shown to be an effective means to foster learning. In the present study, we investigated if providing learners with quiz questions adapted to the cognitive load that they perceive when answering quiz questions (adaptive quizzing) would further increase the beneficial effects of quizzing found in the literature. Our study is based on research on cognitive load that shows that taking into account learners' cognitive resources when constructing or choosing learning material (e.g. questions on a quiz) increases learning outcomes. We conducted an experiment following a one factorial between-subjects design in which we compared the learning outcomes of $N = 160$ university students. Using a digital learning environment, participants first watched an e-lecture and then learned its content according to one of three randomly assigned conditions: (a) adaptive quizzing, (b) non-adaptive quizzing and (c) note-taking. Participants in the quizzing conditions answered open-ended questions on four levels of difficulty. In the adaptive quizzing condition, the difficulty of the questions depended on the cognitive load indicated by the participants; in the non-adaptive condition, the difficulty of the questions gradually increased. Participants in the control condition note-taking were asked to take notes on the e-lecture. Learning outcomes were measured one week later via a posttest. We found that adaptive quizzing yielded higher learning outcomes than non-adaptive quizzing. Both quizzing groups outperformed the note-taking group. We conclude that, in order to increase the yield of quizzing, the cognitive load imposed on learners by the quiz questions should be taken into consideration.

DUAL-TASK PERFORMANCE AND MOTOR LEARNING WITH PREDICTABLE TASKS

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Introduction In multitasking predictability of a task is likely desirable because it enables automatic task control which is less dependent on cognitive resources. In two experiments, we tested the effect of predictability by letting participants practice a predictable tracking task and a go/no-go auditory reaction time task (as single-task or dual-task). **Methods** In the first experiment 33 participants practiced a tracking task and auditory reaction time task separately, each containing predictable sequences. For the second experiment 39 participants trained the tasks as a dual-task. In both experiments, participants were divided into an implicitly and explicitly instructed group. **Results** Predictability improved tracking (Predictable: $M = 1.46$ cm, $SD = 0.32$ cm, Random: $M = 1.55$ cm, $SD = 0.34$ cm) and reaction times (Predictable: $M = 426$ ms, $SD = 79$ ms, Random: $M = 567$ ms, $SD = 55$ ms) during dual-tasking. However, predictability in one task did not improve performance on the other task. Results of the dual-task training experiment mirrored those of the single-task training experiment but dual-task training led to dual-task performance surpassing single task performance. In neither experiment group differences were found. **Discussion** Predictability has a positive but robustly unilateral effect on dual-task performance. A possible explanation is the process of task-shielding, whereby tasks are kept apart in order to reduce interference, but also has the negative effect of inflexible task processing where resources can't be distributed flexibly when task demands might call for it.

THE IMPACT OF VERBAL INSTRUCTION AND TASK FEATURES ON THE EXPRESSION OF IDEOMOTOR EFFECT ANTICIPATIONS

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Markus Janczyk
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Stefan Scherbaum
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According to ideomotor theory, when people observe an action being followed by a certain effect, they acquire bi-directional action-effect associations. At a later point, when they want to achieve the effect, its anticipation activates the corresponding action and facilitates its execution. The expression of action-effect associations is assumed to take place incidentally and automatically. However, verbal instruction and particular features of a task are known to influence action control mode and action selection. Here, we assess the impact of verbal instruction and the task relevance of action effects on the expression of action-effect associations in three experiments. Our results show that an effect-based instruction prompts participants to express action-effect associations more strongly than an action-based instruction. In addition, the acquired associations are only expressed when the effects are relevant for the task and when they are presented in the test phase. These findings show that in contrast to the assumptions of ideomotor theory, action-effect knowledge is only used when it is considered meaningful for the intended goal. Verbal instruction and task features affect the intentional state and may therefore bias the results of ideomotor studies.

SOCIAL PSYCHOLOGY (INDIVIDUAL TALKS)

THINKING LOCALLY OR GLOBALLY? – TRYING TO OVERCOME THE TRAGEDY OF PERSONNEL EVALUATION

Momme von Sydow

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We investigate inner-individual dilemmas (IIDs) in the context of personnel evaluation. In IIDs, reminiscent of social dilemmas, the optimization of local goals has effects on other goals (externalities) and thereby may lead to suboptimal results for the global outcome for an individual. We have previously begun to investigate Two-Level Personnel Evaluation Tasks (T-PETs), where participants were put in the role of (neutral) human-resource managers. Normatively, they should be interested in the overall outcome of work groups. They had to evaluate employees in settings where individual and group contributions could be dissociated. We first sketch previous results that suggested a “Tragedy of Personnel Evaluation” (von Sydow, Braus, & Hahn, 2018). When evaluating an ‘altruistically’ (or strategically group-serving employee) who had the smallest individual contribution, but by far the greatest positive effect on the group’s overall earnings, this employee was often rated the most negatively. In selection-tasks this employee was often excluded from the group. When we removed conflicting information, however, most participants were able to detect quickly the largest overall impact of the ‘altruist’. Here we report two further T-PET experiments (N = 121; 172) that examine whether emphasizing the group by context or by variation of the level of data shown (successions of rounds with local, global, or both kinds of information) can avert ‘tragic’ outcomes. The results show some improvements and new perspectives, but also that the ‘Tragedy of Personnel Evaluation’ is quite robust.

INFLUENCE OF THE COMPARATIVE CONTEXT ON META-STEREOTYPING

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A meta-stereotype is a judgment about how group members think that an out-group stereotypes their in-group. In order to capture meta-stereotypes, we use the Stereotype Content Model (SCM). The distinctive contribution the SCM makes is that stereotypes often hold mixed ascriptions of those two dimensions and assumes an incongruent structure in the warmth-competence space (i.e. being high on one dimension and low on the other) that lead to more extreme judgements. This is closely associated with previous research that indicates that judgements are made in a comparative context. In two studies, we investigate meta-stereotypes in a European setting. In the first study, we investigate how meta-stereotypes of two European nations depend on a comparative national context. Germans and Italians indicated their meta-stereotypes towards the target out-group nations Spain and Great Britain. These contexts were chosen because they exhibit an incongruent stereotype structures based on the Stereotype Content Model: either high in warmth and low in competence or vice versa. The results show that people overstate meta-stereotypes when the meta-stereotypical target is in an opposite position on the warmth-competence-dimension. In a congruent setting, people exhibit less meta-stereotyping. The second study is aimed to replicate the first findings with a different set of German and Spanish participants and expands this research into the field of working professions. In addition, possible moderators like the Social Dominance Orientation and Subjective Social Status of the participant are investigated. All results are discussed in terms of the role of comparative context in meta-stereotyping.

DEVELOPING TRUST IN VIRTUAL LEARNING ENVIRONMENTS: IT'S A MATTER OF LANGUAGE STYLE

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Nowadays, information seekers have the opportunity to use different virtual learning environments (e.g., online courses with video lectures and online information forums) to acquire knowledge and develop new skills. However, most of the Internet is not governed by editors or other gate-keeping institutions and therefore the question arises whom to trust and which information is credible. How do information seekers make such decisions? Using three 2x2 between-subject online experiments (N = 539), we test the hypotheses that the language style (experiment 1: neutral vs. aggressive; experiment 2: neutral vs. enthusiastic; experiment 3: neutral vs. praising) and the professional affiliation (experiments 1-3: scientist vs. lobbyist) of an information source influence the evaluation of (a) his trustworthiness and (b) the credibility of the provided information in virtual learning environments. Overall, analyses of variance show that the professional affiliation influenced the trustworthiness of the information source, but it did not influence the credibility of the provided information. More specifically, scientists were perceived as more trustworthy than lobbyists, but their information was not perceived as more credible. In contrast, all language style manipulations influenced the trustworthiness of the information source as well as the credibility of the provided information: When the information giver used an aggressive, enthusiastic, or praising language style, he was perceived as more manipulative, less benevolent, less honest and the provided information was perceived as less credible. Results are discussed regarding the communication of trust and related research.

REVISITING INTERSUBJECTIVE ACTION-EFFECT BINDING: NO EVIDENCE FOR SOCIAL MODERATORS

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Effect-based accounts of human action control have recently highlighted the possibility of representing one's own actions in terms of its anticipated changes in the behavior of social interaction partners. In contrast to action effects that pertain to the agent's body or the agent's physical environment, social action effects have been proposed to come with peculiarities inherent to their social nature. Here we revisit the currently most prominent demonstration of such a peculiarity: the role of eye-contact for action-effect learning in social contexts (Sato & Itakura, 2013). In contrast to the previous demonstration of action-effect learning, a conceptual (N = 48) and a direct replication (N = 24) both yielded evidence for the absence of action-effect learning in the proposed design irrespective of eye-contact. These results suggest a limited generalizability of the original findings, either due to limitations that are inherent in the proposed study design or due to cultural differences.

INDIVIDUAL BELIEF UPDATING DEPENDS ON THE DISTANCE TO OTHER ESTIMATES AND BEING AN OUTLIER TO DIFFERENT SOCIAL GROUPS

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How do individuals integrate discordant advice with prior estimates? This study tests a two-step model of individual belief updating. The first step determines whether individuals take advice into account or reject it completely. In the second step, individuals that decided to take advice integrate it. We hypothesized that the first step is influenced by whether the initial estimate is an outlier to the advice, while the second step is influenced by the distance between the mean of advice and the initial estimate. This model is tested in a context in which advice is provided by advisors that are a member of either the majority, the participant's ingroup, or an outgroup perceived as competent. This allows to investigate the influence of majority conformity, ingroup conformity and group-level competence on both steps of belief updating. After collecting answers to 28 socio-demographic questions about the EU in a series of pre-studies ($N = 120$), these were presented as advice in four within-participant conditions to 40 British participants. The results of linear mixed-effects modelling support the two-step model of belief updating as superior to models of advice integration proposed by the literature. In addition, factoring in the influence of different social groups improved model performance in both steps through accounting for interindividual differences in the weighting of advice from different groups. We conclude that the two-step model of belief updating not only allows better predictions of updating, but also the opportunity to test the influence of advisor-, advice-taker- and advice-level influences on both steps.

COULD YOU REPEAT THAT? REPLICATING THE “GOOD SOUND GOOD RESEARCH” EFFECT

Isabelle Freiling, Lars König (University of Münster, Germany)

In times of digitization, many scientific talks are recorded. Previous research has shown that people use trivial factors (e.g., sound quality) to evaluate the quality of scientific research. The good sound good research effect suggests that good audio quality leads to better perceived quality of the research and the researcher in comparison to bad audio quality. As the replication crisis has shown, such findings need to be replicated. We tried to replicate the effect (originally found in an US-American sample) with a student sample from Germany and a slightly different method. Our hypotheses were in line with the good sound good research effect. In experiment 1, participants ($N = 157$) listened to a science podcast with either good or bad audio quality. In experiment 2, participants ($N = 161$) watched a scientific conference talk with either good or bad audio quality. Afterwards, participants evaluated the respective researchers and their research. To test our hypotheses, we conducted independent t-tests. Results of experiment 1 show that participants give the podcast a better overall rating if it was presented with good audio quality. However, audio quality does not influence the perceived quality of the research and the competence of the researcher. Results of experiment 2 show that participants like the researcher more and rate his research as more important if it was presented with good audio quality. However, audio quality influences neither the competence of the researcher nor overall rating of the talk. Reasons for replicating the original findings just partly are discussed.

DECISION-MAKING 2 (INDIVIDUAL TALKS)

FLUENCY SPECIFICITY: FLUENCY EFFECTS ARE SUBJECT TO A MATCH BETWEEN THE SOURCE OF FLUENCY AND THE JUDGMENT DIMENSION

Rita Silva (University of Cologne, Germany)

The role of processing fluency in judgments is undebated. Not only is fluency affected by sources as diverse as stimulus repetition or visual clarity, it also affects outcomes as diverse as aesthetic pleasure or subjective validity of a statement. While several studies indicate that fluency sources and outcomes are interchangeable, we propose that fluency effects are subject to a match between the source of fluency and the judgment dimension. Specifically, we propose that conceptual fluency is more informative for content-related judgments, but perceptual fluency is more informative for judgments related to perception. Three experiments (total $N = 582$) tested this hypothesis by implementing a paradigm that allows the orthogonal manipulation of conceptual vs. perceptual fluency, and the judgment of content vs. perceptual stimulus dimensions, respectively the truth value and the aesthetic appeal of statements. Conceptual fluency was manipulated by repeating the content of the statements. Perceptual fluency was manipulated through visual figure-ground contrast in which statements were presented. We predicted that judgments of truth would be more influenced by repetition than by visual contrast, and that judgments of aesthetic appeal would be more influenced by visual contrast than by repetition. Results of the experiments support these predictions, showing the superiority of content repetition on judgments of truth, but the superiority of visual contrast on aesthetic judgments.

THE SEQUENCE OF STANDARD AND TARGET IN SOCIAL AND ECONOMIC COMPARISONS

Victoria Striewe, Sascha Topolinski (University of Cologne, Germany)

The order of target and standard in a paired comparison not only determines the direction of the comparison (upward or downward) but also the efficiency of the comparison process. We tested this in a series of 8 experiments ($N = 856$), where we let participants repetitively perform simple magnitude comparisons of two objects (e.g. one digit numbers or geometric shapes) in various economic and social contexts. Results showed that performance (speed and accuracy) of participants is facilitated when they encounter the standard stimulus before the to be judged target stimulus. A Standard-Target-Sequence Effect (STSE) on comparison processes so far was rather relevant in signal detection and stimuli discrimination tasks in psychophysics (so called Type B Effect, e.g. Dijks & Ulrich, 2014). Social and cognitive psychologists' research on judgements of similarity and contrast have provided inconsistent results for the influence of the sequence of standard and target on the comparison process (e.g. Tversky, 1978; Angostinelli, Sherman, Fazio & Hearst, 1986). Our findings are a strong argument for an underlying mechanism in working memory that contradicts most lay's and experts' intuitive assumption: To perform a comparison most efficiently one has to consider the standard before the target.

HOW THE ATTRACTIVENESS OF A STIMULUS INFLUENCES RISK JUDGEMENTS

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Research has shown that affective responses to a stimulus can influence risk judgements. The complex stimuli of multicue probabilistic judgements have numerous distinct features, each capable of evoking affect irrespective of relevance for the risk judgement. We first examine whether the overall affective response to a complex stimulus, measured as attractiveness, influences its risk judgement. We then investigate whether one feature of the stimulus, having different subjective affective values, influences the risk judgement despite its indeterminate relevance for that judgement. Across 3 studies (N=141), participants judged the safety of 4 backcountry skiing scenarios in terms of avalanche danger. The studies used a mixed design: the within-subject experimental factor was the presence vs. absence of ski tracks, the quasi-experimental factor was the degree of attractiveness of the scenario, and the main response variable was the safety judgement with respect to avalanche risk. Results indicate a positive relationship between scenario attractiveness and safety judgements: increasingly positive affective responses correspond to judgements of greater safety. This relationship holds for novice and expert backcountry skiers. The results further indicate a significant interaction between the preference for no ski tracks and the judgement of safety: the greater the individual preference for the absence of ski tracks, the safer scenarios with no ski tracks were judged to be. A sufficiently strong affective response to a single feature of a stimulus, irrespective of its relevance for the risk judgement, can significantly influence the risk judgement.

MAXIMIZING AS SATISFICING: ON PATTERN MATCHING AND PROBABILITY MAXIMIZING IN GROUPS AND INDIVIDUALS

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Wolfgang Gaissmaier

(University of Konstanz, Germany)

Ben R. Newell

(The University of New South Wales, Australia)

The ability to perceive structure, detect rules, and extract associations is a hallmark feature of human cognition. Yet people search for patterns even in random sequences—a tendency that has been argued to give rise to suboptimal decisions in repeated choice under uncertainty. In this study, we examined the decisions of collaborating three-person groups ($n = 81$) and independent individuals ($n = 81$) in a two-part repeated choice task. In the probabilistic part of the task, outcomes were serially independent and the optimal strategy was to exclusively select the most likely outcome (i.e., probability maximize). In the patterned part, a fixed outcome sequence was repeated and choice optimality was gauged from participants' pattern accuracy (i.e., proportion of correct choices). We found that groups performed as well as the best individuals in the probabilistic part of the task. By contrast, groups' pattern accuracy was not credibly higher than that of the average individual. Moreover, groups who did not identify an existing pattern, systematically underperformed by attempting to maximize probability. Qualitative coding of group discussion data revealed that failures to identify existing patterns were largely driven by a tendency to accept probability maximizing as a “good enough” strategy rather than to expend the effort of searching for a predictable outcome sequence. These results suggest that there are two routes to maximizing probability in repeated choice under uncertainty: recognizing that a probabilistic process cannot be outdone (maximizing as optimizing) or contenting oneself with an imperfect but easily implementable prediction strategy (maximizing as satisficing).
10:20 Anna Thoma (Max Planck Institute for Human Development, Germany)

WHEN ACTIONS DO NOT SPEAK LOUDER THAN WORDS: A MULTI-METHOD APPROACH TO DYADIC MULTIPLE-CUE INFERENCE

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The large majority of research on multiple-cue judgment has focused on the decision strategies of individual decision makers and has relied on outcome measures to investigate inference mechanisms. By contrast, dyadic multiple-cue judgment, during which small groups of individuals are able to communicate freely, has received only little attention. In this study, we developed a qualitative coding scheme for classifying dyads' discussion statements in a multiple-cue judgment task as indicative of either cue-abstraction or exemplar-based inference mechanisms. Based on the qualitative data from 40 dyads, we examined the effects of two different learning conditions ($n = 20$) on subsequent judgment accuracy and strategy use: learning by comparison, in which dyads learned which of two objects had a higher criterion value, and direct criterion learning, in which dyads learned each object's criterion value directly. We found evidence for a social abstraction effect — during group discussions, dyads expressed more statements indicative of a cue-abstraction than an exemplar-based strategy. This effect was more pronounced after training in the learning by comparison condition. Furthermore, evaluation of judgment accuracy suggested better cross-item generalization and extrapolation for dyads classified as cue-abstraction users. Finally, comparing the strategy classification results obtained from qualitative coding with those of a computational modeling analysis, revealed a high consistency between the two approaches. These findings suggest that dyads' verbalizations of decision strategies are consistent with the underlying cognitive processes and that qualitative coding of verbal protocols can provide valuable insights into the mechanisms underlying multiple-cue inference.

THE EFFECT OF TIME PRESSURE AND GAMBLE COMPLEXITY ON RISKY CHOICE

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Recent studies claimed that time pressure can change risk preferences in decisions between risky gambles. Yet, often inference is based on group choice proportions. When choice proportions deviate from 50% in control, a significant change towards 50% could either be modeled as a change in preferences or an increase in noise. Without a stochastic choice model, one cannot distinguish between both hypotheses. In two studies ($n=40$ and $n=60$), we examined binary risky choices with and without time pressure in a within-subjects design. In each condition, people chose 120 times between two gambles that varied in expected value and variance. In addition, we varied whether the safer or riskier gamble was more complex. In the first study complexity was manipulated as gambles consisting of either one sure thing or a 50-50 gamble compared to two-outcome gambles with unequal prospects. In the second study, complexity was varied by presenting gambles with either 2 or 4 outcomes. Using Bayesian hierarchical estimation of utility functions with a probit link function, we showed that time pressure decreased consistency (leading to more noise), but did not systematically affect risk preference. Furthermore, we found evidence for complexity aversion in that people were less likely to choose the more complex gamble. This effect maintained controlling for expected value, variance, and consistency. We conclude that stochastic utility modeling is necessary to understand the effect of time pressure on risky choice and that gamble complexity has to be held constant to measure risk preferences.

POSTER SESSION 1: DECISIONS AND COGNITIVE CONTROL

MORALITY WITHIN CHILDREN'S SIBLING RELATIONSHIPS AND FRIENDSHIPS

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Children's sibling relationships and friendships form important developmental contexts, especially on the issue of moral development (Dunn 2014, Schmid/Keller 1998, Youniss 1994). Moral obligation and interpersonal responsibility matter crucially within relationships (Keller 1996). I supposed that children feel obligated to moral norms depending on the particular relationship and expected children to be stronger committed to their siblings than they are to their friends. To investigate these hypotheses, children in the 5 to 6 age group (N = 83) were asked questions concerning their siblings and friends in a semi-standardized interview. Second, they were presented 5 scenarios referring to positive duties (sharing, helping) and to negative duties (stealing, promise). The analysis (Qualitative Content Analysis and Chi-square tests) of the interviews revealed that sanctions, justice, welfare or norms were not striking for their decision. Children referred to their relationships and the moral commitment arising from these. Choosing their sibling as well as choosing their friend correlates significantly with their relationship. In addition, the results reveal that children are stronger committed to their siblings than they are to their friends. Especially the changes of perspectives within the scenario sharing a sweet clarifies this result. This pattern appears within positive duties (sharing, helping) and within the positively structured duty (promise). Stealing is only an issue within friendships. Taking something away is not classified as stealing within sibling relationships. As the results support the link between relationships and moral development, future research on moral development should take relationships more strongly into account.

IMMEDIATE DISPLACEMENT, DELAYED GENERALIZATION: TESTING THE LATERAL ATTITUDE CHANGE MODEL

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According to the lateral attitude change (LAC) model (Glaser et al., 2015), a displacement effect occurs when people explicitly resist a persuasion attempt toward a focal object, but do change their attitude toward a lateral object, which was not the target of persuasion. Similar to the sleeper effect (Hovland, 1949), however, the reasons for resisting focal persuasion may become inaccessible, and thus a delayed explicit attitude change toward the focal attitude object may emerge. In an ongoing 3x2 experiment, participants read either one of two pretested persuasive messages (favoring or opposing inclusive schooling) or a non-persuasive control text. Immediately afterwards, they receive a disclaimer (or validation message) declaring message content invalid (valid). Participants' explicit and implicit attitudes toward the focal attitude object inclusive schooling and one lateral attitude object are assessed both immediately (T1) and after a one-week delay (T2). Results are expected to be in line with the LAC model: Participants who read no disclaimer will show a pattern of generalization (explicit attitude change toward focal and lateral objects) at both T1 and T2. Participants who do read the disclaimer will show a pattern of displacement (explicit attitude change only toward the lateral object) at T1, and of generalization at T2. Implicit attitudes will always show a generalization pattern, as they are unaffected by conscious rejection of the message. Results and implications for theory will be discussed.

RIVALS REBOOTED - WHAT WE LEARN FROM OTHERS IN SPEED-ACCURACY TRADE-OFFS

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Information search is greatly curtailed when competition threatens to pre-empt one's choice. Inspired by Phillips, Hertwig, Kareev, & Avrahami (2014), we introduced a computerized rival into our speed-accuracy trade-off paradigm to encourage participants ($N = 103$) to make their binary sampling-based decisions more optimally than in previous studies. The trade-off arises from a limited total session time, in which the number of decisions possible depends on the time spent sampling. Since correct and incorrect decisions were rewarded and punished, there was a trade-off between two goals. On one hand, one ought to maximise the number of decisions one encounters to maximise the potential total payoff (speed component), on the other hand, one ought to maximise sample size and thereby accuracy and payoff per decision (accuracy component). While the optimal strategy demands a strong focus on the speed component, participants considerably overemphasise accuracy. Introducing a rival, who followed a close-to-optimal strategy and could pre-empt the participants' decision proved successful in fostering a faster strategy and showed transfer effects in a subsequent standard session. However, our additional conditions, in which participants merely watched a computerised teammate execute a close-to-optimal strategy (either alone or playing against the rival) induced similar transfer effects. Moreover, all conditions regressed towards a slower strategy than what they had observed or applied. Learning from experience seemed no better than vicarious learning, and neither seemed to provide a suitable learning environment for participants to gain enough insight into the optimal strategy to uphold or even outperform the demonstrated strategy.

HOW DOES LEARNING NEW INFORMATION AFFECT JUDGMENT POLICIES?

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People often forget acquired knowledge over time such as the names of previous prime ministers. Judgments hinge on the knowledge people possess. For instance, the decision to vote for a party may rest upon a similarity-based retrieval of the previous political successes a party reached or a more rule-based assessment to what degree the party follows liberal positions. Past research has suggested judgment accuracy declines for the rule- and similarity-based judgments over time, but practice helps to restrict this decay for rule-based judgments. One potential reason why people forget is they learn new information that interferes with the previously acquired knowledge. The present study aims to further shed light on how forgetting processes limit the human ability to make accurate judgments by studying how learning of new information interferes with the judgment policies people have established earlier. Specifically, we expect that if participants have established a rule-based judgment policy, changing this rule will be more detrimental to their judgment policy than storing new knowledge in the form of single exemplars and vice versa. To test these predictions, participants learned to solve a judgment task in which they had to identify two exceptions among one linear, additive rule. In a second training phase, participants then either learned another rule, new exceptions, or both. A control group did unrelated task. In the last phase, participants were asked to remember how they judged the stimuli in the first phase. Taken together the study aims to better understand the consequences of forgetting in judgment.

THE INFLUENCE OF SITUATIONAL FACTORS ON THE PERCEIVED FAIRNESS OF SCHOOL INTERACTIONS

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The present paper investigates the influence of situational factors on subjective experiences of justice in school. The perceived justice of interactions is especially important in inclusive classrooms as it fosters the students' sense of belonging and community. Based on a psychological perspective of justice, we developed vignettes focusing student-teacher-interactions. In an experiment we varied the special educational need of the student in 6 vignettes. A total of 275 teacher students of the University of Potsdam evaluated the perceived justice of the situations. Linear mixed effect model analyses showed a significant influence of the student's special educational need on justice judgements, specifically for behavioral problems and marginally for learning difficulties. The diagnostic status did not influence the justice judgements. These findings suggest a shift from the principle of equality to the principle of need in the formation of justice judgements.

ANTHROPOMORPHIZING ROBOTS: THE EFFECT OF FRAMING IN HUMAN-ROBOT COOPERATION

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A current trend in human-robot interaction is to create social robots which resemble human beings. This can be done by anthropomorphic design or by framing a robot humanlike. The current study examined how framing a robot affected people's perception of it as well as their willingness to bear financial costs for the robot's sake. It was hypothesized that anthropomorphic framing would lead to a more humanlike perception of the robot and to greater willingness to give up money for it. Half of the participants ($n = 20$) received an anthropomorphizing story about NAO, the robot, and the other half ($n = 20$) read a mechanical description of it. All subjects were supported by NAO in solving the Tower of Hanoi, a mathematical game. Afterwards, participants filled in a questionnaire assessing perceived humanness, eeriness, and attractiveness of the robot and received 5€ for participation. When they were about to leave the laboratory, they were told a fake story about why NAO needed a repair. They were then asked if they wanted to donate an arbitrary amount of the money they just received for this specific purpose. Framing did not yield a significant difference in people's perception of NAO. However, contrary to our hypothesis, people donated significantly less when the robot was framed humanlike. This suggests that anthropomorphic framing may induce people to dismiss the robot's purpose as a tool by creating a context in which it is perceived more like an individual subject rather than a machine (object).

THE ROLE OF INDIVIDUAL DIFFERENCES IN RISK-TAKING ACROSS ADOLESCENCE: HOW IMPULSIVITY AND EMPATHY COULD TELL US MORE THAN AGE

Corinna Lorenz, Jutta Kray (Saarland University, Germany)

Recent theories on decision-making in adolescence suggest a peak of risk-taking in mid-adolescence, while actual findings imply that this might only be true for highly rewarding and social task contexts. The aim of this study was to examine whether differences in adolescent risk-taking might rather be explained by individual differences in impulsivity and empathy than age, raising doubts that the biological factor age is the most critical factor in understanding risk-taking in adolescence. To investigate this, we applied a STOPLIGHT task, a well-known task to measure risky decisions in a simulated driving game. Overall, 50 early- (9-11 years), 63 mid- (12-14 years), and 56 late-adolescents (15-17 years) were faced with the decision to either stop (safety-decision) or run over (go-decision) yellow traffic lights. With go-decisions, they saved time else spent at the traffic light but risked to cause an accident and to lose more time. Adolescents were told to progress as fast as possible to arrive at a friend's party. We measured impulsivity and empathy with self-report questionnaires and separated each age group in high or low impulsive and empathic subjects. Results indicated (a) more go-decisions in high impulsive and high empathic participants irrespective of age, (b) lower go-decisions in low than high impulsive and empathic individuals only in early adolescents, and (c) low impulsive and empathic mid- and late-adolescents did not significantly differ in go-decisions from high impulsive or empathic peers. These findings suggest that individual differences in personality need to be considered in developmental theories on adolescent decision-making.

DOES YOUR NAME REVEAL YOUR BLAME? ON THE EFFECT OF THE PERPETRATOR'S ETHNICITY, NEGATIVE ATTITUDES AGAINST MUSLIMS, AND RAPE MYTH ACCEPTANCE ON JUDGMENTS OF A RAPE CASE

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Philipp Süssenbach (Fachhochschule des Mittelstands, Germany)
Sarah Teige-Mocigemba (University of Marburg, Germany)

The religious background of refugees and their behavior towards women is a controversial issue in German politics, society, and media ever since the incidents of sexual assaults during New Year's Eve in Cologne 2015/2016. As part of an online study, we examined the effect of the perpetrator's ethnicity, negative attitudes against Muslims and the Islam as well as rape myth acceptance on participants' perpetrator and victim related judgments of a rape case. In a between-subjects-design, 987 subjects read an ambiguous rape vignette in which the perpetrator's ethnicity was manipulated by his name. As expected, rape myth acceptance predicted victim blaming and perpetrator exoneration, independent of the experimental condition. Contrary to our expectations, negative attitudes against Muslims and the Islam predicted more lenient judgements for the migrant perpetrator than for his German counterpart. We discuss possible boundary conditions of and processes underlying this leniency effect.

DISMANTLING DECISION-MAKING UNDER KNOWN RISK IN ADOLESCENCE – ON THE INFLUENCE OF INCENTIVE VALENCE, EXPECTED VALUE AND COGNITIVE ABILITIES

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There is an ongoing debate whether adolescents are poor or reasonable decision-maker in experimental risk settings. As findings remain inconsistent, they are mostly limited to decisions when maximizing gains. The aim of this study was to investigate how the incentive valence (gain, loss) and expected values (EV) of safe and risky options influence adolescents' risk-taking. Based on findings in adults, we expected that more risks should be taken in loss than gain situations. Also, more risks should be taken in situations with a higher EV for the risky option than for the safe option. The ability to distinguish beneficially between options based on their EV (EV-sensitivity) should increase during adolescence. Here we were specifically interested in whether the association between age and EV-sensitivity would be mediated by working-memory capacity. We investigated 164 participants in a decision-making task, in which the incentive valence (gains, losses) and the EV (risk-advantageous, risk-disadvantageous) were systematically varied. Hence, decisions for the risky option as a function of valence and EV were compared between early (9-11 years), mid (12-14 years) and late adolescence (15-17 years). Results showed (a) higher risk-propensity to avoid losses than to maximize gains, (b) an increase in EV-sensitivity with increasing age, and (c) that this increase was strongly mediated by individual differences in working-memory capacity. These results emphasize the need to consider risk-contexts, as well as cognitive control abilities such as working-memory in theories concerning adolescent development, as they seem to influence the ability to make reasonable decisions in risk-taking situations.

STEREOTYPE-BASED EMPLOYMENT DISCRIMINATION OF PEOPLE WITH MENTAL VS. PHYSICAL DISORDERS

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Angela Dorrough, Andreas Glöckner (University of Cologne, Germany)

People with mental disorders have to overcome multiple barriers to find a way back into full occupational reintegration. With this project we aim to get a better understanding of the processes underlying the stereotype-based employment discrimination applying a cognitive decision making approach. With a hypothetical reintegration hiring scenario with probabilistic inference decisions we show that participants base their response not only on the information about the actual (objective) suitability of the applicants but also systematically discriminate against people with mental disorders compared to people with physical disorders (Study 1), and that individuals are not able to correct for this discrimination even with explicit instructions and monetary incentivization (Study 2). We show that this hiring bias is mediated by the perceived competence of the applicants. Furthermore, we show that the hiring bias varies between different occupations used for the scenario (i.e., architect, manager and police officer) supporting the assumption that the stereotypical perception of a certain job's requirements is also crucial for employment discrimination. In sum, results suggest that people activate stereotype knowledge associated with mental and physical disorders serving as cues in probabilistic inference decision tasks in the context of employment decisions. These cues result in systematic discrimination even under incentives that make discrimination irrational.

HONESTY CONTRACTS: A SIMPLE METHOD TO ELICIT TRUTHFUL ANSWERS TO EMBARRASSING QUESTIONS

Madita Frickhoeffler, Jochen Musch (University of Duesseldorf, Germany)

The validity of surveys asking for self-reports of sensitive attributes is threatened by socially desirable responding. We propose honesty contracts as a new method for reducing social desirability bias. The method is based on placing an explicit contract with voluntary respondents who are asked to commit themselves to providing honest answers prior to starting the survey. Asking participants to actively conclude an honesty agreement increases attention to honesty norms and avoids the problem of participants skimming or skipping instructions asking to provide truthful responses. Honesty contracts are easy to implement and can be added to any survey. They are a rather soft form of nudging because there are no sanctions that force respondents to conclude or to honor a contract. To investigate whether honesty contracts are nevertheless capable of inducing a commitment to answer honestly, we conducted an experiment. We asked 215 participants to provide self-reports with regard to nine sensitive attributes, as for example, driving a car after consuming alcohol, gossiping about other people, and lying to other people. As expected, respondents in the honesty contract condition were significantly more ready to admit socially undesirable behaviors than respondents in the control condition. Virtually all participants (98%) in the honesty contract condition were ready to commit themselves to providing honest answers. Taken together, our results suggest that honesty contracts may be a promising means to reduce response distortions due to social desirability.

DUAL-TASKING IN RISKY DECISION MAKING: DO PARALLEL AUDITORY WORKING MEMORY DEMANDS AFFECT CHOICE PERFORMANCE IN COMPLEX SITUATIONS?

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Previous findings in cognitive decision-making research indicate that decisions get riskier (i.e. more disadvantageous) if a secondary cognitive task is performed simultaneously. Studies often used visual working-memory tasks that had to be performed in parallel to a (visual) decision-making task. Our research question was whether this dual-task interference is also true for decision making in complex situations (including conflicting short- and long-term risks) in case the parallel task addresses a different sensory modality. The current study tested three groups of participants ($N = 115$), who performed executive function and working memory tasks as well as a complex risky decision-making paradigm (the Cards and Lottery Task; CLT). Participants performed the CLT either as a single task ($n = 39$) or a dual task including either an auditory 1-back ($n = 38$) or auditory 2-back task ($n = 38$). The results show that, overall, performance in the CLT was not affected by a parallel auditory n -back task (neither 1-back nor 2-back). However, the group variable moderated the effects of general working-memory span on the decision-making performance. Furthermore, significant interactions with decision time occurred. The results indicate that working memory contributes differentially to advantageous decisions depending on whether parallel working-memory resources are required or not. However, the results indicate that a secondary cognitive task does not necessarily have negative effects on decision making in complex situations, at least if it addresses a different sensory modality. In this case, having good working memory and taking more time seem to compensate for additional cognitive demands.

IN SEARCH OF HOMO HEURISTICUS: DO USERS OF THE RECOGNITION HEURISTIC ALSO EMPLOY THE FLUENCY HEURISTIC?

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Previous research has found individual differences in the use of different fast and frugal heuristics suggesting that individuals have preferences for using versus avoiding each of these strategies. Additionally, it has been established that use of a specific heuristic, the recognition heuristic (RH), is stable across time and stimulus materials suggesting that the preferences individuals have for or against using such strategies are stable. These findings indicate that use of heuristics might be a stable person-specific cognitive style of decision making. Extending this line of research, we investigated whether individuals display the same inclination to the use versus non-use of heuristics in general. In particular, we studied use of two of the most prominent heuristics, namely the RH and the fluency heuristic (FH). We hypothesized that individuals who show higher levels of RH-use will also show higher levels of FH-use. To test this hypothesis, we conducted a classical city-size task consisting of a recognition task and a paired-judgment task, which allows the assessment of both heuristics simultaneously. Participants' proportions of RH-use and FH-use as well as their relation were measured by a hierarchical extension of a multinomial processing tree model (the r-s-model). In line with our hypothesis, a significant positive correlation between use of both heuristics could be observed, i.e., individuals who applied the RH more often also applied the FH more often. This result is in line with previous findings and serves as further evidence for heuristic use representing a stable person-specific cognitive style of decision making.

CROSS-CULTURAL DIFFERENCES IN METACONTROL POLICIES: EVIDENCE FROM TASK-SWITCHING

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According to the metacognitive state model, cognitive processing can be affected by metacognitive states that vary between two poles: extreme persistence and extreme flexibility. While the former is characterized by a strong top-down influence of the current action goal, high selectivity and goal maintenance, and strong mutual competition between alternative representations, the latter is characterized by a weak top-down influence of the current action goal, low selectivity and goal maintenance, and weak mutual competition between alternative representations. Interestingly, previous research has suggested that metacognitive states can be affected by several long-term factors that may determine relatively stable biases towards either persistence or flexibility. In the present study we focused on the role of culture in shaping metacognitive biases. To this end, we compared performance of people from four different countries (Germany, Italy, The Netherlands, and China; N=60 in each group) on a task assessing cognitive flexibility (i.e., color-shape task-switching paradigm). Results corroborated the hypothesis that whereas collectivistic cultures are more biased towards flexibility, individualist cultures are more biased towards persistence.

COGNITIVE CONTROL OF EMOTIONAL DISTRACTION – VALENCE-SPECIFIC OR GENERAL?

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Emotional information captures attention due to privileged processing. While this emotional-priority is beneficial in some situations, it comes at the costs of increased distractibility in other situations. Therefore, shielding current goals from emotional disrupt (ED) is essential for adaptive goal-directed behavior. Current research on the interplay between cognition and emotion has shown that for negative stimuli, ED is reduced when participants recruit cognitive control prior to the presentation of an emotional distractor. Following up on this finding, we asked whether this control of ED is valence specific or general. A valence-general account predicts that cognitive control shields against the distracting influence of arousal, irrespective of the valence (positive or negative) of an event. In contrast, a valence-specific account predicts that cognitive control interacts with the specific hedonic value of an emotional event and cognitive control reduces ED from negative stimuli only. To test this, we systematically manipulated the valence and arousal (positive, high arousal; negative, high arousal; and neutral, low arousal) of emotional distractors (pictures) and assessed how control (instigated by the flanker task) interacts with ED. We found that following conflict, ED decreased similarly for negative and positive pictures. Accordingly, results support a valence-general account of cognitive control mechanisms that block off high arousing emotional distractors from interfering with goal-directed actions, irrespective of their valence.

HIERARCHICAL BINDINGS IN ACTION CONTROL

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Many accounts of human action control assume bindings between stimuli and responses of individual events (e.g., Hommel, Müsseler, Aschersleben, & Prinz, 2001; Logan, 1988; Schmidt, De Houwer, & Rothermund, 2016). That is, the representation of an event can be thought of as a loose network of bindings between its elements. Notably, most human action is hierarchically organized, meaning that a particular action (e.g., typing a word) is both part of a larger scale action (e.g., typing a sentence) and also composed of smaller scale actions (e.g., individual keystrokes). Yet, to date, there is no evidence for a hierarchical organization of bindings. The present experiment ($N = 32$) bridged that gap and analyzed whether bindings within smaller scale events (stimulus-response bindings in individual responses to stimuli) can exist simultaneously with bindings between these events (bindings between successive individual responses). Supporting the notion of a hierarchical organization of bindings, the results indicate that successive individually executed responses can be bound to each other, while (smaller scale) bindings between elements of each individual response exist. Implications for the role of binding in action control in general are discussed.

A SMILE AS A CONFLICT: AFFECTIVE MISMATCH BETWEEN EMOTIONAL EXPRESSIONS AND GROUP MEMBERSHIP INDUCES CONFLICT AND TRIGGERS COGNITIVE CONTROL

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Initial affective reactions to emotional expressions of others have been shown to critically depend on the group membership of expresser and perceiver. The underlying mechanisms that are responsible for this response divergence are, however, still unclear. The most prominent explanation - the social intention account - holds that affective response tendencies are elicited by others' intentions: In-group members are imputed to pursue benevolent intentions thereby facilitating concordant responses. Out-group members, however, are imputed to pursue malevolent intentions, thus, triggering discordant responses in an interaction partner. In this talk, we put forward an alternative account that is able to explain the observed response divergence much more parsimoniously. We propose that a combination of group membership and facial displays results in affectively compatible (e.g., positive emotional expressions by positively evaluated persons) or incompatible configurations (e.g., positive expressions by negatively evaluated persons) assuming that incompatible faces represent an affective processing conflict. To test this processing conflict account, participants categorized facial displays of in-/out-group persons. Results revealed a clear performance benefit for affectively compatible over incompatible faces (i.e., a compatibility effect) which is indicative of perceived conflict. Moreover, we observed typical conflict adaptation effects: Incompatible faces in trial N-1 substantially reduced the compatibility effect in trial N, which occurred irrespective of the type of the preceding conflict. More precisely, the fact that an affectively incompatible joyful face triggered control adjustments that facilitated processing of an affectively incompatible fearful/angry face, speaks in favor of the conflict instead of the social intention account.

CONTEXTUAL MODULATION OF MOTOR-BASED BETWEEN-TASK INTERFERENCE IN DUAL TASKING

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In dual tasking, between-task interference arises when both tasks share similar processing characteristics (compatibility-based BCE) or when withholding a response in the secondary task (T2) conflicts with Task 1 (T1) response execution (no-go BCE). Because both types of BCEs seem to fundamentally differ in the underlying cognitive processes (Durst & Janczyk, 2018), it remains unclear whether a contextual modulation of the compatibility-based BCE can be equally assumed to occur for the nogo-based BCE. To test this, a visual S1 was randomly presented at upper or lower locations followed by an auditory S2 (100 vs. 200ms SOA). One location was associated with 80% T2 response execution (go-R2) and the other with 80% not responding in T2 (no-go-R2). Results showed overall slowed R1 when R2 was a nogo-response, demonstrating a no-go BCE. This no-go BCE was contextually modulated: It was present at the context of mostly go-R2s, where withholding R2 considerably slowed R1 execution. At the same time, the no-go BCE was absent at the context of mostly no-go R2s. Frequently withholding R2 at this location, however, did not facilitate R1 execution. Instead, the location of the mostly no-go R2s seemed to generally induce (inhibitory) costs on R1 execution irrespective of R2 response type (go vs. no-go). This modulation was not present at long SOA. Here, participants (strategically) delayed R1, which diminished the predictive impact of the context but maintained an overall no-go BCE. Together, these results demonstrate a contextual modulation of motor-based between-task interference in dual tasks.

CULTURES DIFFER IN THEIR USE OF SENSE OF AGENCY CUES

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Sense of agency (SoA) is the sense of having control over one's own actions and through them events in the outside world. People estimate their SoA by integrating different agency cues. In the present study, we examined whether the use of congruency between action and effect, affective valence of the effect, and temporal relation between action and effect as agency cues differs between Asian (Mongolia) and Western (Austria) cultures. 61 Mongolians and 70 Austrians participated. In a learning phase, participants learned to associate actions (keypresses) with positive and negative action effects. In a test phase, participants performed the same keypresses. After different intervals positive and negative action effects, which were either congruent or incongruent with the previously acquired action-effect associations, were presented. In each trial, participants were asked to rate how likely the action effect was caused by themselves or by the computer (authorship rating). Higher authorship ratings for congruent than incongruent action effects indicated that action-effect congruency strengthens SoA. Higher authorship ratings for positive than negative action effects indicated that emotional valence modulates SoA. Authorship ratings decreased with increasing interval in Austrians but not in Mongolians. For Mongolians, the temporal chronology of events might be less important when inferring causality. Therefore, information regarding the temporal occurrence of the effect might not be used as agency cue. In conclusion, some agency cues might be similarly used in different cultures but the use of other cues might be culture-dependent.

CEREBRAL BLOOD FLOW MODULATIONS DURING PROACTIVE CONTROL IN CHRONICAL LOW BLOOD PRESSURE

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Chronic low blood pressure (hypotension) is typically associated with symptoms including fatigue, mood disturbance, dizziness or cold limbs. In additions, a number of studies demonstrated hypotension-related cognitive impairments, particularly in the domains of attention and memory. Deficiencies in cerebral blood flow regulation may contribute to these deficits. This study investigated cerebral blood flow modulations during proactive control in hypotension. Proactive control refers to cognitive processes during anticipation of a behaviourally relevant event that allow optimization of readiness to react. Using functional transcranial Doppler sonography, bilateral blood flow velocities in the middle cerebral arteries (MCA) were recorded in 40 hypotensive and 40 normotensive participants during a precued Stroop task. The task included 18 congruent and 18 incongruent trials, which were presented 5 s after an acoustic cue. The MCA supply cerebral structures as the dorsolateral prefrontal and inferior parietal cortices, which are relevant in preparatory cognitive processing. Hypotensive participants exhibited smaller bilateral blood flow increases during response preparation and longer response time. The group differences in blood flow and response time did not vary by executive function load, i.e. congruent vs. incongruent trials. Over the total sample, the flow increase correlated negatively with response time in incongruent trials. The findings indicate reduced cerebral blood flow adjustment during both the basic and more complex requirements of proactive control in hypotension. They also suggest a general deficit in attentional function and processing speed due to low blood pressure and cerebral hemodynamic dysregulations rather than particular impairments in executive functions.

A GRATTON-LIKE EFFECT CONCERNING TASK ORDER IN DUAL-TASK SITUATIONS

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Performing two tasks simultaneously involves the coordination of their processing. Task coordination is particularly required in dual-task situations with varying order of the component tasks. When task order switches between subsequent trials, task-order coordination leads to order switch costs in comparison to task order repetitions (i.e., worse performance in trials associated with an order switch compared to an order repetition). However, the adaptive characteristics of task-coordination processes and order switch costs are underspecified so far. For example, studies on other control processes have shown that these processes can be modulated in response to changes in task demands. The present study investigated therefore whether task-order coordination processes are modulated by the previous experience of a task-order switch. To investigate these costs in a dual-task situation with two sensorimotor tasks with variable task-order, we analysed reaction times in trials with task-order switches and trials with task-order repetitions following task-order switches and repetitions in the preceding trial. Order switch costs were reduced in trials following task-order switches compared to task-order repetitions; resembling the Gratton effect commonly observed in conflict adaptation paradigms. We discuss the present results in the context of cognitive control theories.

OPTIMIZATION CRITERIA OF SELF-ORGANIZED TASK SWITCHING: TRADEOFF BETWEEN WAITING COSTS AND SWITCH COSTS IN MULTITASKING

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We investigate the reciprocity of task choice and task performance in multitasking when participants can freely decide which task to perform on each trial. It is a central finding that switching between tasks leads to switch costs. Thus, in voluntary task switching experiments the switch rates were often low. In the self-organized task switching paradigm, a novel variant of voluntary task switching, the likelihood of tasks switch is increased because the stimulus needed to repeat the previously executed task, is delayed. 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 repeated 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, switch costs and waiting time for repetition stimulus were rather similar. In the present study, we aim to optimize the novel self-organized task switching paradigm. We elaborated whether delay increment per repetition and switch costs impact on task choice to assess which combination of delay increment and switch costs maximizes participants' attempt to tradeoff waiting time and switch costs. Correlational analyses indicate relations between individual switch costs and individual switch rates across participants. Moreover, we identified conditions where participants could trade their switch costs and waiting time for the repetition stimulus most efficiently.

SWITCHING ATTENTIONAL DEMANDS - ON THE RELEVANCE OF IMPULSIVITY, WORKING MEMORY, AND BASIC ATTENTIONAL FUNCTIONS

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In our modern world, we are constantly faced by an endless array of stimuli, all put different demands on our attentional system and, moreover, require us to permanently switch between these demands. While previous task-switching paradigms mostly focused on the rapid switching between small sets of simple tasks, or different modalities, switching between different attentional demands (such as selective and divided attention) is somehow neglected. Therefore, we developed the Switching Attentional Demands (SwAD) paradigm to investigate switching costs between different attentional demands. The study at hand addresses relationships between the SwAD paradigm, the UPPS impulsive behavior scale, an oddball task, a classic dual-task paradigm, as well as a visual digit span task. In total, 92 people [$M=21.59$, $SD=3.66$; 75 women] completed the study. Results showed – among others – that switching between attentional demands leads to an increase in RTs of selective attention ($t(91)=78.256$, $p<.001$). In contrast, RTs in the divided attention task decreased under switching conditions, compared to the performance of solely divided attention tasks ($t(91) = 72.122$, $p < .001$). Significant correlations were found between RTs of selective attention and the oddball task ($r(87)=.536$, $p<.001$), as well as between RTs of divided attention and a classic dual-task paradigm ($r(75)=.444$, $p<.001$). Switching between attentional demands had a differential effect on selective and divided attention. Future studies should implement further demands such as vigilance or sustained attention within the SwAD paradigm, but also supplement behavioral findings by investigating neurophysiological correlates.

EXPLORING PSYCHOLOGICAL RESEARCHERS' DATA MANAGEMENT MISTAKES

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Procedural mistakes committed by the researchers during their activity throughout research data management can deteriorate both the credibility and efficiency of the research project. In our exploratory study, we investigated the frequency and seriousness of mistakes that researchers commit during data management. We surveyed 484 psychology researchers about the most frequent and most serious mistakes that they committed in the last 5 years. We collected the contact information of our sample from articles published between 2010 and 2018 in 153 psychology journals. The results showed that 72% of research teams discover data-management issues in their projects, for more than half of them leading to major project delays or money loss. By exploring the most frequent and serious mistakes we can improve the efficiency and credibility of psychological research in the long run by linking existing solutions to the problems or to show where solution-development is most needed.

TEMPORAL BINDING IN MULTISTEP ACTION-EVENT SEQUENCES

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Our daily experiences are usually made up of multistep sequences of actions and sensory events. Events trigger actions, which in turn evoke ensuing events and further actions. Previous studies on dyads consisting of an action and an event revealed a perceived shortening of the interval between causally linked actions and events, i.e., temporal binding. That is, the perceived points in time of actions and events are shifted towards one another. What happens to this perceived shortening when actions and events are presented in multistep sequences? Previous research examining the perceived timing of events in sequences suggests that action-event sequences break down into dyads which are temporally grouped together. It is not clear, however, whether actions are equally drawn towards the event in multistep sequences. This study examined temporal binding in event-action-event and action-event-action triads. Therefore, participants (N=36) had to judge the perceived timing of actions in six different conditions. An action-only baseline condition was compared to the experimental conditions comprising either an action-event dyad or triads of actions and events. Actions in dyads were temporally bound to both preceding and ensuing events. However, the perceived action-timing in action-event-action sequences did not differ from the baseline condition. Contrarily, the action in event-action-event sequences was perceived to occur earlier than in the baseline condition. Consequently, the results suggest that while actions and events are temporally drawn together in isolated dyads this pattern is more complex in multistep sequences of actions and events.

PERFORMING A SECONDARY EXECUTIVE TASK WITH ADDICTION-RELATED STIMULI IS ASSOCIATED WITH AN ADDICTIVE USE OF SOCIAL MEDIA APPLICATIONS

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Background and aims: The pathological use of social media applications is discussed as specific type of Internet-use disorders, sharing similarities in behaviors and underlying processes with Internet-gaming disorder. Based on current theoretical assumptions and research on Internet-gaming disorder as well as substance-use disorders, it is assumed that the confrontation with addiction-related cues also has an effect on Internet-related decision-making behavior as well as on executive functions. **Methods:** The current experimental study used a between-subjects design (N=356) with two groups performing a working memory task (either with neutral or social-media-related cues) in parallel to a decision-making task (Game of Dice Task; GDT). We furthermore investigated associations between task performance and tendencies towards an addictive use of social media (assessed by a modified version of the short Internet Addiction Test). **Results:** In the social-media-related version of the working-memory task, participants made more mistakes compared to the neutral version. Additionally, lower performance in the social-media-related working-memory task was associated with an addictive use of social media. GDT performance was not different across the two groups.

Conclusions: The results are consistent with theoretical models as well as empirical results in addiction research, which emphasize that addiction-related cues affect attention and working-memory capacity. Reductions in the addiction-related working memory task are associated with the urge to use these applications, but not with decision-making behavior. Future studies should investigate the relevance of further executive functions such as inhibitory control when being confronted with specific cues in the context of addictive social media use.

DOES THE SUBJECTIVE COST OF EFFORT DETERMINE THE CHOICE BETWEEN TASKS OF UNEQUAL DIFFICULTY?

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In the context of effort-based decision making, it is assumed that humans generally tend to avoid effort. However, effort is a vague concept and may be experienced differently between individuals. In a recent study, we have already shown that some participants deliberately invested more effort than others as indicated by more frequent switches to the more difficult of two tasks (especially so with an increasing reward prospect), even though the potential reward increase was not contingent on task choice but on performance only (Jurczyk et al., in press). In order to investigate whether the subjective cost of effort may explain this seemingly irrational behavior, we used the same paradigm of voluntary task switching between an easy and a difficult task and reward cues of changing magnitude (N=64). After this task, we measured each individual's subjective effort cost: The effort discounting paradigm (Westbrook et al., 2013) requires participants to make a series of choices to indicate their preference between re-doing a difficult-task block for a certain amount of money or an easy-task block for less. In order to pinpoint the subjective cost of the difficult block (versus the easy block) for each participant, the difference between the two reward offers adapts based on participants' prior choices, approaching a subjective indifference point. Results show the predicted correlation between the subjective value of effort and individual's voluntary choice rate of the difficult task, particularly in a situation of increasing reward prospect. Implications for the study of effort-based decision making will be discussed.

POWER TO THE LEARNER? EXAMINING LEARNERS' CONTROL IN SHORT TERM TASK SWITCHING TRAINING

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Content variability was previously suggested to promote stronger learning effects in cognitive training whereas less variability incurred transfer costs (Sabah et al., 2018). Here, we expanded these findings by additionally examining the role of learners' control in short-term task switching training by comparing voluntary task switching to a yoked control forced task switching condition. To this end, three conditions were compared: a (1) Voluntary and a (2) forced task switching group with changing tasks in every block and (3) a voluntary task switching group with the same two tasks in all training blocks. The experiment consisted of a baseline block, seven training blocks (learning phase), followed by one transfer block. Although no additive benefits for learners' control beyond varied content training was observed, granting participants control over learning seemed to counteract the entailed costs in the third group when transferred to untrained task switching context. Taken together, the current results provide further evidence to the beneficial impact of variability on training outcomes. In addition, they encourage the reconsideration of motivational differences as moderating rather than confounding factors in cognitive training research.

POSTER SESSION 2: EYETRACKING AND NEUROSCIENCE

NO DISTRACTOR-RESPONSE BINDING IN A SACCADIC DISCRIMINATION TASK

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Reacting to a stimulus can lead to benefits or interference in a succeeding trial, depending on response and feature repetitions: If responses and features only partially repeat, interference occurs, leading to slower reaction times and higher error rates. However, if responses and features fully repeat, typically benefits are observed. One explanation for this pattern is feature-response binding: Response and stimulus features are bound together and can be retrieved, when repeated. This leads to benefits for full repetition, but interference for partial repetition. Even irrelevant information, i.e. distractors, can be bound to a response (distractor-response binding). According to the literature, such binding mechanisms are ubiquitous and can possibly explain a large amount of actions. We investigated, if these binding effects are effector-specific, specifically, if binding effects are present when giving saccadic responses. In an eye-tracking study (N=27), participants had to discriminate appearing target letters by looking to one of two locations. The appearing target letter was framed by a distractor. We found no evidence for distractor-response binding. These results suggest that eye-movements follow other action control processes than manual movements do.

TIME DILATION DURING THE PREPARATION OF DIFFICULT TASKS IS CAUSED BY THE INCREASED RELEASE OF NOREPINEPHRINE AS INDICATED BY PUPIL DILATION AND P3b AMPLITUDE

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Preceding a difficult action, e.g., a penalty kick, time appears to slow down. Underlying this subjective dilation of time might be the motivational significance of the event and the resulting expenditure of effort prior to the action. On a neural level, this is related to the phasic release of norepinephrine (NE), which has recently been shown to contribute to subjective time dilation. In order to test the assumption that preparation-related time dilation is caused by a phasic NE release, we investigated how indices of NE release, the P3b amplitude and pupil dilation, as well as time estimation are modulated by the cued difficulty of a subsequent mouse-tracking task. We presented participants stimuli of varying duration that cued the difficulty (easy, hard) of the immediately following task. This task involved moving a cursor into a target area within a time limit. The target area was either large (easy) or small and accompanied by distractors (hard). Following this task, participants had to estimate the cue duration relative to two previously established references. As hypothesized, cues indicating a difficult task were not only perceived to be longer than cues indicating an easy task, they also caused a more pronounced P3b amplitude and a larger pupil dilation response. Replicating prior results, we further found that the P3b amplitude predicted subsequent time estimates. In sum, these results indicate that during the preparation of a difficult task the recruitment of cognitive effort, which manifests in the increased release of NE, causes subjective time dilation.

A NOVEL TEST OF IRRELEVANCE INDUCED BLINDNESS

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According to load theory, task-irrelevant stimuli are processed automatically under conditions of low perceptual load. This notion was challenged by the discovery that, even under low perceptual load, thought-to-be irrelevant stimulus features are not processed. In the so-called concentric circle task (Eitam, B., Yeshurun, Y., & Hassan, K., *Journal of Experimental Psychology: Human Perception and Performance*, 39, 611–615, 2013), participants saw two differently colored concentric circles – a ring surrounding a disk. Participants were instructed to concentrate on one of the two objects. After a brief exposure to the stimuli, in an unannounced memory task, participants had to identify the color of either the previously focused on stimulus (congruent condition) or the color of the previously irrelevant stimulus (incongruent condition). Memory for the previously irrelevant stimulus color was significantly worse. In our present one-trial experiment, we aimed to conceptually replicate the original study while addressing a variety of caveats of the original study and measuring eye-movements in order to implement a more sensitive measure of residual memory (i.e., priming). Although we only partially replicated the findings of the original study, a meta-analysis of reported irrelevance induced blindness effects lends credence the existence of this effect.

AN EXPERIMENTAL APPROACH TO INVESTIGATING VISUAL COMPLEXITY USING EYE TRACKING

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Visual complexity is a construct of relevance in many different domains, from basic research to human-computer interaction or the perception of art. However, despite its relevance, visual complexity is still not understood comprehensively. Within a novel approach, we experimentally investigated the influence of core dimensions of visual complexity on subjective ratings in order to contribute to a better understanding of the construct itself. Moreover, we employed eye tracking in order to gain deeper insights into the perception of complexity. We hypothesized that both the number of elements as an aspect of the quantitative dimension as well as symmetry as a facet of the structural dimension strongly affect the participants' subjective perception of visual complexity as well as their gaze behaviour. For that purpose, we constructed a controlled picture set which allowed for the manipulation of the above-mentioned dimensions. These stimuli were presented within a laboratory eye tracking study with 33 participants. Statistical analyses revealed significant main effects of both number of elements and symmetry on ratings of visual complexity. Moreover, effects of the experimental manipulation could also be found within the ocular parameters number of fixations, scanpath length and spatial density. Our results support a two factor model of visual complexity as reported by other researchers (Chipman, 1977; Gartus & Leder, 2017; Ichikawa, 1985), while contributing to a better understanding of the cognitive processing of visual complexity.

JUDGING THE PLAUSIBILITY OF INFORMAL ARGUMENTS: AN EYE-TRACKING APPROACH TO IDENTIFY DIFFERENT PROCESSING STRATEGIES DURING READING

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The ability to evaluate the plausibility of informal arguments is an important competence for making sense of scientific texts across different domains. To investigate the cognitive processes involved in evaluating informal scientific arguments, we used eye-tracking measures and related these measures to the accuracy of the plausibility judgements provided during reading scientific texts. Indicators of strategic processes (e.g., regressions and longer reading times), which reflect an elaborative processing of cognitive conflicts, were predicted to be positively related to accurate plausibility judgments for implausible (invalid) but not for plausible (valid) arguments. The sample (60 university students) consisted of mostly female participants (83.3%) with an average age of 25.7 years. Participants were asked to judge the plausibility of 22 informal arguments embedded in two coherent scientific texts about psychological topics. Subsequently, the students assigned the sentences marked as implausible to one of several categories of reasoning errors. To vary the arguments' plausibility, ten of the 22 arguments contained typical reasoning errors. Linear mixed models revealed differential relations between the accuracy of plausibility judgements and eye tracking indicators for implausible and plausible arguments. Implausible arguments that were judged accurately were related to more regressions and longer reading times, indicating a more elaborated and integrative information processing. As hypothesized, this was not found for plausible arguments. These arguments do not require elaborated processing strategies because less cognitive conflicts occur. These findings indicate that different processing strategies are employed for evaluating scientific arguments, depending on characteristics of the arguments and the individual reader's competence.

A NEW VIEW ON COMPLEX SPAN TASKS. USING EYE TRACKING TO REVEAL THE INFLUENCE OF MEMORY LOAD ON EYE MOVEMENTS.

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Visual processing tasks, such as reading, involve the perception of visual symbols with series of fixations, their short-term storage and decoding. For fluent processing in such a task, the ability to perceive multiple symbols with single fixations is crucial. As of yet, it is an unresolved question how this ability is influenced by memory load. I expect that limited attentional resources are used to ensure a high perceptual capacity of fixations. Hence, the amount of information that can be perceived with a single fixation should decrease with increasing memory load. I employed a novel combination of the complex span paradigm and eye tracking to test this assumption. Music students ($n=75$) were asked to memorize one note and then play a simple melody at first sight on a piano. After twelve repetitions of this procedure, they were asked to recall the memorized notes in correct order. Eye movements during the performance of the melodies were tracked. While the distance of saccades was unaffected by memory load, the number of fixations used to read the melodies increased with each additional note that had to be held in memory. When more notes were stored in immediate memory, fewer attentional resources were available for visual processing and the amount of information that was perceived with a single fixation decreased. These findings show that the combination of complex span tasks and tracking of eye movements are the ideal research method to analyze the influence of memory load on eye movements during visual processing.

DESCRIBING COGNITIVE PROCESSES BY HIDDEN MARKOV MODELS OF EYE TRACKING DATA TO INDICATE TEST PERFORMANCE

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Performance tests to estimate someone's ability can be hampered by ceiling and floor effects, i.e., if certain tasks are too easy or too hard for most of the participants. Even differences in reaction times might be uninformative in extreme cases. Contrary, gaze-fixation-based data seem to be a promising alternative to deliver further insights in cognitive processes that might be related to abilities in a specific domain. This hypothesis was examined with $N = 48$ participants in the context of spatial thinking utilizing the R-Cube-Vis test consisting of six distinct difficulty levels, whereby the easiest and the most difficult level usually produce ceiling and floor effects, respectively, in a student population. Participants performed the test while tracking their gaze movements. Afterwards, 2-states Hidden Markov Models (HMMs) were computed, one for each participant and each level intended to reflect cognitive processes for this kind of tasks. A certain parameter of the HMM, which might indicate an uncertainty about the structure of the item, was able to significantly predict the test performance of the whole test additional to the accuracy and reaction times of the respective level, but only in the easiest level. Although, similar effects for the most difficult level could not be found, the results strongly support the potential of gaze fixation-based measures to indicate cognitive processes to deliver further insight in a participant's ability that goes beyond the information provided by accuracy and reaction times.

BLINKING IS LINKED TO MOTOR BUT NOT TO COGNITIVE ASPECTS OF A CONVERSATION

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A robust finding in eye research shows that blinks increase their rate if a person indulges in a conversation compared to quiet rest. Various factors, such as social demands, emotional engagement, cognitive load and motor actions during speaking, were suggested to explain this increase. One main criticism of the motor-based explanation comes from the finding that chewing a gum do not result in an equally increased blink rate compared to talking. Stimulation of facial motor neurons has been shown to innervate both the facial eye muscles as well as muscles around the lips. We therefore hypothesize that we must differentiate between muscle groups in order to assess the influence of motor components on the blink rate. Analyzing eye tracking data of 27 subjects sitting alone in a room (without social interaction), we replicate the significant difference in blink rate between talking and resting. A comparison between different motor output conditions further showed that while talking without sound and eating a lollipop led to a significant increase in blink rate, chewing gum did not. Neither auditory nor cognitive task modulations showed an influence on the blink rate, however, interaction effects might be present. Our findings clearly suggest a relationship between blinking and motor output but indicate a specific role of lip movements. Such purely motor related influence on blink rate advises caution when using blinks as neurological indicators during patient interviews. Further research needs to investigate if cognitive and social factors have an independent influence on the blink rate.

PUPIL DILATION SIGNALS PERCEPTUAL SWITCHES IN AUDITORY MULTISTABILITY

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Sensory signals provide ambiguous information about the environment. If a stimulus evokes several interpretations ("percepts") that alternate in awareness, this is referred to as "multistability". For visual multistability, it has been demonstrated that the pupil dilates when the percept changes ("perceptual switch"). We ask whether the pupil reacts similarly to perceptual switches in auditory multistability. We presented a sequence of two alternating sounds ('ABABAB...') in three conditions. In "rivalry", participants reported their dominating percept by pressing one of four buttons, referring to four reportable percepts: perception of a coherent 'AB' sequence ("integrated"), or perception of separate 'A' and 'B' sound streams ("segregated") with either 'A' or 'B' or both streams in the foreground. In "replay", the perceptual switches of a preceding rivalry block were simulated by physical stimulus changes, and participants reported analogously to rivalry. In the "random" condition, participants listened to the stimulus of the rivalry condition and pressed the four buttons randomly. We found the pupil to dilate around perceptual switches. Dilation started prior to the report of the switch and peaked 750ms after. Dilation in response to stimulus changes in replay was larger than to perceptual switches in rivalry. In the random condition, participants exhibited a qualitatively different button-press pattern, rendering this condition incomparable to rivalry and replay. The observed pupil response in auditory multistability shows similarities to previously reported effects in vision. This suggests common principles to be involved in multistability in both sensory modalities.

EVALUATION OF ASSESSMENT STRATEGIES FOR PILOTS WITH PARTICULAR FOCUS ON INCORPORATING NON-COGNITIVE APTITUDES

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Modernization of assessment and enhancement of human performance capabilities among commercial and civilian aircrew is becoming increasingly important to sustain the safety of aviation operations across international airspace. When selecting pilots, mainly cognitive tests are used as this has shown to be a good indicator of pilot success across a range of studies. Non-cognitive aptitudes such as stress tolerance are rarely assessed, but have shown to be relevant for high performance as well. Our main research question is whether pilots with high non-cognitive aptitudes show higher performance than pilots with low non-cognitive aptitudes. We plan to conduct an experiment in a flight simulator with 30 pilots or advanced trainees. The study will be conducted in a multi-level assessment approach involving psychophysiological data (eye-tracking), subjective data, and performance data. Preceding the simulation, non-cognitive aptitudes such as stress tolerance and emotional regulation will be assessed. The participants will be divided into two groups before the main experiment starts: (1) Lower non-cognitive aptitudes, (2) Higher non-cognitive aptitudes. Each pilot will have to fly different maneuvers under different flight conditions. Levels of stress will be induced, divided into two levels: 1) low (e.g. instruments on); 2) high (e.g. instruments off). Participants will be instructed to maintain heading in a sensory-deprived environment. We suppose better performance for pilots with high non-cognitive aptitudes than for pilots with low non-cognitive aptitudes; the difference should be the strongest under high stress induction. The experiment will be conducted between April and June 2019.

GAZE TRANSFER: EXAMINING CHARACTERISTICS OF GAZE VISUALISATION METHODS

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Deriving a diagnosis in medical as well as technical settings is a complex task that requires expertise and involves problem solving. Recent research could show that the transfer of an expert's eye movement can have beneficial effects, both during remote collaboration and as modelling examples during training. Interestingly, these effects did not appear reliably. We propose the method of visualisation as a key factor for successfully transferring eye movements. Consequently, our research examines the question, which characteristics of visualisation methods can improve the perceptibility and utility of transferred eye movements. In an experiment (N=50) we contrasted three different visualisation methods, which differed regarding the amount of information displayed, with a control condition. The visualisations were presented either at original or at half speed, resulting in a 2x4 mixed design. The stimulus material consisted of screen recordings of experts solving the Tower of London task. The results show significantly higher workload ratings for all visualisation methods compared to the control group. More complex visualisations showed better ratings regarding ease to follow while their perceived overall usability depended on the playback speed. Participants remembered details of the solution process equally well in all conditions but performed significantly better at the Tower of London task after watching a gaze visualisation of lower complexity compared to the control condition. We conclude that potential benefits of transferred eye movements not only depend on both speed and amount of displayed information, but also on the measure chosen for evaluation.

WHAT TIME'S THE FUTURE? TEMPORAL EXPECTANCY VIOLATIONS AFFECT ANTICIPATORY SACCADDES TOWARDS FUTURE ACTION CONSEQUENCES

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Idiomotor theories suggest that goal-directed actions are selected based on learned contingencies between actions and their effects (e.g., Elsner & Hommel, 2001). These action-effect associations let us anticipate the future consequences of our actions which is also evident in anticipatory saccades towards the location of future effects (Pfeuffer, Kiesel, & Huestegge, 2016). These anticipatory saccades reflect a proactive effect monitoring process which prepares a later comparison of expected and actual effect. Interestingly, anticipatory saccades are initiated earlier when the interval between action and effect is shorter. Here, we questioned how such anticipatory saccades are affected by violations in participants' temporal effect expectations. Left/right keypresses generated effects (colored circles on the left/right side) that predictably appeared after a short or long action-effect interval (75% frequent action-effect interval/25% infrequent action-effect interval; $N = 32$). Each keypress consistently produced spatially action-effect compatible/incompatible effects per half of the experiment. First, we replicated the finding that anticipatory saccades (as well as manual responses) occurred earlier for short rather than long action-effect intervals. Anticipatory saccades towards future action effect locations were more frequent and occurred earlier following trials with infrequent rather than frequent action-effect intervals. A similar pattern emerged for manual responses. Moreover, when action-effect intervals were longer than expected, expectancy violations also showed in fewer but earlier anticipatory saccades towards future effect locations in those trials themselves. Thus, we conclude that proactive effect monitoring processes can be adapted based on violations of temporal effect expectations.

CEREBRAL BLOOD FLOW MODULATIONS DURING PRECUE ANTISACCADES IN CHRONIC LOW BLOOD PRESSURE

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In addition to symptoms including fatigue, dizziness, reduced drive or mood disturbance, individuals with chronic low blood pressure (hypotension) frequently report cognitive impairments. While a number of studies confirmed reduced performance in attention and memory, not much is known about hypotension-related deficits in executive functions. This study investigated cerebral blood flow modulations in hypotension during a precued antisaccade/prosaccade task requiring the executive function of proactive inhibition in addition to preparatory attention. Using functional transcranial Doppler sonography, bilateral blood flow velocities in the middle cerebral arteries were recorded in 39 hypotensive and 40 normotensive participants. In the task, a stimulus appeared left or right of a fixation point 5 s after a cuing stimulus; subjects had to move their gaze to the mirror image position of the stimulus (antisaccade) or towards it (prosaccade control condition). Video-based eye-tracking was used for ocular recording. A right dominant MCA blood flow increase arose during task preparation, which was smaller in hypotensive than normotensive participants. Moreover, hypotensive participants exhibited lower peak velocity of the saccadic response. The extent of the reductions in blood flow and task performance in hypotension did not differ between antisaccade and prosaccade trials. The smaller MCA flow increase may reflect reduced activity in the dorsolateral prefrontal and inferior parietal cortices during proactive inhibition and preparatory attention in hypotension. Given that group differences in blood flow and performance arose independent of task complexity and executive function load, hypotension may be characterized by basic attentional impairments rather than particular executive function deficits.

BEHAVIORAL AND NEURAL CORRELATES OF COGNITIVE-MOTOR INTERFERENCE DURING MULTITASKING IN YOUNG AND OLD ADULTS

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The concurrent execution of cognitive and postural tasks is associated with an increased risk of falls in older adults. Biological aging of the cognitive and postural control system appears to be responsible for increased cognitive-motor interference effects. We examined neural and behavioral markers of motor-cognitive dual-task performance in young and old adults performing spatial 1-back working memory single- and dual-tasks during semi-tandem stance. We used EEG to test for age-related modulations in the frequency domain related to cognitive-postural task load. Twenty-eight young and thirty old adults performed a postural single-task, a cognitive-postural dual-task and a cognitive dual-task with postural demands (triple-task). Postural sway was recorded in semi-stance on an unstable surface placed on a force-plate during task performance. Neural activation was recorded using a 64-channel mobile EEG system. Our findings revealed impaired cognitive dual-task performance in old participants, as indicated by significantly lower cognitive performance at triple task demands. Further, old adults showed significantly larger postural sway, especially at cognitive-postural task conditions. Old participants also showed significantly lower theta- and alpha-band activity and greater beta-band activity, most pronounced at Fz electrode. Moreover, we observed higher theta- and lower alpha-band activity with increasing task difficulty. These effects were greater in young adults for theta- and alpha-band activity, suggesting an age-related cognitive decline. The results suggest that old compared to young adults were able to recruit additional neural resources at low task demands but not at high task demands, reflecting a compensatory mechanism in order to cope with an age-related cognitive decline.

NEURAL ERROR PROCESSING IN A MULTIFRAME VISUAL SEARCH PARADIGM WITH COVERT NON-MOTOR RESPONSES

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In visual search tasks, participants have to locate and identify a target stimulus within a set of competing distractors. Errors can happen easily in such displays due to interference from the more salient distractors. Neural processing of these kinds or errors are often investigated by means of speeded choice tasks that require a motoric response (e.g. a button press). They typically feature two response-locked neural correlates of error processing, the Ne/ERN and the Pe. The conflict monitoring theory suggests that the Ne/ERN emerges due to a motor conflict between competing response tendencies. However, in the case of visual search, errors can occur that are purely attention-based and therefore independent of any motor response. Here, we aim to investigate the occurrence of neural correlates of error processing after such covert, non-motor errors. To this end, we collected and analysed EEG data from 30 participants completing a multi-frame visual search task, in which an overt motor response was required only after completion of all display frames. This temporally detaches any motor response from the time point of error occurrence. Our analyses indicate that error processing is triggered after erroneous target selection alone, as the Ne/ERN emerges even though the target selection is accomplished without any overt motor response. This demonstrates that non-motor errors are associated with similar mechanisms of error processing as motor errors.

IMPULSIVITY AND LANGUAGE NETWORK: AN INDEPENDENT COMPONENT ANALYSIS

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Behavioural studies have shown connection between impulsivity and verbal performance. The accuracy on the verbal tasks correlated negatively with the level of impulsivity. Our aim was to investigate the neural background of the previously found correlation between verbal performance and impulsivity. Our hypothesis was that impulsivity will have an effect on the activation of Broca-related language networks. The sample consisted of ninety healthy, right-handed university students (45 males), who participated in a verbal fluency task in the fMRI, and they filled out two self-reported questionnaires targeting impulsivity (BIS-BAS, BIS11). Task-related activations and deactivations were assessed using block design fMRI in a phonetic verbal fluency task. The paradigm included seven cycles of 30-second long altering rest and internal word generating task. During the active condition, participants had to silently generate different words starting with a particular letter (S, K, E, T, L, A, N), without any movements. During the rest periods, they had to relax. The measurements were performed on a 3T Magnetom Tim TRIO, human whole-body MRI scanner (Siemens AG, Erlangen, Germany) with a 12-channel head coil. To assess task-related networks we used model-free independent component analysis (ICA) on the fMRI data. The results showed that the activation measured in the Broca area confirm our hypothesis. From the 21 task-related meaningful components we found, 4 correlated positively with the behavioral activation system (BAS) and 7 with the motor impulsivity factor of BIS11, therefore the people with higher level of impulsivity had a greater activation in the language networks.

THE CEREBELLUM IN MOTOR-COGNITIVE DUAL-TASKS: EVIDENCE FROM A PATIENT COHORT

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Whilst it has long been known that the cerebellum is crucial in coordinating movements, more recent studies have also implicated the cerebellum in executive functions such as dual-tasking. However, it is still unclear which precise mechanisms of motor-cognitive dual-tasking are supported by the cerebellum. We hypothesized that the cerebellum would integrate the two single tasks into a dual-task network. We created a paradigm to assess dual-tasking abilities using a continuous motor task in addition to a cognitive visual attention task based on the “theory of visual attention” (TVA). 26 patients with isolated cerebellar lesions and 26 healthy matched controls were tested using this paradigm. fMRI data was also collected. Both groups performed similarly in the TVA-based task in both the single and dual-task conditions, with no significant differences between the groups in their visual threshold, visual processing rate, and the visual short-term memory storage capacity. However, despite showing no residual deficits in fine motor skills, the patient group showed much greater difficulties in performing the motor task in the dual-task condition, although not in the single-task condition. Moreover, resting state connectivity data indicated a correlation between the performance in the motor task in the dual-tasking condition and the connectivity between the cerebellum and the ventral attention network stream. These data suggest that the cerebellum plays an important role in the integration of both tasks during motor-cognitive dual-tasking. Moreover, in cognitively demanding situations such as motor-cognitive dual-tasking, a cerebellar lesion may impede the distribution of attentional resources.

THE NEURAL FATE OF UNSEEN EMOTIONAL FACES. AN ATTENTIONAL BLINK FMRI-STUDY.

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The question if the processing of emotional content in the absence of awareness is possible cannot yet been conclusively answered, since heterogeneous methodological procedures lead to heterogeneous results. Here, an attentional blink (AB) paradigm was used during functional magnetic resonance imaging (fMRI) to render emotional faces invisible and investigate the neural correlates of non-conscious processing under limited attentional resources. AB is a rapid serial visual presentation (RSVP) paradigm in which participants are, usually unable to report a second (T2) of two targets if it occurs 200-500ms after the first one (T1). Since T2 fails to reach visual awareness despite considerable visual processing we expected, based on the prominent theories in this field, at least subcortical activity for unseen emotional faces. Before the main experiment was carried out, all participants (n = 40) performed an AB-training session followed by an individual contrast calibration (CC). In the CC the AB-task was performed and contrast was calibrated for faces to achieve a comparable trial number of seen and unseen emotional trials. Beside the expected activity for seen emotional faces, we observed neuronal activity for emotional compared with neutral faces regardless of visibility. This is in line with our hypothesis, that processing of non-conscious emotional stimuli is possible when unawareness is caused by a lack of attentional resources.

THETA POWER AND THE N2/P3 EVENT-RELATED POTENTIAL COMPLEX AS ELECTROPHYSIOLOGICAL MARKERS FOR COGNITIVE CONTROL PROCESSES: A COMPARISON BETWEEN THE Go/NoGo AND THE FLANKER TASKS

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Cognitive control processes are important in order to pursue goal-directed action in conflicting situations. In recordings of electrical brain activity, oscillatory theta activity as well as the N2 and P3 event-related potential components have been identified as electrophysiological markers of conflict-related processing. The aim of this study was to compare both electrophysiological markers of conflict processing in two different conflict tasks. The Go/NoGo task was used to induce response inhibition, whereas the Eriksen flanker task was administered to probe interference control. While the subjects executed the tasks, an electroencephalogram was recorded from 64 scalp electrodes. The sample consisted of 18 women and 9 men aged between 19 to 29 years. In the analysis of event-related potentials, the N2 was modulated by conflicting trials in both tasks (NoGo trials, incongruent trials in the flanker task). Only in the Go/NoGo task a P3 effect (NoGo P3) was observed, suggesting that this ERP component is specifically associated with motor control. Time-frequency analysis showed increased theta power in conflict situations in both tasks. The results of our study suggest that brain processes given rise to the N2 component as well as to oscillatory theta activity support conflict resolution in both response inhibition and interference control tasks. The P3 ERP component, in contrast, specifically reflects motor control during response inhibition in the Go/NoGo task.

EEG EVIDENCE FOR IMPROVED VISUAL WORKING MEMORY PERFORMANCE DURING STANDING AND EXERCISE

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Although a substantial body of research has investigated the effects of aerobic exercise on cognitive performance, few have monitored exercise-concurrent cognitive processes via electroencephalography (EEG) and fewer still using an event-related potential (ERP) approach. As such, little is known regarding how the temporal dynamics of cognitive processing are influenced during aerobic activity. Here, we aimed to elucidate the effect various modalities of aerobic exercise might have on the temporal dynamics of concurrent visual working memory (VWM) performance. Participants ($n = 18$) performed a VWM retro-cue task at rest and during aerobic exercise across two postural modalities: seated (using a stationary bicycle) and standing upright (using a treadmill). Three consecutive phases of the VWM processing pipeline were assessed via lateralized ERPs – access to VWM representations (CDA), response selection (sLRP), and response execution (rLRP). Aerobic exercise and upright posture were found to significantly facilitate VWM performance; reaction times (RTs) were expedited during exercise, while both RTs and error rates decreased during upright posture. Further, analysis of ERL waves isolated the observed speed of processing facilitations to a finite temporospatial stage of the cognitive processing pipeline, between the phases of accessing VWM representations (CDA) and response selection (sLRP). Our findings hold implications not only for understanding the influence of aerobic exercise on VWM, but also for contemporary models of VWM that are built almost exclusively on data recorded during seated rest.

AFFECTIVE PROCESSING DURING ACTION MONITORING: RESULTS FROM EMOTIONAL PRIMING, NEURAL ERROR SIGNALS, AND AUTONOMIC REACTIVITY

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Goal-directed behavior requires constant monitoring and rapid evaluation of ongoing actions. The error-related negativity (ERN) has been studied extensively as a neurocognitive electrophysiological correlate of action monitoring, yet little is known about links to the affective significance of errors. The current study aims to elucidate how action monitoring relates to affective processing by investigating the relationship between the ERN and activity of the autonomic nervous system and by examining whether action monitoring processes involve an affective evaluation of performed actions. In our first experiment, EEG and skin conductance response (SCR) were recorded while participants ($N = 29$) performed a go/no-go task. Results indicated that the ERN amplitude predicted a heightened SCR to incorrect responses on a single-trial level. In our second experiment, we assessed behavioral performance during a go/no-go task, which was combined with a word categorization task. After each response to the go/no-go stimuli, participants ($N = 30$) categorized an affective word as either positive or negative. Extending previous findings on affective priming, incorrect responses were followed by faster categorization of negative words, while correct responses were followed by faster categorization of positive words, suggesting that responses were automatically appraised along a negative-positive dimension. Integrating our results into current theoretical frameworks, the relationship between SCR and ERN supports the notion of the ERN as an alarm signal, reflecting the affective significance of errors. A relation between action monitoring and affective processing is substantiated by results of experiment 2, indicating that an affective value is rapidly assigned to performed actions.

**ON THE ROLE OF RETRIEVAL PROCESSES IN THE SURVIVAL PROCESSING EFFECT:
EVIDENCE FROM ROC AND ERP ANALYSES.**

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Words encoded in the context of a survival scenario are better remembered, an effect that is modulated by word imageability or concreteness. To investigate the contribution of different retrieval modes to this “survival processing effect”, we examined measures of familiarity- and recollection-based retrieval using receiver operating characteristic (ROC) parameters and brain activity (event related potentials; ERPs). Thirty-six participants encoded high- and low-imageability words by rating their relevance either to a survival scenario or to a moving (control) scenario. Performance on a subsequent recognition test replicated the survival processing effect – better memory performance for the survival group – only for words that were high in imageability. The ROC analysis revealed that high-imageability words were associated with greater recollection than low-imageability words, and that this effect was increased in the survival group. ERPs elicited during the recognition test showed a late old/new effect 500-800 ms after word onset, which is typically associated with recollection-based retrieval, for both groups and word types. However, only for the survival group did this ERP effect differ in scalp distribution between high- and low-imageability words. Notably, the scalp distribution was more frontal for high-imageability words in the survival group, compared to both low-imageability words in the same group and to the analogous ERP effects in the moving group. There were no differences between groups on ROC or ERP measures of familiarity. These findings suggest that survival processing during encoding affects subsequent recollective processing and that the mechanisms underlying the effect are specific to high-imageability content.

THE NEURAL DYNAMICS OF FAMILIAR FACE RECOGNITION

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Recognizing individual faces is a challenging task for the visual system. Recently, fMRI decoding studies have revealed face identity representations in the occipitotemporal cortex. To uncover the temporal emergence of these representations, we used representational similarity analyses (RSA) of EEG responses for familiar faces. The participants ($n=26$) viewed a set of ambient face images of four highly familiar celebrities (two males, two females), while performing an orthogonal task. While univariate analyses revealed a differentiation between male and female faces, they were not able to show a distinction between identities of the same sex, multivariate RSA, on the other hand, demonstrated a gradual emergence of face identity representations, with an increasing degree of invariance. We observed the rapid emergence of identity information, starting shortly after 100ms, modulated by sex differences and image similarities. From 400ms after onset and predominantly in the right hemisphere, we observed a high degree of discriminability between both opposite and within-sex stimuli, and a tolerance for image-dependent variations. As the appearance of a familiar person can vary drastically, these invariant representations may be a crucial prerequisite for successful face recognition in everyday situations.

LATER BUT NOT EARLY STAGES OF FAMILIAR FACE RECOGNITION DEPEND STRONGLY ON ATTENTIONAL RESOURCES: EVIDENCE FROM EVENT-RELATED BRAIN POTENTIALS.

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In everyday life we usually recognise personally familiar faces efficiently and without apparent effort. This study examined to which extent the neural processes involved in recognising personally familiar faces depend on attentional resources by analysing event-related brain potentials. In two experiments, participants were presented with multiple ambient images of highly personally familiar and unfamiliar faces and pictures of butterflies, with a letter string superimposed on each image. Their task was either to indicate when a butterfly occurred (effectively ignoring the letter strings) or to indicate whether each letter string contained the letter X or N. Attentional resource load was manipulated in the letter task by presenting the target among different distractor letters (high load; Experiment 1) or by using only a single repeated letter in each string (low load; Experiment 2). ERPs revealed more negative amplitudes for familiar relative to unfamiliar faces under both high and low load conditions, both in the N250, reflecting the activation of perceptual face representations, and in the subsequent Sustained Familiarity Effect (SFE). Nonetheless, while the magnitude of the N250 effect was not substantially affected by attentional load, the SFE was still present but reduced in the high relative to the low load experiment. These findings suggest that perceptual face representations are activated independent of the demands of a competing task. However, the subsequent SFE, presumably reflecting more sustained activation needed to access identity-specific knowledge that can guide potential interactions, strongly relies on the availability of attentional resources.

CYBERBULLYING AND NEUROIMAGING: A TASK TO MEASURE CYBERBULLYING'S NEURAL CORRELATES

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Objectives: There is a considerable amount of research investigating cyberbullying although there are only a few studies using neuroimaging techniques so far. Our aim was to develop a task that is ecologically more valid than the existing social exclusion tasks (e.g. Cyberball) and allows us to measure reactions to cyberbullying with fMRI. **Methods:** In a pilot study, 5 university students (2 males, mean age=20.2, SD=0.84) participated. Task-related activations and deactivations were assessed using block design fMRI in the Cyberbullying Task. During the Cyberbullying Task participants see neutral posts (others' and themselves') and comments. There are three different conditions: (1) others get negative comments, (2) the participant gets negative comments and (3) the participant gets positive comments. In a block there are a post, six comments, and after every block there are two questions: how the one feels who gets the comments and how would the participant react to the situation. Each condition recurs five times, in all, there are fifteen blocks. **Results:** Right orbitofrontal cortex revealed greater and left insula showed smaller activation when participants got negative comments compared to the conditions when they got positive comments or others got negative comments. Additionally bilateral posterior cinguli showed greater activation when they got negative comments compared to when they got positive comments. **Conclusions:** Our results are important because insula and cingular cortex usually show activation during social exclusion/inclusion, in addition orbitofrontal cortex has an important role in self-monitoring and emotional processing. Thus our Cyberbullying Task is worthy for further research.

CONTROL-RELATED BRAIN SYSTEM ALTERATIONS IN PROBLEMATIC INTERNET USE: AN INDEPENDENT COMPONENT ANALYSIS

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It has long been posited that impaired inhibitory control, similarly to other addictions, could play a pivotal role in the development and maintenance of internet addiction. Yet, to our knowledge, no studies have assessed specifically the underlying functional neural networks. Therefore, the aim of this study was to explore the relationship between internet addiction and functional networks involved in inhibitory control. Sixty healthy, young, right-handed healthy university students were included. They underwent a block-designed Stroop- and Simon-task during BOLD-contrast imaging in 3T Siemens MRI scanner. Task-related activations were assessed using model-free (T-PICA) analysis. The Problematic Internet Use Questionnaire (PIUQ) was used to measure internet addiction, and the Barratt Impulsiveness Scale (BIS-11) to measure impaired control. After visual checking of the data, we found three meaningful components that positively correlated with both impaired control subscale of PIUQ and motor impulsivity subscale of BIS-11. The activation pattern across the three components was highly similar, involving frontal areas (e.g. Precentral Gyrus, Superior Frontal Gyrus, Supplementary Motor Cortex, Frontal Orbital Cortex, etc.) as expected. Deactivations in all three components involved the Default Mode Network (i.e. Precuneus Cortex, Postcentral Gyrus, Medial Frontal Gyrus, Frontal Pole, etc.). Our results provide further evidence for altered brain functions in internet addiction. The results may help understand the underlying factors of IA and could lend further support in developing a treatment.

BEHAVIORAL AND NEURAL CORRELATES OF ASSOCIATIVE LEARNING IN ARACHNOPHOBIA

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Arachnophobia is a high prevalent psychiatric disorder, which is probably maintained by maladaptive associative learning. However, the neural basis of disorder-relevant associative learning in arachnophobia has not been investigated, yet. Thus, the present fMRI study explored behavioral and neural correlates of associative learning in patients (n=34) with arachnophobia compared to healthy controls (n=34). Participants performed a paradigm, in which one stimulus became disorder-relevant due to coupling with a spider picture, while another was never followed by a spider picture. Behavioral and neural responses to stimuli, which lay in the perceptual space between both stimuli, were assessed and compared between both groups. In subjective ratings, patients described the disorder-relevant stimulus and those, which were perceptually similar as more fear-evoking, arousing and negative than healthy controls. The fMRI results showed increased activity in the bilateral insula, right bed nucleus of the stria terminalis, right amygdala and left anterior cingulate cortex in patients compared to healthy controls, to the disorder-relevant stimulus and the perceptually similar stimuli compared to the stimulus, which was never followed by a spider picture. In this study maladaptive associative learning in arachnophobia was demonstrated, reflected by increased fear to perceptually similar stimuli to a disorder-relevant stimulus compared to healthy controls. Furthermore, this was accompanied by hyperactivity of the fear network.

EXCLUSION OF LIGHT SCATTER AS A POSSIBLE EXPLANATION FOR BLINDSIGHT

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The term 'blindsight' describes residual visual capacities without acknowledged awareness in the blind area of participants with visual field defects. However, some researchers have argued that blindsight might merely be only an experimental artefact caused by light scatter, i.e. light from stimuli presented in the blind field falling on areas of the retina corresponding to intact areas of the visual field. The aim of our study was to test this hypothesis in healthy participants using the blind spot to simulate a scotoma. We tested 21 participants in three paradigms: (1) movement direction discrimination, (2) redundant target task, (3) detecting a circular stimulus (temporal 2AFC). In the default condition, black stimuli were presented on a grey background. Moreover, we ran the detection task (3) in two additional conditions: white stimuli on a grey background and white stimuli on a black background in darkness. Our results show that (1) movement stimuli presented in the blind spot can be discriminated above chance at a control position but not in the blind spot. (2) In the redundant target task, a second stimulus in the blind spot did not reduce reaction times. (3) Analyzing all three light conditions of the detection task, only a white blind spot stimulus in darkness resulted in above-chance performance. In summary, light scatter can be an issue if stimuli are too bright. However, black stimuli on a grey background did not create a sufficient difference in light scatter to influence task performance and can therefore be used to investigate blindsight.

BINOCULAR RIVALRY IN CONGENITAL PROSOPAGNOSIA

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Presenting the two eyes with different stimuli results in a phenomenon called binocular rivalry (BR) as the two stimuli rival for perceptual dominance. In healthy participants salient stimuli are often dominant for longer periods of time. We tested participants with congenital prosopagnosia (cP) in a BR paradigm to evaluate whether their differences in face processing were also reflected in the BR dominance times of face stimuli. Studies suggest that the holistic perception of faces is disrupted in cP, which leads to a focus on local features of the face. This is illustrated by a finding concerning the Thatcher illusion: In this illusion mouth and eyes of a face are rotated 180°. Although the upright face looks grotesque, healthy participants often fail to notice these massive changes when the face is inverted. Participants with cP, however, also notice the changes in the inverted face. In experiment 1 we used BR to compare predominance of faces displaying different emotions (fearful, happy, neutral) vs. houses between participants with (N=21) and without cP (N=21). Results show decreased face predominance in the cP-group compared to the control group which implies reduced saliency of faces in cP. In experiment 2 we used “thatcherized” faces (vs. houses) and found a lower sensitivity to face inversion in the cP-group indicating stronger local face processing, which – as opposed to holistic processing – is more immune to inversion.

A COMPARISON BETWEEN DISTINCTIVENESS AND ACCENTUATION IN THE ILLUSORY CORRELATION PARADIGM: AN EVENT-RELATED POTENTIAL STUDY

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An illusory correlation (IC) is the erroneous perception that two categories are correlated. Even though numerous studies have investigated ICs, there is still debate over the exact mechanisms leading to ICs. According to the distinctiveness approach, most attention is paid to the least frequent category combination at learning. The heightened attention leads to a higher availability of this category combination and, consequently, to an overestimation of its frequency. In contrast, proponents of the accentuation hypothesis claim that attention should lie on both the most frequent and the least frequent category combination in order to maximize the differentiation between the categories. In this ERP study (N=24) we compared the distinctiveness approach with the accentuation hypothesis. An active oddball task was used to elicit a P300, a marker for subjective probability and attention allocation. If the distinctiveness account were true, there should be a linear increase of the P300 amplitude from the most frequent to the least frequent category combination. However, if the accentuation hypothesis were true, we expected P300 amplitudes to be larger for the most frequent and the least frequent category combinations than for the moderate frequent category combinations. Consistent with the distinctiveness approach, we found a linear increase in the P300 as a function of infrequency. Furthermore, a frontal slow wave differentiated between the least frequent category combination and all other category combinations. Together, our results not only support the distinctiveness hypothesis, but also indicate that a fronto-parietal network is involved in the formation of mental contingency representations.

LANGUAGE NETWORKS AND INTERNET ADDICTION: fMRI STUDY

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Internet addiction (IA) is defined as an excessive and prolonged Internet using pattern that causes behavioral and cognitive problems and is generally conceptualized as a behavioral addiction. Functional brain alterations that are related to IA have been revealed, significant differences were found in brain regions involved in cognitive control and reward processing. However, other brain networks might be also altered, one possible candidate is the language system of the brain. To our knowledge, no one has investigated language networks in addictions with neuroimaging techniques, however, indirect evidences suggest its involvement. In this study, we investigated IA-related language network alterations in young adults using fMRI during phonemic fluency task in 59 healthy young adults. IA was assessed using the Problematic Internet Use Questionnaire. This questionnaire consists of 18 items, and three subscales: Obsession, Neglect, and Control disorder. To get clear picture about the phenomenon model-based (GLM) and model-free (ICA) analyses were performed. We found two independent components (IC3 & IC4) that are positively associated with control subscale of PIUQ and GLM analysis also supported our hypothesis, that language processing is impaired in IA. These results suggest that IA might have long term negative effect on neuro-cognitive processes.

THE ROLE OF MIDFRONTAL THETA OSCILLATIONS IN PROACTIVE COGNITIVE CONTROL ADJUSTMENTS

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Successful cognitive control during behavioral conflicts relies on neural adjustments that can occur reactively (i.e., after conflict occurrence) and proactively (i.e., in preparation prior to conflicts). While midfrontal delta/theta oscillations are known to play a role for reactive control, their relevance for proactive control is unclear. The current study tested the role of midfrontal control oscillations during the anticipation of action-related conflicts via EEG. On each trial, participants ($N = 33$) either had to perform a frequent, prepotent action or an infrequent, conflict-inducing alternative response. This action was preceded by a cue, which either reliably indicated the absence of any action conflict (certain-cues) or that a conflict might potentially occur (maybe-cues). We investigated both inhibition conflicts (suppression of prepotent actions) and switching conflicts (alteration of prepotent actions). Results showed clear evidence for proactive adjustments in neural activation prior to the action onset: Maybe- compared to certain-cues led to significantly stronger suppression of posterior alpha oscillations during preparation, indicating intensified sensory processing. Additionally, maybe- compared to certain-cues led to task-dependent preparatory adjustments of motor activation, as indicated by increased central beta suppression during switching conflicts, but decreased beta suppression during inhibition conflicts. Importantly, while midfrontal control oscillations significantly increased after a conflict occurred, preparatory neural adjustments during conflict anticipation were not accompanied by increases in proactive midfrontal oscillations. This dissociation suggests that midfrontal oscillations are an important part of reactive adjustments during behavioral conflicts but that proactive adjustments of neural processes can be implemented without midfrontal oscillatory control.

LATE BUT NOT EARLY EVENT-RELATED POTENTIALS REFLECT EMOTION MODULATIONS DURING OVERT ATTENTION SHIFTS

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There has been a long debate on whether emotional stimuli like angry faces or emotional scenes draw attention and gaze faster than neutral stimuli. Previous studies using physically salient stimuli showed that distractors lead to slower eye-movements and slower neural responses towards targets (Kulke, Atkinson & Braddick, 2015). The current study aimed to investigate the effect of emotional salience by combining eye-tracking and electroencephalography (EEG) to measure neural mechanisms of overt attention to faces displaying emotional (happy or angry) or neutral expressions. Thirty-four participants completed a gaze-contingent fixation shift paradigm (preregistration: osf.io/vbk2e). Once they fixated on a central dot, faces appeared in the periphery and disappeared once participants moved their eyes towards on them. There was no effect of emotional expression on eye-movement latency or P1 latency in response to the peripheral face, which was in contrast to previous studies manipulating physical rather than emotional salience. However, the amplitude of the later EPN response was significantly larger to emotional compared to neutral faces. This component occurred after the saccade towards the stimulus had been completed. In summary, modulations of event-related potentials by emotional content only occurred after an eye-movement towards the stimulus. Therefore, emotional peripheral stimuli did not draw attention faster than neutral ones. Fast eye-movements may be guided by physical rather than emotional salience in the fixation shift paradigm.

‘WHERE’ IN THE VENTRAL STREAM – A COMMON GRADIENT OF SPATIAL AND FACE-PART SELECTIVITY IN THE INFERIOR OCCIPITAL GYRUS

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An influential model of vision posits two streams of visual information – one dorsal and crucial for localising visual objects (e.g. for actions, such as eye movements), the other ventral and crucial for identifying visual objects. In line with this dichotomy, ventral processing of visual objects has often been characterized as location-invariant. However, recent studies found that typical face-directed gaze behaviour reflects location-dependent biases in perceptual sensitivity (de Haas et al., 2016 JNeuro; de Haas & Schwarzkopf, 2018 JoV) and may be linked to corresponding biases in neural tuning within the inferior occipital gyrus (IOG). Here, we present data from an fMRI experiment directly testing the hypothesis that neural tuning for facial features is linked to spatial (i.e. retinotopic) tuning in IOG ($n = 14$ hemispheres). We used encoding models to probe voxel-wise spatial preferences and independently tested the preferred relative position within a face. The majority of responses were well explained by Gaussian population tuning curves (pTCs) for spatial location and face-parts. Parameter maps revealed a common gradient of spatial and face-part selectivity, decreasing from posterior to anterior IOG. Preferred location was organised more idiosyncratically, but showed local clustering and was correlated across maps of visual and face space. These findings reveal correlated spatial and face-part maps as principles of functional organisation in IOG and thus a tighter link between ‘what’ and ‘where’ than proposed by the dual-stream hypothesis. This organisation likely reflects developmental boundary conditions, constrains the neural mechanisms of face perception and typical gaze behaviour.

THE GROUNDING OF ABSTRACT CONCEPTS IN THE VISUAL AND MOTOR SYSTEM: AN fMRI STUDY

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The grounding of concepts in the sensorimotor brain systems is discussed controversially. Modality-specific models propose that concepts are embodied in the sense that they are represented in distinct sensory and motor brain areas depending on specific sensory and motor experiences during concept acquisition. Accumulating evidence suggests that concrete concepts are closely linked to the sensorimotor systems, whereas the mere existence of abstract words seems to contradict embodied approaches. Here, we adopted a theory-driven approach frequently used in the investigation of concrete concepts to the domain of abstract concepts and compared brain activation to well-defined subtypes of abstract concepts with a known feature content using functional magnetic resonance imaging. Carefully matched visual (e.g. beauty) and motor (e.g. fitness) abstract words were presented to $n = 24$ participants along with pseudowords while performing a lexical decision task. Furthermore, participants performed two localizer tasks by actually moving their hands and by looking at real pictures. Processing of visual abstract words specifically elicited higher activity in occipital visual areas whereas processing of motor abstract words specifically activated frontal and parietal motor areas. In addition, these differential fMRI signals showed overlapping patterns with brain activations observed during the motor (pre- and postcentral gyrus) and visual (fusiform and lingual gyrus) localizer tasks. Consistent with the grounded cognition framework, our results suggest that, similar to concrete concepts, visual and motor abstract words are grounded in the corresponding modal brain systems typically engaged in actual perception and action.

AUTONOMIC CONTRIBUTIONS IN THE CARDIAC DEFENSE RESPONSE DURING AN EXTERNAL ATTENTIONAL TASK

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Previous research has shown that the cardiac defense response (CDR) is enhanced when participants perform simultaneously an external attentional task. The aim of this study was to examine autonomic mediation in this type of modulation. Participants were 30 university students (20 women and 10 men) randomly assigned to two conditions. The psychophysiological test consisted of two presentations of an acoustic stimulus capable of eliciting the CDR with an inter-trial interval of 12.5 min. Participants belonging to Condition 1 performed Sternberg's Visual Search Task using neutral pictures as targets. The task had 80 s duration and started immediately after each noise presentation. Participants belonging to Condition 2 performed no task. Continuous measurements of heart rate (HR), pre-ejection period (PEP), and systolic blood pressure (SBP) were used. The dependent variables were the simultaneous beat-to-beat pattern of HR, PEP, and SBP. Results concerning the CDR showed a reduction of the first decelerative component and a potentiation of the second accelerative component in the attentional group, compared to the control group. Regarding autonomic mediation of the CDR, it was observed a higher PEP and a lower SBP for the attentional group, coinciding temporarily with the second accelerative component of the CDR. These results suggest the involvement of the parasympathetic branch in external attentional modulation of the CDR.

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ANXIETY AND LANGUAGE NETWORK: INDEPENDENT COMPONENT ANALYSIS

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The connection between the cognitive functions like verbal performance and the anxiety have been shown in behavioral studies. The level of anxiety correlated negatively with the result of verbal (letter and word) fluency task. The aim of our study was to measure the neural background of the connection of the verbal performance and personal differences in anxiety. We hypothesized that the activation of Broca-related language networks is affected by the level of trait anxiety. Ninety healthy university students (45 males) were included in our study, to investigated anxiety-related language network alterations during a verbal fluency task. The self-reported anxiety questionnaire was used to measure trait anxiety. Task-related activations and deactivations were assessed using block design fMRI in a phonetic verbal fluency task, with seven cycles of 30 second long alternating rest and word generation task. During the verbal task the subjects were asked to silently generate different words with a particular letter without any movements. During the rest periods, they were instructed to stop the active task and relax. The measurements were performed on a 3T Magnetom Tim TRIO, human whole-body MRI scanner (Siemens AG, Erlangen, Germany) with a 12-channel head coil. Model-free independent component analysis (ICA) was used on fMRI data to assess task-related networks. We found 21 task related meaningful components 6 of which correlated significantly with trait anxiety. The activation measured in the Broca area confirm our hypotheses. According to our results the language networks are less pronounced in people with higher levels of anxiety.

POSTER SESSION 3: LANGUAGE

AFFECTIVE PROSODY PROCESSING IN AND OUTSIDE THE FOCUS OF SPATIAL ATTENTION IN CONGENITALLY BLIND AND SIGHTED ADULTS

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The question whether spatial selective attention is necessary in order to process vocal prosody has been controversially discussed when testing sighted individuals. Whereas some studies argue that spatial attention is necessary in order to process emotional human voices, other studies point to the fact that emotional human voices (e.g. anger) can be processed even outside the focus of spatial attention (e.g. Grandjean et al., 2005). Here, we asked if longterm visual deprivation starting from birth requires attention in order to process emotional information in human voices. Therefore, eight congenitally blind individuals and thirteen sighted controls had to attend either to the left or to the right loudspeaker and to detect rare deviant syllables spoken in neutral, angry, happy, and fearful prosody while the EEG was recorded. Blind individuals processed emotional voices at the attended speaker more efficiently compared to sighted controls. In contrast to sighted controls, who showed early attention effects in the time range of the N1 in the fearful prosody but not in the neutral, happy, and threatening vocal prosody (manifested in an interaction between emotion and attention), blind individuals do not show an enhanced capture effect in the fearful condition compared to the other emotions (main effect of emotion, main effect of attention). Moreover, blind individuals show enhanced N1 amplitudes irrespectively of the presented emotion or the attention conditions. Enhanced excitability of unimodal sensory areas might be one underlying neural mechanism responsible for emotional voice processing in congenitally blind individuals.

THE TESTING EFFECT IN ARTIFICIAL LANGUAGE LEARNING

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The 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 formative assessment which is used to monitor student learning to provide ongoing feedback. In the present study we combined the testing effect with the provision of timely feedback during an artificial language learning task. 24 participants studied 72 grammatically sentences of the artificial language BROCANTO to learn the underlying grammatical rules. One group of participants received additional 72 sentences for further study and a second group received a different set of 72 sentences, one-half of which were ungrammatical, making grammaticality judgments on each sentence presented. The third group received the same test as the second group but received additional feedback on each judgment. 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. Crucially, feedback enhanced performance at both retention intervals with larger improvements at 48h. These results indicate that the testing effect is underlying the benefits of formative assessment that can be further improved by feedback.

WORKING MEMORY CAPACITY BUT NOT PRIOR KNOWLEDGE IMPACT ON READERS' ATTENTION AND TEXT COMPREHENSION

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Reading digital texts is a common practice in today's education. Prior studies showed that the coherence of a text can influence text comprehensibility with low degrees of coherence causing attention failures (mind wandering) and, consequently, negatively impacts reading comprehension. In addition, working memory capacity (WMC) and prior knowledge of the subject have been suggested to be related to both reading comprehension and mind wandering. However, results remain controversial as the interaction of these three factors has not yet been explored. 85 participants either studying law or a different subject read either a coherent or incoherent version of the same unfamiliar hypertext about the copyright law. While reading, they reported self-caught mind wandering with task-embedded thought probes. After reading the hypertext, subjects were probed on their text comprehension. Supporting prior findings, mind wandering did occur more frequently when participants read difficult rather than easy texts regardless of their undergraduate course. Moreover, this was modulated by WMC in that participants with lower WMC exhibited more frequent mind wandering than high WMC participants solely when reading low coherent texts. In addition, high WMC participants outperformed low WMC participants on all measures of text comprehension. With a low WMC it seems difficult to inhibit irrelevant information and access related information from working memory, especially when text complexity is high. Interestingly, the present results also indicate that prior knowledge benefits later text comprehension despite not affecting reader's attention. These findings provide insights into processing attention during reading online texts

CUMULATIVE SEMANTIC INTERFERENCE IN COMPOUND PRODUCTION

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When naming a sequence of pictures of the same semantic category (e.g., clothes), latencies increase with each additional picture. According to one account, this cumulative semantic effect is assumed to reflect interference during lexical access (e.g., Howard et al., 2006), and seems to be modulated by semantic similarity (Rose & Abdel Rahman, 2017). While this effect has been shown for morphologically simple nouns (e.g., basic level category members, such as blouse or pants), it is yet unclear if and how the semantic interference differs for semantically transparent compound nouns, which are subordinate category members (e.g. silk blouse or leather pants). In the current (ongoing) study, we use the continuous picture naming paradigm to investigate the difference between these two types of nouns. Participants (N=36) are presented a series of objects that are derived from different semantic categories, and are asked to either use simple nouns or compounds when naming these out loud. Although we expect to find a cumulative semantic effect in both conditions, we predict weaker interference for the compounds. Our simple-noun targets are basic-level category members that share most common semantic attributes (Rosch & Mervis, 1975), whereas the compounds are subordinate category members that are semantically richer but less interconnected. Therefore, we predict stronger co-activation and, thus, stronger interference for the simple-noun than the compound targets.

COMPATIBILITY EFFECTS IN READING-BY-ROTATING PARADIGMS: DIFFERENT RESULTS FOR SENTENCES WITH ONE CHARACTER VS. TWO CHARACTERS?

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The literature on the embodied simulation view suggests that language comprehension activates traces of related motor experience. The reading-by-rotating paradigm introduced by Zwaan and Taylor (2006) for instance uncovered a compatibility effect between the content of a sentence and the actual movement participants performed during reading. Participants read sentences by rotating a knob either clockwise or counterclockwise (e.g. Eric turned down/up the volume.). Reading times were faster when the described actions involved a direction of rotation matching the required direction of rotation of the knob. A similar study by Claus (2015) with verb-gapping sentences (e.g., John closes a juice bottle and Jim a lemonade bottle.) produced the opposite pattern of results, with an advantage for mismatching rotation directions. Claus (2015) discussed several potential accounts for the deviances in the results, referring either to differences in the devices used for rotation, or to differences in the materials (one vs. two characters). The current replication study aims at further investigating these accounts. We used the exact same device as in Claus (2015), but our sentences always described only one character. A preliminary analysis of the results (N=43 out of 80 participants) shows numerically faster response times in the mismatching condition, similar to the result obtained by Claus (2015). In the current analysis, this difference is not significant. However, if it turns significant in the final analysis, this would undermine the idea that the number of characters in the sentence is the relevant factor for obtaining one or the other result pattern.

PROCESSING TRUE AND FALSE NEGATIVE SENTENCES IN CONTEXTS CONTROLLED FOR LEXICAL ASSOCIATIONS

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Barbara Kaup
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In experiments investigating the processing of true and false negative sentences, it is often reported that polarity interacts with truth value, in the sense that true sentences lead to faster reaction times than false sentences only in affirmative conditions. Also in electrophysiological data, negative sentence typically do not show the expected facilitation in true versus false conditions. Various reasons for this difference between affirmative and negative sentences have been discussed in the literature (lexical associations, predictability, informativeness). In the present study we excluded lexical associations as a potential influencing factor. Participants saw artificial visual worlds (e.g., a white square and a black circle) and the corresponding sentences (i.e., “The square/circle is (not) white”). The results again showed a clear effect of truth value for affirmative sentences (true faster than false) but not for negative sentences. This result implies that the well-known polarity-by-truth-value interaction cannot solely be due to long-term lexical associations. Additional predictability manipulations allowed us to also rule out an explanatory account that attributes the missing truth value effect for negative sentences to low predictability. In our presentation, we will discuss the viability of an informativeness account.

NOT KNOWN: ANONYMOUS, UNKNOWN OR NON-KNOWN? REMARKS ON THE INTERPRETATION OF NEGATED ABSOLUTE ADJECTIVES IN ROMANIAN

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Absolute adjectives, in contrast with relative adjectives (tall/short), are said to behave symmetrically, the negation of one member entailing its pair: not dead=alive and not alive =dead. Recent studies have shown that absolute adjectives are rather asymmetric: right \neq not wrong and bound \neq not (Kennedy and McNally 2005; Paradis and Willners 2006). This talk aims at discussing the negated absolute adjectives in Romanian. To that end, a judgment test was designed in which the sentential negation nu A ‘not A’ (She is not healthy) was tested against the affixal negation neA ‘unA’ (unhealthy), the affixal negation non-A (non-healthy) and the polar opposite B (sick). The negative affix ne- “un-” is said to express a scalar, ‘neither-nor’ reading (which is incompatible with absolute adjectives). We hypothesize that if the participants choose this negative affix as the interpretation for the nu A ‘not A’, then the adjectives have scalar features which lead to the asymmetries. 18 absolute adjectives forming 9 canonical pairs were tested (N=66). The Principal Component Analysis was used to analyze the data (Rstudio software and FactoMineR and Factoshiny packages). The results show different profiles of the adjectives, displayed in three categories: (a) absolute adjectives which have different degrees of scaling potential, (b) relative scalar adjectives, with some absolute traces and (c) adjectives that can be both absolute and relative, their interpretation being set contextually. This cast new light on the interpretation of canonical antonym pairs as well as on the absolute interpretation of these adjectives.

NAMING SWEAR WORDS: A COMPARISON OF L1 AND L2

Anke Huckauf (Ulm University, Germany)
Tatjana Nazir (CNRS, France)

Research with bilinguals revealed certain differences in the way a native language (L1) and a language that is learned later as a foreign language (L2) shape our thoughts. For example, moral evaluations (Hayakawa et al., 2016) or risky decisions (Costa et al., 2014) were found to be more rational in L2 than in L1. Our research question is centered around the processing of swear words presented either in L1 or L2. Bowers and Pleydell-Pearce (2011) recently showed that pronouncing swear words (e.g. Fuck) in one's native language provokes stronger electro-dermal activity (EDA) than pronouncing its euphemisms (e.g. "F-word"). This, although both verbal forms refer to the same concept. The authors thus suggested that some form-affect associations might be established bypassing the semantic system. In the present study we borrowed Bowers and Pleydell-Pearce's paradigm to contrast L1 and L2. Native German and Turkish participants named swear words and neutral control words in their native language as well as in their foreign language. EDA and pupil sizes served as dependent measures. Our findings are discussed within the frame of linguistic relativity.

BILINGUAL EDUCATION – A BENEFIT FOR NON-NATIVE SPEAKER?

Christina Kraut (UMIT The Health & Life Science University, Austria)
Julia Bahnmüller (IWM Leibniz-Institut für Wissensmedien, Germany)
Silvia Pixner (UMIT The Health & Life Science University, Austria)

Bi- and Multilingualism are concepts that do not hold a special scarcity value in today's world anymore. With continuous globalization and immigration even mainly language-homogenous countries show increasing numbers of children and adults whose dominant language differs from the language of the country. In this scenario the question arises how education has to be structured to be most efficient in bilinguals with a distinct language dominance and if bilingual education might be beneficial? In the following study we aimed to get more insight into the possible importance bilingual education can have in mathematics education. Our research question was whether bilingual education is helpful to bilinguals when trying to learn arithmetic facts in their less dominant language. We tested 90 bilingual adults whose first and dominant language was German and who spoke English as their second language. Participants were assigned to three different training groups and either practiced simple multiplications in German, English or both languages on five consecutive weekdays. Reaction times on solving multiplications in both German and English were recorded before and after the training. The results showed that language dominance seems to have a major effect in educational situations. German items were solved more quickly than English counterparts, before and after the training and in every training group. Nevertheless, there were more learning gains for English items when participants received a training in both languages. This lets us conclude that bilingual education can be beneficial when bilinguals are learning arithmetic facts in their less proficient language.

KINEMATIC FEATURES OF AKTIONSPORT

Marietta Sionti, Thomas Schack (University of Bielefeld, Germany)

This poster focuses on the difficult domain of Aktionsart and examines whether some of its dimensions could be grounded to captured motion data. This analysis and the visualized plots that were exported from various actions offer a sound basis of aspect's understanding in language and motion. Aktionsart is a multidimensional linguistic phenomenon, which encodes temporal and frequency information. It is considered to play significant role to mental simulation of an action both in the execution of the movement -per se- and the linguistic expression of the real world actions. According to Talmy (2000, II), languages form event temporal information into a particular typology according to the manner of the change or not state and especially the pattern of distribution along time. The graphic representations of the lexical aspect have many similarities with those of the kinetic data. Preliminary results are: • Elicitation of features (duration, iteration) resembling Aktionsart and plots of path, direction, velocity (Scheme 1). • Correlation between kinematic features and linguistic characteristics Apart from the kinematic features that are crucial for human motion analysis, anaphora resolution (gestures), machine translation (for ASL) etc, we wanted to directly link sensorimotor and linguistic information. Running correlation matrices for kinematics and linguistic variables-taken from corpus driven analysis-we observed that the two significant correspondences are (i) between variables verb_class (it groups motion verbs according to Levin's (1993) classes) and repetition and (ii) repetition with linguistic duration, a notion that implies Aktionsart but it does not carry the same semantic load.

TESTING AN ONLINE PARADIGM FOR INVESTIGATING THE AUTOMATIC ACTIVATION OF LOCATION INFORMATION DURING WORD PROCESSING

Emanuel Schütt, Eduard Berndt, Guo Yu, Barbara Kaup
(University of Tübingen, Germany)

According to the experiential-simulations view of language comprehension (Zwaan & Madden, 2005), we comprehend the meaning of words by re-activating sensorimotor experiences that are associated with the word's referent. The work of Lachmair, Dudschig, De Filippis, de la Vega, and Kaup (2011, Experiment 2) provides positive evidence for this claim with respect to spatial experiences, indicating that the associated location of a referent in vertical space is automatically re-activated upon hearing or reading the corresponding word. Their participants responded to words such as "bird" or "worm" (that are associated with an upper or lower vertical location, respectively) by performing an upward or downward hand movement depending on the font color of the words. Responses were faster when the hand movement matched the referent's associated vertical position. In our current work, we aimed at developing an online paradigm for replicating these findings. Instead of a vertical response device we used standard keyboard and mouse responses. In Study 1 (N = 56), participants clicked on the word that was presented in the middle of the screen and dragged it to the upper or lower part of the screen by using their mouse. In Study 2 (N = 50), keyboard response keys were associated with an upper or lower location by means of implicit learning. Data analysis showed that responses in Study 1 as well as in Study 2 were significantly faster in compatible than in incompatible trials. We conclude that an actual motor movement is not essential for observing the compatibility effect.

THE IMPACT OF PROSODY AND SEMANTICS IN EMOTIONAL SPEECH: A SET OF GERMAN NEUTRAL AND EMOTIONALLY AFFECTIVE SENTENCES

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The complex interplay of prosody and semantics and their role in the perception of emotion in spoken language is a topic open to discussion. Different approaches try to determine the nature of this interaction, for instance which factor dominates over the other. The present study provides the means to examine precisely this interaction in German by generating sentences with validated emotional content regarding the emotions anger, fear, happiness, sadness, or neutral (expressing no emotion) in both semantics and prosody. German native speakers ($N = 61$) selected the sentences out of a 400 sentences comprising collection based on ratings on a 6-point Likert scale in terms of emotional semantic content. The result thereof are 55 sentences, 11 sentences in each case could reliably be associated with one of four distinct emotions or the neutral category. The sentences were recorded in different prosodies, either congruent to the semantic content or incongruent, by a professional actress. A group of experts such as speech therapists and researchers rated these recordings on the clarity of speech and emotion conveyed via prosody. The result is a compilation of 50 German sentences with separately validated emotional content in prosody and semantics. Moreover, the sentences are carefully balanced regarding linguistic factors (word frequency, phonological neighborhood density, and number of syllables). The linguistic balance enables an unbiased evaluation of the roles of semantic content and prosody in emotional speech. This allows an independent variation of prosody and semantics in studies with factorial design.

EFFECTS OF TEXT-BELIEF AND SOURCE-MESSAGE CONSISTENCY ON THE VALIDATION OF TEXTUAL INFORMATION

Andreas Wertgen, Tobias Richter
(University of Würzburg, Germany)

Evidence for a mechanism that validates incoming text information based on prior knowledge and beliefs accumulates, yet the role that source information might play for validation is unclear. We investigated how text-belief consistency and source information could affect validation of short authentic texts presented as Twitter messages (tweets). Sixty-four participants read 64 tweets about four socio-scientific, conflicting topics (e.g. climate change) stated by different sources in a self-paced fashion. Each text represented one of two argumentative positions regarding the topic. The sources were consistent or inconsistent with the argumentative position of the message (source-message consistency), resulting in two versions of each item. Participants' pre-measured beliefs were used to determine the consistency of each message with individual beliefs (text-belief consistency). Participants read all tweets (plus 64 fillers) in a randomized order and answered comprehension questions after filler tweets. Reading times and (in a separate block) ratings of plausibility and source credibility of the tweets were collected. The results revealed text-belief consistency effects for text-belief and source consistency. Participants read belief-consistent messages faster than belief-inconsistent messages and messages from sources consistent with the argumentative position faster than messages from inconsistent sources. Moreover, for the ratings of plausibility and source credibility, interaction effects of text-belief consistency and source consistency emerged: Source-message consistent and text-belief consistent messages were rated as more plausible and its sources as more credible than inconsistent combinations. We conclude that not only text-belief but also source information are taken into account while validating multiple short texts about complex topics.

UNDERSTANDING QUESTION INTENT IN DIALOGUE SYSTEMS: THE IMPACT OF EXPLANATIONS AND CLARIFICATIONS ON USER BEHAVIOR AND CONFIDENCE

Alexander Blunk, Rica Bönsel, Romy Müller
(TU Dresden, Germany)

Dialogue systems for fault diagnosis can query users to elicit problem descriptions incrementally, but speech is inherently ambiguous. This study investigates whether explanations of question intent can prevent misunderstandings. Eighteen participants were instructed about the production and packaging of chocolate, enabling them to understand fault causes. During the experiment, they were asked whether a given description matched the picture of a faulty chocolate bar or not. In three blocks of a within-subjects design, participants either received only questions, questions accompanied by explanations of question intent (i.e., which cause the system wanted to infer from their response), or questions, explanations, and the option to clarify their response and thereby prevent incorrect interpretations by the system. After each trial, participants rated their certainty of having understood and answered the question correctly. Correctness, certainty ratings, solution times, and the content of participants' clarification texts were analyzed. With explanations, participants responded more correctly than without. However, this explanation benefit was absent when participants had the opportunity to clarify, suggesting that they were less likely to adopt the system's wording. Roughly half of their texts referred to fault causes, while the other half provided reformulations. Confidence ratings were unaffected by explanations, and solution times were increased both by the presence of explanations and the opportunity to clarify. Taken together, the results imply that explanations support the prevention of misunderstandings. However, when given the chance, users accomplish this by providing additional clarifications rather than adopting the words used by the system.

A LARGE DATASET OF SEMANTIC TRANSPARENCY MEASURES FOR GERMAN COMPOUNDS

Fritz Günther, Marco Marelli
(University of Milano-Bicocca, Italy)

Jens Bölte (University of Münster, Germany)

Compound words can be semantically transparent when the contribution of their constituent meanings is clear (airport), but the degree of semantic transparency varies between compounds (compare strawberry, staircase, ladybird). Semantic transparency has been shown to affect compound processing and comprehension in a wide range of tasks. Critically, recent studies have demonstrated that semantic transparency has to be operationalized as a multi-dimensional construct, comprising semantic relatedness (how similar is the meaning of straw to strawberry) as well as compositionality (how well is the meaning of strawberry predicted from straw and berry, and what is the contribution of straw to the predicted meaning?). Here, we present a comprehensive and multi-dimensional dataset of semantic transparency measures for 1,810 German compounds, obtained from a computational and fully implemented semantic model. These measures are validated using data from four behavioural experiments: Explicit transparency ratings ($n = 26$), two different lexical decision tasks using different nonwords (both $n = 16$), and an eye-tracking study ($n = 8$). We demonstrate that different semantic effects emerge in different behavioural tasks, which can only be captured using a multi-dimensional approach to semantic transparency.

WHEN CONGRUENCY MATTERS MORE THAN VALIDITY: SENTENCE-CONTENT CONGRUENT PRIMES FACILITATE VALIDATION

Rebecca Weil (University of Hull, UK)

Liad Mudrik (Tel Aviv University, Israel)

How do people process and evaluate falsehood of statements? The congruency-hypothesis assumes that processing false sentences is not different from processing valid sentences, and accordingly, activating any content-related information – even if it is false in the context of a sentence – should facilitate processing and validation. Alternatively, the validity-hypothesis assumes that validating false sentences is unique, and necessitates activating content that makes false sentences valid. Participants were asked to validate sentences which were preceded by images that conveyed the component of the statement that either made it valid or false (e.g., an image of tracks/highway preceding the sentence “trains run on tracks/highways”). Results from three experiments support the congruency-hypothesis, demonstrating that activating congruent concepts facilitates validation for both false and valid statements. The findings accordingly challenge the assumption that activation of valid content is necessary for detecting falsehood. Rather, a detection of falsehood seems to rely on the association of a sentence’s content to particular semantic networks.

RETHINKING SOURCE MEMORY AND GUESSING: GENERAL MECHANISMS AND DETERMINANTS (SYMPOSIUM)

Nikoletta Symeonidou, Liliane Wulff
(University of Mannheim, Germany)

In our everyday life, remembering the source, that is the origin of an information (e.g., who told me about the new medicine? Where did I read the latest news?), can be critical for judgement formation, and thus behavior. Source monitoring encompasses all cognitive processes that are at play whenever people attribute information to its origin including source memory (i.e., actually remembering the source of an information) and source guessing (i.e., making an educated guess in the absence of memory). Both processes can have far-reaching consequences, for example for assessing the reliability of eyewitness testimony or, more generally, for evaluating the credibility of received information. Acknowledging the importance of source memory and guessing, this symposium will specifically focus on underlying mechanisms and important influencing factors of both processes using a joint theoretical framework and mathematical modeling to disentangle memory and guessing processes. In particular, the symposium will first cover the underlying components and mechanisms of source memory and guessing, respectively. Following this, new insights from metamemory research will be provided. Finally, we will focus on the ecological relevance of source memory, with reference to its social adaptivity and behavioral consequences. Based on multinomial model analyses, experimental evidence from these multifaceted aspects of source monitoring will be presented and brought up for discussion.

SOURCE REINSTATEMENT FACILITATES SOURCE RETRIEVAL

Nikoletta Symeonidou, Beatrice G. Kuhlmann
(University of Mannheim, Germany)

In the classical source monitoring paradigm, source memory failures can result from lack of storage or retrieval of source details. Based on previous research (Dodson & Shimamura, 2000), we suggest that source reinstatement, that is, reinstating the original source at test, facilitates source retrieval. To test this assumption, we extended the classical paradigm by a second test that directly followed the first, standard source test. Specifically, all target items and distractors from test 1 were tested again, this time however, by both sources consecutively (e.g., first spoken by Source A, then by Source B), such that for originally studied items, one presentation was a reinstatement of the original study context. We additionally varied difficulty of encoding and difficulty of reinstatement by manipulating presentation time (i.e., repeating vs. not repeating each word) and source similarity (i.e., using a distinct female and male voice vs. two male voices) between subjects during study. Multinomial model-based analyses indicate a clear source memory enhancement in the retrieval-facilitating second test compared to the first test, however, primarily for the high-similarity groups. Crucially, repetition had also a beneficial effect on source memory, but only in test 2. Because repeating a word during encoding should primarily influence source (and item) storage, this finding corroborates our assumption that source memory in test 2 mostly depends on storage. Altogether, our results suggest that source reinstatement is a useful technique to facilitate retrieval of stored source details, especially if source discrimination is difficult.

IS SOURCE GUESSING AUTOMATIC OR CONTROLLED? EXAMINING COGNITIVE LOAD AND AGING

Liliane Wulff, Beatrice G. Kuhlmann
(University of Mannheim, Germany)

According to the probability-matching account, prior knowledge (e.g., stereotypes) biases source guessing when people cannot remember the source of information and accurate perception of item-source contingency is impeded. However, little is known about the nature of underlying mechanisms that qualify stereotype and contingency-based source guessing. Thus, the main research question is whether the process of source guessing is rather automatic or controlled. We examined the nature testing the effects of cognitive load in younger adults (18 – 26 years) focusing on source guessing of age-stereotypic information. We manipulated provision of specific source information (age; at encoding vs. at test) and cognitive load in the test phase (load vs. no load) between subjects. Preliminary data based on the two-high-threshold multinomial model of source monitoring of 113 participants point towards a replication of the probability-matching account: Under full attention at test, participants who knew the sources' ages at encoding guessed the source based on the item-source contingency; participants who learned the sources' ages only at test guessed based on age stereotypes. Testing the nature of stereotype-based source guessing comparing participants under full and divided attention at test revealed that source guessing tended to be similarly pronounced reflecting an automatic, resource-independent process. Contingency-based source guessing seemed to counteract stereotype-based source guessing automatically, as it was comparable between participants under full and divided attention when providing source ages at encoding. Thus, both stereotype and contingency-based source guessing reflect automaticity rather than controllability.

JUDGMENTS OF GUESSING PARTIALLY CORRECT THE EXPECTANCY ILLUSION ON JUDGMENTS OF SOURCE SCHEMATIC EXPECTATIONS AFFECT SOURCE MONITORING.

Marie Luisa Schaper (Heinrich-Heine-Universität, Germany)
Beatrice G. Kuhlmann (Mannheim University, Germany)
Ute J. Bayen (Heinrich-Heine-Universität, Germany)

When asked to remember the source of items, people more often correctly attribute items to schematically expected than to unexpected sources (e.g., oven in the kitchen vs. hairdryer in the kitchen; expectancy effect). However, this performance advantage stems from schema-consistent source guessing (e.g., Schaper, Kuhlmann, & Bayen, 2018). In fact, pure measures of source memory often show an inconsistency effect (i.e., enhanced memory for unexpected vs. expected sources). In our past studies, people incorrectly predicted an expectancy effect on source memory when providing Judgments of Source (JOSs). In the current research, we investigated whether this apparent dissociation between memory and metamemory exists because people factor their schema-consistent source guessing into their memory prediction, resulting in (accurate) predictions of overall performance. We hypothesized that the expectancy effect on JOSs decreases if participants also provide Judgments of Source Guessing (JOG). Seventy-two participants studied expected and unexpected source-item pairs. Half of the participants provided item-wise JOSs, and the other half both item-wise JOSs and JOGs. In JOGs, participants accurately predicted a guessing advantage for expected pairs. In both groups, JOSs showed an illusory expectancy effect. However, when JOGs were additionally provided, this expectancy effect was smaller. Thus, guessing convictions influenced metamemory judgments when not assessed separately. Nonetheless, although people seemed to be somewhat aware of their schema-based source-guessing bias there remained a robust metamemory illusion regarding expectancy effects on source memory.

ADAPTIVE MEMORY: SOURCE MEMORY IS BETTER FOR ANIMATE THAN FOR INANIMATE ENTITIES

Laura Mieth (Heinrich-Heine Universität Düsseldorf, Germany)
Jan Philipp Röer (Universität Witten-Herdecke, Germany)
Axel Buchner, Raoul Bell (Heinrich-Heine Universität Düsseldorf, Germany)

The animacy effect refers to enhanced memory for animate over inanimate items. Two experiments test whether this memory advantage generalizes to source memory. A multinomial model of source memory was used to disentangle item recognition, source memory, and guessing processes. In Experiment 1, animate and inanimate words were presented at different spatial locations on the screen. Source memory for the spatial locations of the items was enhanced for animate compared to inanimate items. In Experiment 2, pseudowords were associated with animate and inanimate properties. Replicating previous results, pseudowords were better remembered when associated with animate properties than when associated with inanimate properties. Also, participants had better source memory for the association of pseudowords with animate properties than for the association with inanimate properties. These results strengthen the idea that animate items are associated with richer mnemonic representations than inanimate items.

THE INFLUENCE OF SOCIAL RELEVANCE ON SOURCE MEMORY AND THE INFLUENCE OF TRUSTWORTHINESS ON BEHAVIOR

Meike Kroneisen
(Universität Koblenz-Landau, Germany)

Previous research has demonstrated that people remember negative reputational information particularly well. A popular assumption in evolutionary psychology claims that reciprocal altruism is supported by a cognitive module that helps individuals to remember defectors. Recent findings indicate that source memory for cheaters is not generally enhanced. It could be shown that persons have better source memory for expectancy-incongruent information than for expectancy-congruent information. In two studies, we wanted to investigate the influence of relevance on source memory for defectors. Furthermore, we were interested in the question if this source memory advantage can influence behavior. In study 1, we examined the influence of the social situation on memory for social-exchange relevant information. Faces were shown together with descriptions of cheating and trustworthy behavior. In addition, the importance of the social situation was manipulated: Participants had either to decide if they would want to work with the described person on a student project (socially relevant situation) or if they would want to ask this person what time it is while waiting on an airport (socially irrelevant situation). Results showed that only in the social relevant context a source memory advantage for cheaters was found. In study 2, we were interested if this source memory advantage for defectors can influence later behavior. Results indicated that participants spend more money when their opponent showed trustworthy behavior before. However, the appearance of the opponents seems to influence these choices.

EXPERIMENTAL AESTHETICS 2 (SYMPOSIUM)

Thomas Jacobsen

(Helmuth Schmidt University/ University of the Federal Armed Forces Hamburg, Germany)

This is the second part of the morning symposium on Experimental Aesthetics. Experimental Aesthetics is the second-oldest branch of Experimental Psychology. Subsequent to his Psychophysics, Gustav Theodor Fechner established the empirical, experimental study of aesthetics "from below", using empirical building blocks. Firmly grounded in the psychophysical and cognitive paradigms, the field continues to thrive. Our symposium convenes contributions investigating aesthetic domains ranging from dance, literature, music, visual arts, and more. Researchers engage in the quest for elucidating domain-general as well as highly domain-specific mental processing architecture.

ON THE MUSICALLY BEAUTIFUL – REVEALING THE PHYSICAL, PHYSIOLOGICAL AND PSYCHOLOGICAL DETERMINANTS OF BEAUTY JUDGMENTS OF MUSIC

Elvira Brattico

(Center for Music in the Brain (MIB), Aarhus University, Denmark)

Empirical aesthetic research has searched for the physical and psychological reasons for why humans have always sought and thrived to produce beautiful artifacts. This human search for beauty applies to sounds too: In music, evaluative processes, such as judgments of beauty or liking, are a common part of human daily behavior. In spite of this commonality, these evaluative processes for music have received less attention than similar processes related to arts. In an acoustic, behavioral and neuroimaging study, we aimed to fill this gap by investigating the universal factors driving beauty judgments with a naturalistic free-listening paradigm. In two experiments, one group of participants continuously rated the perceived beauty of three musical pieces with a motion sensor and another group had their brain activity measured with functional magnetic resonance imaging (fMRI) while they listened continuously to the same three musical pieces. The continuous behavioral ratings were used to identify the music passages that were most consistently evaluated as beautiful/ugly across participants and to then set up the fMRI analysis of the universal neural responses to musical beauty. A third experiment with another group of participants (music composition experts) aimed to identify the musicological features that characterized the consistently-judged beautiful passages. Evidence from fMRI analysis revealed focal medial orbitofrontal activity in response to the consistently-rated beautiful passages in the musical pieces.

AESTHETIC EXPERIENCE OF MUSIC: EXPECTATION, EMOTION, COMPLEXITY AND PLEASURE

Marcus Pearce (Queen Mary University of London, UK)

Aesthetic experience of music: expectation, emotion, complexity and pleasure
Aesthetic experience is the psychological process of finding satisfaction in the form and content of a piece of music (Levinson, 2009). To elucidate the aspects of form and content involved, this research tests the hypothesis that aesthetic experience arises from the generation of expectations for forthcoming musical events and their subsequent confirmation or denial which lead to experiences of tension and resolution (Meyer, 1956). These expectations are held to arise from a process of probabilistic prediction based on an internal cognitive model of the syntactic regularities of a musical style that is acquired through a long-term process of statistical learning. Empirical studies have shown that listeners' continuously varying emotional state of arousal and valence can be predicted by an information-theoretic computational model of these processes of statistical learning and probabilistic prediction (Egermann et al., 2013; Gingras et al., 2015; Sauvé et al., 2018). Going beyond emotional experience, two recent empirical studies demonstrate that the same model accounts very well for the perception of musical complexity, providing a basis for testing the inverted-U shaped relationship between complexity and aesthetic appreciation hypothesised by Berlyne (1974), amongst others, using a principled model-based approach with real music. The results of an experiment in which 44 participants made continuous liking judgements while listening to 55 pieces of music provide evidence of the hypothesised quadratic relationship between information-theoretic complexity and aesthetic appreciation.

THE GAP BETWEEN AESTHETIC SCIENCE AND AESTHETIC EXPERIENCE

Alexis Makin (University of Liverpool, UK)

This talk is based on my recent paper of the same name¹. Scientific aesthetics sometimes uses the psychophysical approach: We vary an objective property of the stimulus (the X-axis) and measure the subjective response (the Y-axis). However, real aesthetic experience involves rare and special emotional states, such as 'aesthetic rapture' or a 'sense of the sublime'. Unfortunately, such ineffable feelings cannot be evoked or measured, and cannot be plotted on our Y-axis. More ordinary emotions, such as sensory pleasure, are also part of the aesthetic experience. But in practice it is very difficult to obtain any hot reaction with well-controlled stimuli over repeated trials. Thus we resort to plotting cold evaluations on the Y-axis. Now the X-axis becomes deeply problematic. Aesthetic experiences are triggered by gestalts, or wholes, where many dimensions work together (perhaps in harmony or intriguing contrast). Thus preferences for individual features cannot say anything about attraction to real things in art or nature. This 'Gestalt Nightmare' was demonstrated in an experiment with just three dimensions: symmetry, color and curvature. I suggest that the future of scientific aesthetics requires transcending the quasi-psychophysical approach, but then philosophical aesthetics also has obvious and well-known flaws, such as difficulty adjudicating between contradictory claims.

THE CONCEPTUAL SPACE OF AESTHETIC APPRECIATION

Valentin Wagner, Winfried Menninghaus
(Max Planck Institute of Empirical Aesthetics, Germany)

Thomas Jacobsen (Helmut Schmidt University, Germany)

Extending previous work by our group (Knoop, Wagner, Jacobsen, & Menninghaus, 2016) on the conceptual space of aesthetic appreciation terms, we obtained new data for sixteen additional object classes (visual arts, architecture, landscapes, advertisement, websites, theater, movies, music, musicals, dance, movements, faces, touch, smells, food, and wine). We first analyzed the new data in conjunction with our previously published data on literature. Cluster analyses and a network analysis based on the German raw-data for altogether 22 domains yielded similar results: three clearly separated object classes (smells & taste related object classes, faces, landscapes) on the one hand, and a much more interconnected group of man-made object classes and artistic domains on the other. In a second step, we also integrated all comparable free listing data reported by other groups into a comprehensive analysis covering 29 domains/ object classes cluster consistently in groups (narratives, human-made artefacts, faces & pattern, landscapes, sound & movement, smells), reflecting sensory modalities (vision, audition, olfaction, multi-modal) as well as the distinction of natural objects vs. artefacts. Notably, 'beautiful' is the only term listed for all domains/ object classes. Thus, our overall analysis confirms the central role of beauty in aesthetics.

EMOTION MATTERS: DIFFERENT PSYCHOPHYSIOLOGICAL RESPONSES TO EXPRESSIVE AND NON-EXPRESSIVE DANCE MOVEMENTS

Julia F. Christensen (City University, UK)
Ruben T. Azevedo, Manos Tsakiris (Royal Holloway, UK)

The art form dance utilises this communicative power of the human body to convey meaning through movement alone. However, since the 1950ies, formalist dance has gained momentum. Here, the most important aspect is the beauty of the lines and shapes that the dance movement draws in space – independently of any expressivity. The debate between expressive and formalist dance raises an interesting empirical question for neuroaesthetics: Two dance movement sequences being equal, but one with and one without expressivity – which sequence would lay audiences prefer? And do interindividual differences modulate these preferences? Forty-one participants watched and rated 40 pairs of short dance videos in randomised order (N=80). Of each pair, one version of the movement sequence was emotionally expressive (clip a), while the other version of the same sequence (clip b) was not expressive. Participants rated expressivity (part 1), and how much they liked each movement (part 2), while their galvanic skin response (GSR) was recorded online. Interindividual difference measures included interoceptive accuracy and heart rate variability. Participants found expressive dance clips more expressive and liked expressive clips more than the non-expressive clips. Besides, participants' GSR differed, depending on the category of clips they were watching and this relationship was modulated by interoceptive accuracy and heart rate variability. Overall, these results provide first evidence that the intended expressivity of the dancer in a dance movement influences the aesthetic experience that audiences may derive from a dance movement.

RHYTHMS IN THE SIGNAL AND RHYTHMS IN THE HEAD

David Poeppel (New York University, United States)

The brain has rhythms - and so do music and speech. Recent research has revealed that the temporal structure of speech and music and the temporal organization of various brain structures align in systematic ways. The role that brain rhythms play in perception and cognition continues to be elucidated through studies of various types. I will describe some results that illuminate the temporal structure of perceptual experience and how this may form the basis for aesthetic experience. From recognizing speech and melodies to building abstract mental structures, how the brain constructs and represents time reveals unexpected puzzles.

LET ME READ YOU A STORY: EFFECTS OF VOCAL DELIVERY OF LITERARY TEXTS AND MOOD ON AESTHETIC EMOTIONS

Ursula Beermann

(The Health and Life Sciences University - UMIT, Department of Psychology, Austria)

Melina Scheuffgen, Hanna Wode

(University of Innsbruck, Department of Psychology, Austria)

Aesthetic emotions are elicited by aesthetic experiences, such as films, music, or books and audio books. Especially for music, aesthetic emotions are affected not only by the composer's intended emotions, but by multiple facets like the musical interpretation, context, or the participant's mood. This study investigated the research question whether (a) vocal delivery of a literary text (emotionally expressive vs. flat) and (b) mood states before listening to the text affect the frequency of aesthetic emotions. An online sample (N = 148) listened to either an emotionally expressive or flat version of the same audio-recorded text (a novel section describing a scene in WWI) and answered the PANAS (measuring mood states before listening to the text) and the Aesthemos (assessing aesthetic emotions after listening to the text). A MANOVA showed a main effect of vocal delivery, with higher frequencies particularly for fascination, beauty, being moved, and interest in the emotionally expressive condition, and boredom and ugliness in the flat condition. Additionally, negative (but not positive) mood states before listening to the text affected the frequency of aesthetic emotions, indicating that a previous negative mood state lead to higher frequencies particularly of confusion, uneasiness, surprise, insight, and nostalgia in the expressive condition. In conclusion, like with music, aesthetic emotions are not only a product of the content of a literary text, but also of contextual factors like the delivery and previous mood states.

EMOTION 1 (INDIVIDUAL TALKS)

WHEN NEGATIVE AFFECT DRIVES ATTENTIONAL CONTROL: THE ROLE OF MOTIVATIONAL ORIENTATION

Jinhui Zhang, Andrea Kiesel, David Dignath
(Institute of Psychology, University of Freiburg, Germany)

Recently, it was suggested that negative affect motivates the adaptation of attentional control. According to this idea, van Steenbergen, Band, and Hommel (2009) argued that positive affect should counteract the motivation for control adaptation while negative affect should enhance the motivation. In line with their argument, van Steenbergen et al. (2009, 2012) found that positive gain feedback relative to negative loss feedback diminished the congruence sequence effect (CSE) which is an indicator for the adaptation of attentional control. In the present experiment, we attempted to replicate this valence effect of monetary gain/loss feedback on the CSE and furthermore, tested how motivational orientation (approach vs. avoidance) affects the effect of monetary feedback on the CSE. Ninety-five native German speakers (19-30 years old) were quasi-randomly assigned to one of two groups: One approach-oriented group were informed they would gain extra money after task completion, and one avoidance-oriented group were informed they would lose some money after task completion. The experimental procedure and materials were the same as that of van Steenbergen et al. (2009). Results demonstrated that negative affect boosts the CSE, however, in avoidance orientation only. This finding highlights the role of motivation for recent theorizing on emotion-driven control.

THE INFLUENCE OF LISTENING TO MUSIC DURING CAESAREAN SECTIONS ON PATIENTS' ANXIETY LEVELS

Nora K. Schaal (Heinrich-Heine-University Düsseldorf, Germany)
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Several studies have shown that music interventions before and during surgery can lead to reduced anxiety and pain levels of the patient. The present study investigates the effect of a music intervention during the caesarean section on subjective (State Trait Anxiety Inventory, visual analogue scale) and objective (cortisol, amylase, heart rate, blood pressure) measures of anxiety and stress perceived before, during and after the caesarean on the day of surgery. The patients (N = 304) were randomly allocated to the experimental group, listening to music in the operating room, or to the control group, undergoing the procedure without music. The analysis revealed lower levels of subjective anxiety at the end of the surgery in the experimental group compared to controls. The objective parameters showed significant differences between the groups in salivary cortisol increase from admission to skin suture as well as systolic blood pressure and heart rate, indicate lower stress and anxiety levels in the music group. These results propose that listening to music during a caesarean section leads to a reduction of anxiety and stress experienced by the expectant mother. Music during caesarean is an easy implementable and effective way of reducing stress and anxiety of the expectant mother.

MEDIA SOURCE CREDIBILITY AND THE IMPACT OF AFFECTIVE PERSON-RELATED INFORMATION

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Media sources differ in attributed levels of credibility. But does the level of trust placed in different sources affect how the information impacts people's opinions and judgments derived from news? In this pre-registered study, we investigate influences of source credibility on person perception, evaluation, and deliberate person judgments based on affective person-related information. Participants (N=30) read headlines about negative, positive, or relatively neutral social behavior (e.g. Berlin: This casino owner forced teenager to smuggle cocaine) that were presented simultaneously with unfamiliar faces in visual contexts relating to existing, well-known German online media sources associated with low or high levels of credibility. After learning, judgments of persons paired with negative information were more negative than those related to neutral information, independent of source credibility. Similarly, event-related potentials (ERPs) indexing perception-related motivated attention (early posterior negativity, EPN) were affected by the emotional contents. ERPs related to higher-order person evaluation (late positive potential, LPP) showed a modulation due to the implicit appraisal of source credibility. However, this modulation was relatively small compared to the strong impact of the affective information that was present for both, credible and less credible sources. These findings demonstrate that information from media sources of low credibility nevertheless strongly affects emotional responses and deliberate person judgments.

SHADES OF SURPRISE? ASSESSING THE IMPACT OF DEGREE OF DEVIANCE AND SCHEMA CONSTRAINTS ON THE SURPRISE RESPONSE SYNDROME

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The current surprise literature suggests that surprise is about both expectation and explanation. In three experiments (total N = 679) we investigated whether the behavioral, affective, experiential and cognitive surprise components are actually driven by how strong an event deviates from what was expected and by how easily it can be integrated with the constraints of an activated schema. We therefore developed a new paradigm which allowed us to elicit different shades of surprise by manipulating both the degree of deviance and the constraints of the activated schema. Participants were instructed that they would see ten stimuli of a certain type on the screen. Crucially, we manipulated the degree of deviance of the last stimulus and presented a stimulus that deviated to either no, medium or high degree from that one expected due to the activated schema. Orthogonally to that, we varied the constraints of the activated schema and induced a schema which had either high, moderate, or no constraints. As our dependent variables, we assessed behavioral response delay and explicit ratings of liking, surprise, and expectancy. Our findings underline the complexity of the surprise response syndrome by showing that the different components are only weakly correlated and do not follow a uniform response pattern. Expanding the scope of previous accounts, the present results further suggest that surprise is not only about the absolute invalidation of prior expectancies, but also about the degree of deviance and the ease of integrating a surprising event with the constraints of an activated schema.

POLARITY-INDUCED INTERACTIONS BETWEEN COLOUR AND EMOTION

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Through consistent use in everyday life, colours are likely to be associated with emotions: green should be congruent with positive valence, and red with negative valence. Our study tests for such a congruence effect and investigates, whether it arises automatically and in isolation, or is due to polarity correspondence (mapping of the colours to the valence poles). Employing a valence categorization paradigm, participants ($n = 141$) saw, in a single experimental block, positive and negative German words either in only red (red monochromatic block), only green (green monochromatic block), or in red as well as green font colour (mixed-colour block). Median correct reaction times showed a significant congruence effect (faster responses to congruent items, i.e., positive words in green, negative words in red). This was influenced by block type: The congruence effect was significantly stronger for mixed blocks than for monochromatic blocks. Therefore, our results show a green-positive and red-negative association, but only when polarities of both dimensions are present and suggest to the participants to map perceptual cues (colour) as positive vs. negative poles of the conceptual dimension (valence), thus lending support to the polarity correspondence principle.

EFFECTS OF EMOTIONAL FACIAL EXPRESSIONS ON REVENGE PUNISHMENT

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In four studies, we modified a competitive reaction time aggression paradigm that included emotional feedback from the victim via video clips. Participants were provoked and given the opportunity to punish their opponent. The punishment was followed by a short video clip featuring three distinct emotional reactions of the opponent: (1) anger, (2) sadness, (3) pain (and neutral displays as controls). We compared the punishment intensity that was selected by the aggressor in the trials preceding and following the emotional victim feedback. We found a consistent effect of the facial pain display reducing aggressive behavior in all 4 studies (overall $N = 192$), supporting the suffering hypothesis. None of the facial displays benefited from a direct feedback (via scale) indicating pain, stressing the strength of employing natural pain displays in contrast to methods that rely on inferring pain (e.g. pain-o-meters). Pairing the facial display of pain with a direct feedback indicating anger did result in a descriptive decrease of the pain effect (dz pain high anger: 0.26; dz pain low anger: 0.43). We found no significant effect of the facial anger display on aggressive behavior. All differences after anger displays do not significantly differ from the neutral baseline, inconsistent with the understanding hypothesis. Facial expressions of sadness only reduced aggressive behavior if disambiguated by direct feedback indicating the absence of anger. This is especially interesting since the pre-rating indicated that sadness expressions are among the easiest to correctly classify.

MEMORY (INDIVIDUAL TALKS)

SAME SAME BUT DIFFERENT? MODELING N-1 SWITCH COST AND N-2 REPETITION COST WITH THE DIFFUSION MODEL AND THE LINEAR BALLISTIC ACCUMULATOR MODEL

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The ability to flexibly switch among tasks is fundamental to ensure goal-directed behavior in a dynamic environment. However, this flexibility comes along with costs, such as the n-1 switch cost or the n-2 repetition cost. The n-1 switch cost refers to the performance slowing and increase in error rates for task switches relative to task repetitions when switching among two tasks. The n-2 repetition cost is observed when switching among three tasks and refers to the cost for n-2 task repetitions relative to n-2 task switches. Typically, the n-1 switch cost is assumed to result from reconfiguration processes or proactive interference from the previously activated task-set. The n-2 repetition cost is assumed to result from lingering inhibition that reduces competition among task sets in trial n-2. Whereas explanations for both costs are sometimes integrated, it is so far unclear whether both costs are related. To examine this, we decomposed the processes underlying both costs in three task switching experiments (Experiment 1: N = 16, Experiment 2: N = 24, Experiment 3: N = 24) using the diffusion model as well as the linear ballistic accumulator model. The results showed that n-1 switch cost reflects interference caused by the residual activation of the previous task set as indicated by slower evidence accumulation processes. In contrast, there were no consistent parameter modulations underlying n-2 repetition cost. These findings emphasize that different cognitive processes are involved in n-1 switch cost and n-2 repetition cost and question the role of inhibition for task switching.

INVESTIGATING THE MECHANISMS OF CHUNKING DURING DUAL-MEMORY RETRIEVAL PRACTICE

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This study investigated the processing mechanisms of dual-memory retrieval of two distinct task responses after practice. In this task situation, on the presentation of a color word cue, participants either performed a left/ right keypress or gave a verbal digit response; under dual-memory retrieval conditions, both responses were executed. Previous research in this situation demonstrated that dual-memory retrieval practice leads to learned retrieval parallelism in a subset of participants. According to the set-cue bottleneck model, these participants learned to chunk the two responses, such that both responses could be retrieved in one pass through a retrieval bottleneck. Further, that chunking process is only possible when both responses are concurrently in working memory. There exists however no direct empirical evidence for the contribution of the working memory component to this chunking process so far. As a consequence, we investigated whether the modulation of an additional load on working memory has an effect on the occurrence of learned parallelism. This load was modulated from low load of one digit in a first group of participants ($N = 24$) to high load of six digits in a second group of participants ($N = 24$). Consistent with our predictions, high working memory load in comparison to low working memory load reduced the occurrence of learned parallelism after dual-memory retrieval practice, providing empirical support for the contribution of the working memory component to the chunking process in the context of the set-cue bottleneck model.

MUTUALLY CONTRADICTORY POST-EVENT MISINFORMATION: EFFECTS ON EYEWITNESS REMEMBERING

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So far, misinformation research has exclusively focused on the memorial impact of ONE misleading post-event detail relative to ONE original event detail (even if the same misinformation is sometimes repeated). In real-life situations, however, witnesses may encounter multiple different (and mutually contradictory) pieces of misinformation relative to an event detail (e.g. from multiple press reports). Under such circumstances, the misinformation effect may be enhanced (because MORE misinformation is presented) or reduced (because the mutual contradictions undermine the credibility of the misinformation), or both processes may operate simultaneously. In four studies (total N = 238) testing these ideas, we found evidence for each of these possibilities. The experiments followed an expanded misinformation paradigm in which participants first witnessed an event (a harmless traffic accident on video) and later read TWO witness statements pertaining to the event. In different conditions, participants received (a) no misinformation concerning a critical item (control), (b) a single piece of misinformation from one of the witness statements (standard) or (c) two pieces of misinformation from the two statements that contradicted each other (contradictory). Some studies also included a condition in which the two witness statements contained an identical piece of misinformation (consistent), and further used highlighting of statement information as a way of inducing discrepancy detection. Assignment of items to conditions and witness statements was counterbalanced. Discrepancy detection was assessed, and analyses relating discrepancy detection to the misinformation effect size in different conditions will be presented.

ON THE ADAPTIVE NATURE OF DIRECTED FORGETTING: RECALL AND EYE MOVEMENT RESULTS

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Previous research indicates that intentional forgetting might prevent overloading of a cognitive system by decreasing the accessibility of outdated information. Following this idea, outdated information should be overwritten to increase the functionality of the system. To investigate this process, pairs of synonyms (53 word pairs) were created. In an ambiguous situation, the accessibility of one item should be decreased if the other item of the pair was learned. This in turn should increase the time needed to decide between the two alternatives. Before encoding, participants (N 45, 15 per group) were instructed to (a) either remember both items of each pair, (b) forget one item from each pair and remember the other (item-method directed forgetting condition) or (c) received only one item from each word pair and one unrelated item and to remember both. Following the encoding phase, ambiguous fill-in-gap sentences were presented. Participants completed them using the learned information. Finally, a free recall test was included to investigate the accessibility of all items. Reaction times for fill-in-gap sentences were measured using eye tracking and voice onset time. Preliminary results show that participants in the directed forgetting group did neither perform worse in the fill-in-gap task nor recall less words compared to the other two groups during free recall. However, they produced significantly less false items during free recall and preliminary data analyses indicate that they performed the fastest in the fill-in-gap task. This pattern of results will be discussed in the context of adaptive intentional forgetting.

THE MAGIC NUMBERS 4 AND 7. MODELING CHUNKING IN IMMEDIATE MEMORY.

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The main assumption of chunking theory is that knowledge about semantic units in a certain task domain can be used to compress incoming information. Although the maximal capacity of immediate memory is 4±1 information units, this information compression allows to enlarge the memory capacity by increasing the size of information units. As even random information can be compressed to a certain extent, a capacity limit of 7 single bits of information is typically found with random material. These assumptions were tested with a complex span task. Expert musicians (n=75) memorized the pitch of a single note and then played a simple melody on a piano at first sight. This procedure was repeated twelve times and then a memory test followed in which all memorized notes had to be recalled in correct order. The presence of semantic units was varied within-participants: in experimental trials, consecutive notes formed major chords, while in control trials they did not. As expected, mixed model analyses revealed that memory capacity was larger when the material contained semantic units. In experimental trials, the mean capacity limit was 3.18 chords while in control trials it was 7.32 single notes. The TBRSC computational model integrates time-based decay, refreshing mechanisms and chunking. It is explicitly suited to model recall performance in complex span tasks. This model will be used to analyze the data in order to confirm its validity.

COGNITIVE CONTROL AFFECTS MEMORY FOR TARGETS AND DISTRACTORS DIFFERENTLY: THE TWO FACES OF MEMORY SELECTIVITY

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Task switching leads to reduced selectivity in subsequent memory for task-relevant (targets) over task-irrelevant (distractors) items. This effect is modulated by top-down cognitive control during task switching (Richter & Yeung, 2012; 2015). In order to disentangle the relative effects of cognitive control on targets and distractors, we conducted two experiments, in which we manipulated cognitive control during the encoding phase and tested memory for targets and distractors in a subsequent surprise recognition test. The two experiments differed only in the encoding phase where either random (exp. 1, $N = 160$) or predictable (exp. 2, $N = 160$) task switches were administered. In both experiments, preparation duration (150 ms vs. 1200 ms) and stimulus duration (500 ms vs. until response) were varied between-subjects in order to investigate the effects of top-down and bottom-up control, respectively. We hypothesized that bottom-up control would also modulate memory selectivity, defined as the ratio of recognized targets to distractors. Generally, manipulations led to diverging effects on targets and distractors. Enhancing target memory was at the expense of distractor memory and vice versa. Longer preparation led to higher memory selectivity but only in the random task switching experiment while there was no effect of preparation in the predictable task switching experiment. Interestingly, in both experiments higher memory selectivity was obtained through longer stimulus presentation. These findings render strong support for a link between cognitive control and memory in the sense of a cognitive mechanism controlling the gate to long-term memory.

NEUROSCIENCE (INDIVIDUAL TALKS)

IS IT IMPORTANT TO BE ABLE TO LEARN? AN ERP STUDY ON THE INFLUENCE OF GOAL RELEVANCE ON FEEDBACK PROCESSING

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The goal of feedback evaluation is to enable learning, and thus improving future decision making. In contexts such as gambling, however, feedback cannot be used to improve performance due to its missing goal relevance, i.e., its informativeness to optimize subsequent choice behavior. In this study, we compared neural correlates of feedback processing, the feedback-related negativity (FRN) and the P3, in a probabilistic learning task and in a gambling task. Feedback sequence was yoked across tasks and participants were informed that feedback information can be used to improve performance in the learning task, but not in the gambling task. We hypothesized that only in the learning task should the neural correlates of feedback processing reflect behavioral adaptation. Our results provided support for this hypothesis as both components, particularly the P3, were modulated by task type, with only feedback activity in the learning task being sensitive to subsequent behavioral change. Likewise, computational modelling suggests that central parameters of a reinforcement learning model are related to feedback activity only in the learning task. Single-trial analyses revealed that in the learning task, but not in the gambling task, the FRN and the P3 reflected reward prediction errors derived from the reinforcement learning model. Together, these results point to the importance of goal relevance as a key feature of feedback processing.

ATTENTIONAL BLINK AND PUTATIVE NON-INVASIVE DOPAMINE MARKERS: TWO EXPERIMENTS TO CONSOLIDATE POSSIBLE ASSOCIATIONS

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Adaptive behavioral control involves a balance between top-down persistence and flexible updating of goals under changing demands. According to the metacognitive state model (MSM), this balance emerges from the interaction between the frontal and the striatal dopaminergic system. The Attentional Blink (AB) task has been argued to tap into the interaction between persistence and flexibility, as it reflects over-persistence—the too-exclusive allocation of attentional resources to the processing of the first of two consecutive targets. Notably, previous studies are inconclusive about the association between the AB and non-invasive proxies of dopamine including the spontaneous Eye Blink Rate (sEBR), which allegedly assesses striatal dopamine levels. We aimed to substantiate and extend previous attempts to predict individual sizes of the AB in two separate experiments with larger sample sizes ($N=71$ & $N=65$) by means of non-invasive behavioral and physiological proxies of dopamine (DA), such as sEBR and mood measures, which are likely to reflect striatal dopamine levels, and color discrimination, which has been argued to tap into the frontal dopamine levels. Our findings did not confirm the prediction that AB size covaries with sEBR, mood, or color discrimination. The implications of this inconsistency with previous observations are discussed.

TASK-DEPENDENT EFFECTS ON ERROR-PROCESSING

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The ability to monitor our actions and re-adjust our cognitive system when necessary enables us to continually improve our performance. In this process, response conflict detection is thought to play a key role. Due to the temporal resolution of event-related potentials (ERPs) which allow to disentangle cognitive processes in real-time, the error-related negativity (ERN) occurring immediately after an incorrect response has been evaluated as an index of response conflict detection. However, so far little is known about task-specific modulations within the same individual over time. Here, we investigated the extent to which performance and the underlying neural activity are modulated over time in different tasks in a student population ($N = 21$). Participants performed modified flanker and Stroop tasks in two sessions one week apart while EEG was recorded. In the Flanker task, a target arrow was presented in the middle of the screen flanked by a total of 8 arrows. The Stroop task consisted of four different color words presented in either the same or a different color. Each task consisted of 160 congruent and 160 incongruent trials. Behavioral performance was largely stable over time, but showed considerable individual differences, in particular in terms of response accuracy. ERN amplitudes gradually diminished over time, but for each task only subtle differences between sessions were apparent. Notably, task specific effects on ERN amplitudes were evident, suggesting that partly dissociable cognitive processes underlie error-related brain activity. Together, the present results indicate task-dependent inter-individual differences, but intra-individual stability on error monitoring over time.

NEURAL EVIDENCE FOR THE ROLE OF SUPPRESSION IN VISUAL SELECTIVE ATTENTION AND WORKING MEMORY

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To deal with the limited capacity of the visual system, attention allows us to select relevant information from our environment and working memory allows us to maintain the selected information over time. Previous research has focused on the prioritisation of relevant information in attention and working memory and neglected the processing of irrelevant information, although there is a growing body of evidence showing that performance in visual tasks is strongly dependant on the efficiency to suppress irrelevant information. Here, I will present data from various studies that demonstrate the importance of suppression in visual selective attention and working memory. A powerful tool to investigate visual suppression is the distractor-positivity (PD), an event-related potential component in the EEG signal that is typically elicited contralateral to a salient distractor. It reflects active suppression of irrelevant information and is the counterpart of the N2pc component which reflects prioritisation of a stimulus. We used the PD component to provide evidence that suppression efficiency is affected by associate learning ($n = 28$) and by monetary rewards associated with the distractor ($n = 27$). We also used the PD component to show that active suppression plays an important role in working memory processes ($n = 46$). Lateralised components like the PD and N2pc are limited to comparing attentional processes between hemispheres. However, with an inverted encoding models (IEM) that make use of multivariate signals we were able to track the locus of attentional suppression at various locations simultaneously ($n = 36$).

SEQUENTIAL CONFLICT RESOLUTION UNDER MULTIPLE CONCURRENT CONFLICTS: AN ERP STUDY

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Imagine yourself driving quickly but safely while following your navigation system. When approaching a red traffic light, you can slow down. Moreover, if you see a police officer at the junction, you are able to ignore the traffic light and the direction signalled by the navigation system in order to follow the officer's instructions. The goal of the present study was to investigate whether encountering such situations in which multiple conflicts are presented concurrently results in a simultaneous or sequential conflict resolution. To this end, we measured event-related potentials (ERPs) in a paradigm combining a Stroop and a flanker task. In this paradigm, colour words were printed in colour and the colour of the central letter was congruent or incongruent to the meaning of the word (Stroop task) and also congruent or incongruent to the colour of the flanking letters (flanker task). Twenty-four participants were asked to indicate the colour of the central letter while ignoring the meaning of the word and the colour of the flanking letters. The behavioural results replicated previous findings: The Stroop congruency effect (i.e., the difference between Stroop incongruent and congruent trials) was smaller – but still significant – for flanker incongruent than for flanker congruent trials. The ERP results showed that the flanker conflict was associated to an early ERP component (P2), whereas the Stroop conflict was associated to a later component (N450). Together, these findings emphasize a sequential organization of conflict resolution in the brain which is adaptive when facing multiple concurrent conflicts.

LANGUAGE (INDIVIDUAL TALKS)

AN INVESTIGATION OF SPATIAL STIMULUS-RESPONSE COMPATIBILITY EFFECTS BASED ON GERMAN PARTICLES

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We tested if stimulus-response (SR) compatibility effects of spatially ambiguous words depend on a semantic priming context. Although many words, including spatial words, can take on several meanings, this is an open question. From Experiments 1 to 3, we manipulated the likelihood that the vertical meaning of the German particles *auf* and *ab* was processed by (1) instructing the processing of vertical meaning in Experiment 1, but not in Experiments 2 and 3, and (2) by using verbs that either primed (Experiments 1 and 2) or did not prime (Experiments 1–3) the targets' vertical meanings. Spatial SR compatibility effects resulted, regardless of whether or not the processing of the vertical meaning was instructed and the vertical meaning was primed. Results suggest that the selection between vertically discriminated responses could be sufficient to elicit the participants' extraction of the vertical meaning of the ambiguous particles.

INTRODUCING A NOVEL LANGUAGE PREFERENCE EFFECT: CONSONANTAL AND VOCALIC POSITIONS AFFECT WORD PREFERENCE AND PERSON PERCEPTION

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Various features of words have been shown to impact attitudes towards words and the persons or objects they denote, as for instance prototypical and therefore familiar word patterns are perceived positively. Linguistic research has shown that syllables and therefore words are more likely to start with a consonant and end with a vowel. Therefore, words that follow these prototypical linguistic principles (starting with a consonant, ending with a vowel) should evoke positive attitudes. In ten (total $N = 924$) experiments, the impact of starting and ending letters on preference ratings and person perception was tested. Indeed, we found that for the starting letters of pseudo words, consonants were preferred over vowels. For the ending letters of pseudo words, vowels were preferred over consonants (the CV-effect). Words that started with a consonant and ended with a vowel were more likely to be rated as real existing words, which substantiates the notion that the prototypicality of CV-words underlies this preference effect. The effect was applied on preferences of person names, person perception and in an economic decision-making paradigm. It was replicably shown that persons and counterplayers with CV-conform names were liked more, were rated to be more competent and warmer and were allocated higher amounts of money. Implications of this novel language preference effect for the understanding of language processing and experimental set-ups are being discussed.

HOW TO IMPROVE RELATIVE RISK INTERPRETATION IN READERS OF DIGITAL TEXTS

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One reason for misinterpreted risks is inadequate risk communication among stakeholders. This works aims to address the key challenge of relative risks (e.g. 30% more X) with a tool that provides supporting information to the reader of digital texts: Explanations, if absolute risk information is missing because neither baseline risk nor effect size can be inferred; visuals, if absolute risk is reported because low numerated would benefit from them. However, it is not known whether enriching relative risk statements with transparent explanations (about missing information) and relative+absolute risk statements with transparent visuals improves readers' interpretation of risks. 215 laboratory participants read pretested modifications of German online texts about 13 different topics (e.g. sports, finance). The texts contained manipulated statements with single/multiple relative risks with/without absolute level (target conditions) or with single/multiple proportions in percentage/natural frequency format (control conditions). Four groups received plain text, explanations/fact box visuals (embedded or mouse-over), or the statements were simply highlighted (between-subjects). While under control conditions extraction and inference from the text was not systematically improved, embedded explanations and visuals improved both in each target condition. Statement-related risk perceptions were reduced only under the target conditions. Based on a wide range of variations on how to express a relative risk in words, provided explanations (which prompt critical statement review) and visuals (which convey part-to-whole relationships for low numerated individuals) can improve readers' interpretation of risk information. Applied research needs to show whether using this tool promotes learning or creates dependencies and hampers attention of readers.

LANGUAGE SWITCHING AND TASK SWITCHING: DOES SUPERFICIAL SIMILARITY TRANSLATE INTO EQUIVALENT LEARNING PROCESSES IN BILINGUALS AND MONOLINGUALS ALIKE?

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Cognitive flexibility, that is a flexible adaption of processes ensuring goal achievement, is usually measured using the task-switching paradigm. In this paradigm, participants are requested to switch between two simple tasks. Performance costs arise whenever the currently relevant task is different from the task one trial before (trial $n-1$). Likewise, given a more and more multilingual world, we are often asked to switch among languages when addressing different colleagues in the office, for instance. Performance costs are found in this context, too. The question of whether performance costs arising in task switching can be attributed to the same processes as those in language switching is currently under debate. We addressed this question by fitting learning curves to task-switching and language-switching performance in three samples of bilinguals (Russian-German, Russian-Hebrew and Turkish-German) and their monolingual counterparts. We predicted different learning curves for bilinguals, suggesting more memory-based performance (i.e., retrieval of recent episodes) in language switching compared to task switching (i.e., engaging in task-set reconfiguration) whereas no such difference should arise in monolinguals. Such a pattern would suggest that individuals' language proficiency and use might influence the degree to which task switching and language switching recruit similar underlying processes.

DELICIOUS LANGUAGE: THE DRIVING MECHANISMS OF THE IN-OUT EFFECT

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Words with front-to-back consonantal articulation trajectories (inward, e.g., BAKA) are preferred over words with back-to-front trajectories (outward, e.g., KABA), an effect established by several independent labs recently. In this project the minimal required conditions for this in-out effect to occur are explored. In all previous studies whole words were shown, while here we show only word fragments to orthogonally manipulate starting and ending letters. In Experiment (N = 100) we show word fragments with front vs. back starting and ending letters (e.g., B _ K _, inward; K _ B _, outward) and still find the in-out effect. In Experiment (N = 120) we only present front vs. back starting and ending letters (e.g., B _ _ _, starting front; K _ _ _, starting back; _ _ B _, ending front; _ _ K _ ending back) and do not find the in-out effect. Experiment 3 (N = 200) corroborates this pattern with a between-subjects design. These studies show that the in-out effect does not hinge on the identity of the starting or ending letter per se but that the whole front-to-back vs. back-to-front trajectory is necessary to evoke it.

A COMPUTATIONAL INVESTIGATION OF JÜRGEN REICHEN'S LESEN DURCH SCHREIBEN METHOD

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Lesen durch Schreiben (LdS; “reading through writing” in English) is a controversially discussed method for primary reading instruction in German-speaking countries. In LdS, primary school students learn reading and writing through prolonged “invented spelling”, meaning only phonological but not orthographic spelling errors are corrected. Previous studies of the effectiveness of LdS reported inconsistent results, casting doubt onto the suitability of LdS for primary school instruction. Furthermore, there are many methodological evaluation difficulties, such as separating the effects of LdS from other instruction-related variables. In this work, we propose a connectionist model based on recurrent neural networks. The model enables us to test the LdS teaching regime in isolation, circumventing some of the previous challenges. We compared the behaviour of neural agents trained using the LdS regime against agents trained using a classical, primer-based training regime. Experimental results revealed that our LdS agents performed significantly worse than our primer agents in writing tasks and, to a lesser extent, in reading tasks. The LdS agents frequently repeated stereotypical spelling mistakes of children exposed to LdS. These mistakes arise naturally during writing acquisition of all learning agents, but are either suppressed or reinforced depending on the learning regime. We examined the learned, internal representations of both agents and found deviations in the LdS agent that may have induced the amplified confusion of similar phonemes. Our work presents a modest step towards building a biologically inspired framework of primary reading instructions that may act as a starting point for future research.

THE ROLE OF DOUBLE CONSONANTS IN GERMAN HANDWRITTEN WORD PRODUCTION

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Sonia Kandel
(Université Grenoble Alpes, France)

In French, Italian, and English double consonants have been shown to have a special status during the handwriting process. We investigated the role of double consonants in German handwriting, recording writing durations and pauses between letters during the handwriting process in four groups of participants: primary school children (3rd and 4th graders) (n=60), 6th graders (n=26), young adults (n=22) and adults (n=20). We expected that the planning of double consonants in words like TANNE (fir tree) differs from the planning of corresponding non-double consonant letter pairs, such as NT in TANTE (aunt). Such differences should be detectable in differences in stroke durations and inter-letter interval durations between the double consonant words and the control words. Participants copied the words that were presented on a screen onto a graphic tablet. Their writings were recorded using the software Ductus. Linear-mixed effect models with either stroke durations or inter-letter interval durations as dependent variables and position and word type as predictors revealed that double consonants had a different status in handwriting compared to non-double consonant letter pairs, detectable in significant main effects of word type or an interaction between word type and letter position. These effects differed between the groups of participants. Overall, results suggest that double consonants are planned together as one unit in German handwriting, which mirrors the results of studies in other languages.

SEMANTIC CONTEXT EFFECTS ON LANGUAGE PRODUCTION: NEW PERSPECTIVES AND METHODS (SYMPOSIUM)

Anna Katharina Kuhlen
(Humboldt Universität Berlin, Germany)

Cornelia van Scherpenberg
(Berlin School of Mind and Brain, Germany)

During language production speakers are influenced by the semantic context in which they speak. Numerous studies using experimental paradigms like the Picture-Word-Interference (PWI), the blocked-cyclic or the continuous naming paradigm, have revealed that semantic context can interfere with or facilitate language production. In this symposium we introduce novel approaches that build on established findings but employ new methods, perspectives and applications to the study of semantic context effects. Moving forward from classical PWI, Cornelia van Scherpenberg will present data on this paradigm in combination with eye tracking showing how speakers make use of the semantic context they view. Eva Belke will discuss semantic interference across languages, demonstrating how the blocked-cyclic naming paradigm can be used to assess lexical-semantic representations in Turkish-German bilingual children. Speaking in its most natural form – during social interaction and shared activities – will be addressed in two contributions. Hsin-Pei Lin will describe how seemingly unrelated objects can induce interference in naming after they are introduced in a unifying narrative told by a task partner. Anna Kuhlen will present electrophysiological and behavioural data from a social setting in which two task partners alternate naming pictures, investigating whether the partner's word retrieval process is simulated. Finally, an innovative combination of TMS and PWI will be introduced by Katrin Sakreida, allowing insights into the spatial and temporal mapping of semantic processes in language-related cortical regions. Our symposium will provide intriguing insights on cutting-edge methodological approaches but also new theoretical facets in a thriving field of language production research.

SEMANTIC INTERFERENCE DURING LANGUAGE PRODUCTION – CAN THE EFFECT BE MODULATED? AN EYE TRACKING STUDY

Cornelia van Scherpenberg

(Berlin School of Mind and Brain, Humboldt-Universität Berlin, Germany)

Rasha Abdel Rahman

(Institute for Psychology, Humboldt-Universität Berlin, Germany)

Hellmuth Obrig

(Department of Neurology, Max-Planck-Institute for Human Cognitive and Brain Sciences, Leipzig, Germany)

Experimental manipulations of semantic context during language production, for example through Picture-Word-Interference (PWI), have consistently shown that semantically related distractor words (e.g., cat) inhibit retrieval of the target picture name (dog). Here we tested the hypothesis that this effect may be parametrically modulated, i.e. that interference should increase with more distractor words presented. Using a new variation of the PWI paradigm we manipulated the number of distractors that could interfere with picture naming. In each trial, we presented 8 words in a circle, out of which 3 to 5 belonged to the same semantic category (e.g., horse, donkey, goat). Consecutively, participants ($n = 24$) named a picture that was either related to these context words (sheep), or unrelated (apple). We furthermore tracked their eye movements to investigate how they processed this semantic context. Our results show that the participants fixated longer on those words that were semantically related to each other. Overall, we replicated the interference effect for related vs. unrelated pictures. However, participants seemed to profit more from a bigger cohort of distractor words, because naming was faster with 4 or 5 than 3 distractor words. This effect appeared strongly only at the first naming instance of every picture and dissipated across the experiment. Our findings therefore indicate that besides interference during first exposure, repeated exposure to the semantic context, and a bigger lexical cohort (5 vs 3 words) may facilitate picture naming.

LEXICAL-SEMANTIC REPRESENTATIONS AND PROCESSES IN GERMAN-TURKISH BILINGUAL PRIMARY SCHOOL CHILDREN

Eva Belke

(Sprachwissenschaftliche Institut, Ruhr-Universität Bochum, Germany)

Johanna Bebout

(Logopädische Praxis Heike Bagus, Plümers Kamp 10, 45276 Essen, Germany)

A large proportion of primary school children in Germany grow up with German as their second language. They typically begin to acquire German when they join Kindergarten. Starting primary school, their German proficiency is often less advanced than that of their monolingual peers. Nevertheless, German is the teaching language at school, posing a challenge to many multilingual children. Using the blocked-cyclic naming paradigm in naming, reading, and translation tasks, we investigated behaviorally the lexical-semantic representations of 17 Turkish-German children aged 9 to 11. 19 German children served as a control group. As expected, there were no context effects on reading aloud in either group. In picture naming, Turkish-German children showed similar context effects as their monolingual peers in German. The corresponding effect in Turkish picture naming was much larger, as were the effects on translating words. While translating from German into Turkish caused similar effects as picture naming in Turkish, translating from Turkish into German yielded strongly exacerbated context effects. These results suggest that in Turkish-German speakers, lexical-semantic representations in German are similarly strong as those of their monolingual peers. The corresponding Turkish representations are less stable, possibly because the children use them less frequently than the corresponding German representations. This may be the case because the language dominance of the children has changed from Turkish to German in the first years of primary school.

SEMANTIC CONTEXT EFFECTS ON LANGUAGE PRODUCTION: NEW PERSPECTIVES AND METHODS

Hsin-Pei Lin, Anna Katharina Kuhlen, Rasha Abdel Rahman
(Humboldt-Universität Berlin, Germany)

The influence of socially shared information on semantic context effects
In dialogues, interlocutors usually establish mutually shared knowledge to enable successful conversation. Yet how shared information influences lexical-semantic processing remains largely unknown. In the semantic blocking paradigm, participants name repeatedly pictures that are either semantically related to each other (homogeneous blocks) or not (heterogeneous blocks). Naming latencies in repetitions after the first presentation are longer in the homogeneous relative to the heterogeneous blocks, known as semantic interference. Similar patterns have been observed when the stimuli are from different semantic categories but are perceived as having a common theme. This study examines whether information shared between two task partners can create such a common theme. Before each naming session, participants watched a video of their task partner narrating a short story. In the subsequent naming session, blocks consisted of pictures either related or unrelated to the narrative. In our first experiment ($N=32$), the expected interference effects were found only when participants named pictures first in the heterogeneous block and then in the homogeneous block, but not in the reversed order. This pattern was replicated in a second experiment ($N=32$). We conclude that the observed interference effects are susceptible to the time elapsed between narrative and picture naming. A control experiment ($N=32$) demonstrates that semantic interference is not experienced (in neither block order) when the narratives are unrelated to the picture stimuli. Together our experiments indicate that semantic relations are flexibly shaped by information shared between two task partners.

JOINT PICTURE NAMING: IS LEXICAL ACCESS SIMULATED ON BEHALF OF THE TASK PARTNER?

Anna Katharina Kuhlen, Rasha Abdel Rahman
(Humboldt Universität Berlin, Germany)

Speaking is a fundamentally social activity. Yet, surprisingly little is known about the neurocognitive processes underlying speech production in social interaction. Here we investigate in a joint action setting a well-established effect in speech production research, cumulative semantic interference, which arises when naming a series of semantically related pictures. In our experiments, two task partners take turns naming pictures of everyday objects. In three behavioral experiments we were able to show that naming latencies increase not only in response to the number of semantically related pictures speakers name themselves, but also in response to pictures named by their partner. This suggests that speakers represent their partner's actions and pursue lexical access on their behalf. In two electrophysiological experiments we aimed to identify neural correlates of such simulated lexical access. As expected, in both experiments participants showed an increase in naming latency with each additional semantically related picture they named. Correspondingly, participants showed an increase in posterior positivity between 250-400ms, a time window typically associated with lexical access. However, unlike our previous experiments, our speakers did not appear to be influenced by their task partner's picture naming. Accordingly, we found no electrophysiological evidence of lexical access on behalf of the partner. We conclude that speakers do not always represent their partner's naming response and discuss possible factors that may have limited the participants' evaluation of the task as a joint action.

SEMANTIC PICTURE-WORD INTERFERENCE IN LANGUAGE MAPPING WITH TRANSCRANIAL MAGNETIC STIMULATION

Katrin Sakreida, Magdalena Jonen, Marie Grünert
(Uniklinik RWTH Aachen, Department of Neurosurgery, Germany)

Stefan Heim
(Uniklinik RWTH Aachen, Department of Psychiatry | Research Centre Jülich, INM-1, Germany)

Georg Neuloh
(Uniklinik RWTH Aachen, Department of Neurosurgery, Germany)

Language mapping by use of neuro-navigated transcranial magnetic stimulation (TMS) is applied in clinical research to identify language-related cortical regions. Recently, we proposed a high spatial resolution approach for more detailed mapping of cortical sub-areas such as Broca's region. Moreover, we introduced the reaction time based picture-word interference paradigm into TMS language mapping to increase the objectivity of the method and to explore functional specificity with high temporal resolution. In a first study on 12 healthy participants, we employed a multimodal phonological picture-word interference paradigm. The inhibitory effects of TMS on language processing indeed reduced the behavioral phonological priming effect, which is characterized by accelerated naming responses to target pictures accompanied by phonologically related distractor words, specifically at stimulation sites overlapping with the probabilistic cytoarchitectonic area 44. Here, we adapt the picture-word interference paradigm to explore semantic specificity in Broca's region. In a pilot study without TMS, we compared multimodal and unimodal presentation of auditory and visual distractor words, respectively, for efficiency of naming response acceleration. As a result, an unimodal semantic picture-word interference paradigm was chosen for the TMS study presented here. First results indicate a more anterior distribution of the semantic processing. Our results complement previous functional imaging data suggesting separate regions for semantic, syntactic, and phonological processing in an anterior-to-posterior direction along the inferior frontal gyrus, supporting a structure-function relationship in Broca's region.

SEMANTIC GENERALIZATION OF RESPONSE-EFFECT COMPATIBILITY?

Andrea M. Philipp, Noemi Földes, Iring Koch
(RWTH Aachen University, Germany)

In the response-effect compatibility (REC) paradigm, participants respond faster when the irrelevant effect presented after the response is compatible with the response than when it is incompatible. Compatibility hereby can refer to stimulus identity (e.g., seeing the number two after having responded by saying "two" is compatible, whereas seeing the number two after having responded by saying "eight" is incompatible) but also to a categorical decision like the spatial location (e.g., a right-sided effect following a right-hand response is compatible, whereas a right-sided effect following a left-hand response is incompatible). In our experiments, we were interested to see whether compatibility in the REC paradigm is also effective when it refers to semantic similarity. We describe data from five experiments in which semantic similarity was implemented either by using translation-equivalent words from two languages (e.g., dog - Hund) or by using a category-exemplar relation (e.g., dog - animal). Across all experiments, we observed a REC effect mainly in those conditions in which the identical stimulus was used as response and effect (i.e., monolingual, same word condition; e.g. hearing the word dog after having responded with saying "dog"). REC effects based on semantic similarity were weak and inconsistent across experiments. These data suggest that endogenous response priming due to the anticipation of an effect in the REC paradigm mainly relies on an anticipation of perceptual (in our case phonological) rather than semantic response features.

KEYNOTE SPEAKER DAY 3 JOHN DUNCAN, MRC COGNITION AND BRAIN UNIT, UNIVERSITY OF CAMBRIDGE 'FLUID INTELLIGENCE AND COGNITIVE CONTROL'



KEYNOTE FILM

<https://easychair.org/smart-program/TEAP2019/KEYNOTES.html>

We are now coming to our third keynote speaker of the TEAP 2019, Professor John Duncan. He told me that it is not the first time that he is a keynote speaker on the TEAP. Many years ago, he gave a keynote on the TEAP when the conference language was still German. The result was that he could not understand what the other scientists on the conference were saying. Well, this year he hopefully will have a different and better experience. When looked at his CV, I also saw another trace of continental inclinations as the long publication list does not begin with the most recent paper as in most other UK CVs, but with his first one in the Quarterly Journal of Experimental Psychology.

John is Professor at the Medical Research Council Cognition (in short MRC) and Brain Sciences Unit in Cambridge and since 2012 also at Oxford University. Oxford is also where his career began: John studied at Exeter College at the University of Oxford as an undergraduate, and then at the Department of Experimental Psychology as a postgraduate. His PhD had the title 'Association and decision: Stimulus-response compatibility in choice reaction time tasks'. John did his post-doc at the University of Oregon in the States before he joined the MRC predecessor unit for Applied Psychology Unit in Cambridge in 1995.

John currently works on five research grants on neural networks in the primate and human brain funded by the MRC, the BBSRC, the Wellcome Trust, and the Australian Research Council. John Duncan is the president of the Experimental Psychological Society, short form EPS, in the United Kingdom from next year onwards. John was invited by many other universities and conferences as a keynote speaker, for instance, Pennsylvania State University, the MIT, Princeton University, and Tübingen University. We now welcome John to give the keynote lecture on the TEAP 2019 at the London Metropolitan University!

ABSTRACTS DAY 3

CURRENT TRENDS IN IMPLICIT LEARNING RESEARCH (SYMPOSIUM)

Simone Malejka
(University College London, UK)

Many researchers claim that people can detect regularities in their environment and adapt behavior accordingly in the absence of awareness. However, the demonstration of such implicit (unconscious) learning hinges on participants' unawareness of the process and products of learning or on the necessity of two cognitive processes (an automatic and a deliberative one) to explain behavior. This symposium will bring together researchers employing different paradigms and methods of investigating the possibility of unconscious learning. The first two talks will present new insights in evaluative conditioning: Mandy Hütter will show that its sensitivity to contingencies depends on the ratio of positive to negative stimulus pairings, while Christoph Stahl will provide evidence for a single-process perspective on evaluative conditioning that does not require an automatic process. In the domain of category learning, Andy Wills will present recent work on the COVIS dual-process model, showing that participants' apparent use of implicit categorization strategies may be due to inaccurate strategy classification. Because evidence for implicit learning often requires proving the null hypothesis of zero awareness, Zoltan Dienes will show how to use Bayes factors to obtain evidence for (or against) one's theory relative to the null. The final two talks will address the often low correlations observed between awareness and behavioral measures. Miguel Vadillo will show that low correlations in contextual cuing are biased by the reliabilities of both measures. Lastly, Simone Malejka will show that the same holds true for memory suppression and present three Bayesian models to correct for unreliability.

REVISITING THE CONTINGENCY SENSITIVITY OF EVALUATIVE CONDITIONING: AN ECOLOGICAL CONCEPTUALIZATION

Mandy Hütter, Max Ihmels
(Eberhard Karls Universität Tübingen, Germany)

We reassessed the sensitivity of evaluative conditioning (EC) to contingencies under an ecological framework. In an EC procedure, a conditioned stimulus (CS) is paired with a positive or negative unconditioned stimulus (US) and as a result acquires US valence. Our ecological definition of contingency is dependent on two aspects: The conditional probability of a US being positive given a specific CS occurs and the probability of a US being positive given any other CS occurs. We assume that the more a stimulus is predictive of positive (negative) valence, the more positive (negative) should the evaluative shift be. This implies relativity and context sensitivity of EC. That is, for a CS to demonstrate a positive evaluative shift, it needs to be paired with positive USs with a higher probability than other CSs in the environment. We manipulate ecological contingencies by introducing CSs paired with different ratios of positive and negative USs and by manipulating the overall positivity (negativity) of the context. In three experiments (total $N = 252$), we found support for the impact of the ecological contingencies on evaluative shifts. Further analyses showed that the effects are mainly driven by the ratio of positive to negative pairings of a stimulus rather than the overall positivity (negativity) of the stimulus context. This holds true for objective as well as subjectively perceived values of CS-US contingencies, conditional probabilities and valence base rates. The implications for theoretical models of EC are discussed.

A SINGLE-PROCESS ACCOUNT OF EXTINCTION AND AWARENESS IN EVALUATIVE CONDITIONING

Christoph Stahl (University of Cologne, Germany)

Evaluative conditioning (EC) has been discussed as a learning process qualitatively distinct from classical conditioning, mainly because it was found to dissociate from expectations in extinction protocols, and because it has been reported to occur in the absence of awareness. It features prominently in dual-process models of attitude learning which propose that EC reflects an automatic learning process independent of awareness, resources, and goals. Contrasting this view, I present several lines of evidence that are consistent with a single-process perspective on EC. Regarding awareness, EC in the absence of awareness could be found under either subliminal (i.e., weak stimuli that are attended, e.g., with brief and masked presentation) or preconscious conditions (i.e., strong stimuli that are unattended, e.g. under incidental learning conditions). Contrasting dual-process predictions, several studies show that EC requires awareness of stimulus presentations, as well as memory for critical US properties, for EC to obtain. Regarding extinction, the dissociation arises at the retrieval or performance (rather than the learning) stage: It is due to differences between the evaluation and expectation measures and does not require dual learning processes or representations. A single-process memory-based-judgment framework of EC is briefly discussed.

DUE PROCESS IN DUAL PROCESS: OR, HOW HUNDREDS OF CATEGORY LEARNING STUDIES MIGHT BE WRONG

Andy Wills (Plymouth University, UK)
Charlotte Edmunds (Warwick Business School, UK)
Fraser Milton (University of Exeter, UK)

Behavioral evidence for the COVIS dual-process model of category learning has been widely reported in over a hundred publications (Ashby & Valentin, 2016). It is generally accepted that the validity of such evidence depends on the accurate identification of individual participants' categorization strategies, a task that usually falls to Decision Bound analysis (Maddox & Ashby, 1993). Here, we examine the accuracy of this analysis in a series of model-recovery simulations. Implications for due process in the future evaluation of dual-process theories, including recommendations for future practice, are discussed.

HOW DO I KNOW WHAT MY THEORY PREDICTS?

Zoltan Dienes (University of Sussex, UK)

To get evidence for or against one's theory relative to the null hypothesis, one needs to know what it predicts. The amount of evidence can then be quantified by a Bayes factor. It is only when one has reasons for specifying a scale of effect that the level of evidence can be specified for no effect. In almost all papers I read people declare absence of an effect while having no rational grounds for doing so. So we need to specify what scale of effect our theory predicts. Specifying what one's theory predicts may not come naturally, but I show some ways of thinking about the problem, some simple heuristics that are often useful, including the room-to-move heuristic and the ratio-of-scales heuristic.

ON THE POOR CORRELATION BETWEEN AWARENESS AND PERFORMANCE IN IMPLICIT LEARNING RESEARCH

Miguel Vadillo (UAM, Spain)
Simone Malejka (University College London, UK)
Zoltan Dienes (University of Sussex, UK)
David Shanks (University College London, UK)

Several analytical approaches to assessing the unconscious character of learning rely on analyzing the relationship between awareness and performance. For instance, if participants' performance in a learning task does not correlate with their awareness of the stimuli, it is typically assumed that learning must have been unconscious. What these analyses often overlook is that the statistical relationship between measures of learning and awareness is biased by their respective reliabilities. In the present paper, we present evidence that the measures used in a popular implicit learning paradigm, contextual cuing, are remarkably unreliable and that once reliability is taken into account, the correlation between performance and awareness is relatively large. These results suggest that correlational analyses should be restricted to highly reliable measures of learning and awareness.

A BAYESIAN PERSPECTIVE ON CORRELATION ANALYSIS TO INVESTIGATE UNCONSCIOUS MENTAL PROCESSES

Simone Malejka
(University College London, UK)

Miguel A. Vadillo
(UAM, Spain)

Zoltan Dienes
(University of Sussex, UK)

David R. Shanks
(University College London, UK)

As a method to investigate the scope of unconscious mental processes, researchers frequently obtain concurrent measures of task performance and stimulus awareness across participants. Even though both measures might be significantly greater than zero, the correlation between them might not, encouraging the inference that an unconscious process drives task performance. We highlight the pitfalls of this null-correlation approach with reference to a recent study by Salvador, Berkovitch, Vinckier, Cohen, Naccache, Dehaene, and Gaillard (2018), which reported a non-significant correlation between the extent to which memory was suppressed by a Think/No-Think cue and an index of cue awareness. In the Null Hypothesis Significance Testing (NHST) framework, it is inappropriate to interpret failure to reject the null hypothesis (i.e., correlation = 0) as evidence for the null. Instead, a Bayesian approach is needed to compare the extent to which the data provide evidence for the null versus the alternative (i.e., correlation > 0) hypothesis, while considering the often low reliabilities of the performance and awareness measures. When applied to the Salvador et al. data, such an approach indicates virtually no support for the claimed unconscious nature of participants' memory suppression performance. Researchers are urged to employ Bayesian methods to analyze correlational data involving measures of performance and awareness rather than NHST methods—ideally while accounting for the unreliability of these measures.

VISUAL ATTENTION'S THREE GUIDES (SYMPOSIUM)

Florian Goller
(University of Vienna, Austria)

Christina Pfeuffer
(University of Freiburg, Germany)

As soon as we open our eyes to perceive the world around us, our attention is drawn to certain stimuli in our environment. Originally, it was assumed that either bottom-up (i.e., saliency) or top-down guides (i.e., search goals) steer our attention. Bottom-up guides make it easy to spot the green apple among the oranges, whereas top-down guides help us to find the red apple among pomegranates. However, recent ideas suggest that attentional selection is likely not as black and white as initially assumed. A person's prior experience (i.e., learning history) appears to also direct attention and distinctions between bottom-up, top-down, and experience-based processes have proven surprisingly difficult in some cases. Likely, often more than one guide steers visual attention. In this symposium, examples from a wide range of topics and methods demonstrate how these three guides affect visual attention and how difficult their differentiation may be. First, two talks, on contingent capture and crowding, assess the influence of bottom-up and top-down processes on visual attention, as well as their remarkable interactions. Then, a talk on how decision-making reflects in pupil dilation and microsaccade rates provides further evidence for an influence of top-down processes. Subsequently, two talks investigating the influences of native language and anticipated action consequences on attention indicate possible effects of selection history, while also illustrating the blurred borders between top-down and experience-based processes. The final talk aims to integrate the influence of several guides for visual attention into a model for oculomotor control levels in free-choice saccades.

NOT ALL ONSETS ARE CREATED EQUAL: ERP EVIDENCE FOR A TOP-DOWN CONTROL OVER ATTENTION CAPTURE BY ONSET CUES

Florian Goller, Tobias Schöberl, Ulrich Ansorge
(University of Vienna, Austria)

For a long time, researchers assumed that visual abrupt-onset singletons (i.e., stimuli that suddenly appear) in the periphery of the visual field capture attention in a bottom-up way. The underlying assumption is intuitive: Suddenly appearing peripheral stimuli (that might even pose a threat or an obstacle) have not been foveated so far, such that it makes sense to register these stimuli for a potential upcoming eye movement. Although past research casted doubt on this assumption and suggested top-down control over this kind of capture, clear-cut evidence from a continuous measure of attention capture is lacking. Therefore, we conducted an N2pc (a continuous electrophysiological marker of attention capture). Our participants searched for a white peripheral target and reported its shape. The target was either a white abrupt-onset target, presented in isolation, or a white color target, presented simultaneously with three red distractors. Each target display was preceded by a single peripheral abrupt-onset cue either in red or white. We found that the cue-elicited N2pc was restricted to color matching white abrupt-onset cues, whereas color non-matching red abrupt-onset cues were suppressed. In two additional experiments, we replicated these results and ruled out possible confounds like luminance differences. Taken together, our results demonstrate that participants exert top-down control even over attention capture by abrupt onsets.

CROWDING ACROSS DEPTH DEPENDS ON TARGET OR FLANKER DEPTH

Lisa Eberhardt, Anke Huckauf
(Ulm University, Germany)

Crowding refers to the impaired recognition of a peripheral target stimulus by adjacent flankers. Studies showing that target recognition is facilitated when the target owns distinct features suggest that crowding comes from uncertainty in spatial selection. Indeed, crowding especially depends on the spatial arrangement of target and flanking stimuli. In two Experiments, we investigated crowding across depth, aiming at the question whether depth as a spatial feature of target or flankers can facilitate target recognition and reduce crowding. Real depth was presented by superimposing the displays of two orthogonal arranged screens via a half-transparent mirror. Adjustment of screen distances created a fixation depth and a defocused depth. Participants' task was to identify the gap position of a target Landolt ring (eccentricity 2°) surrounded by two flankers (spacing 1°). In Experiment 1 (n=20) flankers were presented defocused, in front or behind the fixation depth, while the target was presented on the fixation depth. In Experiment 2 (n=24) targets were presented defocused, while flankers were presented on the fixation depth. Our results indicate a systematic difference in crowding effects between varying target and varying flanker depth, which might be interpreted as an attentional effect based on task relevance of stimuli. When defocusing the task irrelevant flankers, crowding increased with increasing flanker distance from the fixated depth. When defocusing the task relevant target, crowding effects were increased when the target was in front of fixation depth compared to on and behind the fixation depth.

PUPIL DILATION AND MICROSACCADE RATE RELATE INVERSELY IN DECISION-MAKING

Christoph Strauch, Anke Huckauf
(Ulm University, Germany)

Pupil dilation and microsaccades, small and very fast eye-movements occurring under fixation, have become two popular variables that allow investigating ongoing cognitive processing. Increasing activation is linked to an increase in pupil diameter, while microsaccade rate is commonly suppressed. Investigating top-down processes, both pupil diameter and microsaccade rate have been linked to changes in cognitive load, visual search, or emotional activation. Moreover, main neural correlates of pupil dilation (Locus Coeruleus) and microsaccade generation (Superior Colliculus) are reportedly linked and covary in their activation. Surprisingly however, they have scarcely been combined, although literature points towards a potential redundancy in research. Consequently, the question arises whether pupil dilation and microsaccade rate produce redundant results in a number of investigations. To test this notion, two experiments investigating binary decision-making were conducted, during which targets and distractors were presented in a balanced frequency. While pupil dilated more when fixating a target compared to a distractor, microsaccade rate was lower for target compared to distractor in both experiments. These results support the idea of an overlap between pupil and microsaccade results in eye tracking research. Future investigations may profit from this fact by choosing the respective preferable variable.

THE EYES HAVE IT: EVENT CONCEPTUALIZATION IN GERMAN AND KOREAN SPEAKERS

Alexandra Kroiss, Florian Goller
(University of Vienna, Austria)

Jeong-Ah Shin
(Dongguk University, South Korea)

Ulrich Ansorge, Soonja Choi
(University of Vienna, Austria)

This study investigates the grammatical influence of language on memory and gaze behavior of spatial events in German and Korean native speakers. German and Korean, the two languages contrasted in this study, differ strikingly in how spatial events are described and processed. In German, the path of a spatial event is expressed in prepositions or particles, whereas in Korean it is expressed in the verb root. We tested German and Korean native speakers in a linguistic description task as well as in an eye tracking memory task. Our results show that both verbal (linguistic expressions) and nonverbal (memory performance, eye movements) behaviors are determined at least in part by language-specific grammar. While German speakers focus on the motion of an event, Korean speakers' attention is drawn by the result of a spatial event.

PROACTIVE EFFECT MONITORING FOR FORCED-CHOICE AND FREE-CHOICE ACTIONS

Christina Pfeuffer (University of Freiburg, Germany)

When our actions yield predictable consequences in the environment, our eyes often already saccade towards the locations we expect these consequences to appear at. Such spontaneous anticipatory saccades occur based on bi-directional associations between action and effect formed by prior experience. That is, attention is guided by expectations derived from prior learning history. The resulting anticipatory saccades are thought to reflect a proactive effect monitoring process that prepares a later comparison of expected and actual effect. Here, we examined whether action mode (forced-choice vs. free-choice) affected such anticipatory saccades. Participants pressed a left/right key to predictably produce a visual effect on the left/right side. Action and visual effect were spatially compatible in one half of the experiment and spatially incompatible in the other half. Across and within experiments, we manipulated whether participants effect-generating actions were performed in a forced-choice or free-choice action mode. Both when participants performed forced-choice and free-choice actions, we observed anticipatory saccades towards the location of the future effect preceding the respective effect's presentation. Importantly, neither the frequency, nor latency or amplitude of these anticipatory saccades significantly differed between forced-choice and free choice conditions. We further ruled out an influence of target-effect associations. Overall, our findings suggest that forced-choice and free-choice action modes have comparable effects on attentional processes involved in the proactive monitoring of future action consequences.

ACTION CONTROL LEVELS IN THE OCULOMOTOR DOMAIN: THE CASE OF FREE-CHOICE SACCADDES.

Lynn Huestegge
(Wuerzburg University, Germany)

Aleks Pieczykolan
(RWTH Aachen University, Germany)

Oliver Herbort, Wilfried Kunde
(Wuerzburg University, Germany)

Nora Gosch
(TU Braunschweig, Germany)

Models of eye movement control distinguish between different control levels, ranging from automatic (bottom-up, stimulus-driven selection) and automatized (based on well-learned routines) to voluntary (top-down, goal-driven selection, e.g., based on instructions). However, one type of voluntary control has yet only been examined in the manual, not in the oculomotor domain, namely free-choice selection among targets that are equally attractive both from a bottom-up and top-down processing perspective. Here, we ask which features of targets (identity-related or location-related) are used to determine such oculomotor free-choice behavior. In two experiments, participants executed a saccade to one of four peripheral targets in three different choice conditions: free choice (unconstrained), constrained choice based on target identity (color), and constrained choice based on target location. The analysis of choice frequencies revealed that free-choice selection closely resembled constrained choice based on target location. The results suggest that free-choice oculomotor control is mainly guided by spatial (location-based) target characteristics. We explain these results by assuming that participants tend to avoid less parsimonious re-coding of target-identity representations into spatial codes, the latter being a necessary prerequisite to configure oculomotor commands. Based on these and other results, a model of oculomotor control levels will be developed.

MORALS (INDIVIDUAL TALKS)

LYING, WHAT IS SAID, PRESUPPOSITIONS, AND IMPLICATURES

Alex Wiegmann (Ruhr University Bochum, Germany)

No matter if it is in election battles, in personal relationships, or in fake news – lying affects us almost every day. Since lying is such an important moral category, it does not come as a surprise that there has been a lot of empirical research about lying, for example about how to detect lies, the time children start telling lies, and how often people lie in everyday life. Naturally, empirical researchers in the described areas all assume a particular concept of lying - and philosophers have argued a lot about the right definition of lying, especially which definition best captures people's use and understanding of this concept. However, there is surprisingly little empirical research about the concept of lying and what it actually means to lie. Virtually all popular philosophical and linguistic definitions of lying are bound to declarative sentences and based on "what is said". According to these narrow definitions, you cannot lie by asking a question or by implicating something false. We put these restrictions to the empirical test. In a series of 3 experiments, we presented a total of 500 participants with cases of deceiving questions (Experiment 1 & Experiment 2) and true assertions (Experiment 3) carrying deceiving implicatures. Here, we present our findings and provide first evidence that the lay concept of lying might be broader than commonly assumed in the philosophical and linguistic literature, i.e. participants' concept of lying seems to include instances of asking a question and false implicatures as lying.

OBEDIENCE VS. FREE WILL: ADAPTION OF A BUG-KILLING PARADIGM FOR THE STUDY OF OBEDIENCE TO AUTHORITY

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Obedience is a form of social influence in which a person yields to orders from an authority figure that are in conflict with her/his own values and norms (Milgram, 1974). The present research adapted a bug-killing paradigm (Martens et al., 2007) for the study of obedience. The study allegedly investigated how people feel when they destruct things (cover story). In one condition, the experimenter ordered participants to shredder living bugs in a manipulated coffee grinder. Most people condemn killing animals (including bugs), leading to an internal conflict with the order to kill. This obedience condition is compared with a control condition, in which participants killed bugs on their own free will (between subjects) and/or in which the experimenter ordered the destruction of non-living objects (e.g., coffee beans; within subjects comparison). In Experiment 1, 22 out of 23 (96%) participants killed the bugs in the obedience condition, while only 7 out of 22 (32%) followed the experimenter's instruction in the free-will condition. In Experiment 2, 22 out 30 (73%) participants killed the bugs in the obedience condition, while only 12 out of 31 (39%) followed the experimenter's instruction in the control condition. Please note that, participants in Experiment 1 (but not in Experiment 2) were additionally filmed by a video camera. In both Experiments, participants showed clear signs of distress in the obedience condition, suggesting that they experienced conflict with the order to kill the bugs.

MORAL REASONING WITH MULTIPLE EFFECTS

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Research on moral judgment often focuses on actions causing a single outcome. Many actions, however, have both an intended primary effect and unintended foreseen side effects. In two experiments we investigated how people morally evaluate such situations. In Experiment 1 we presented participants with cases in which an action causes a negative side effect (harming people, animals, or plants). While the side effect was held constant across conditions, we varied the number of entities that were helped as a primary effect. Moreover, we manipulated whether these entities were saved from a threat or whether the action merely led to a further improvement. We found that subjects aggregated the outcomes across multiple effects when asked about moral justification. With an identical negative side effect, the action was seen as more morally justified the more entities were helped. Also, saving has more impact on judgments of justification than mere improving. We additionally asked subjects to assess moral responsibility and found that agents were held less morally responsible for the same side effect when their action's primary effect was an instance of saving as opposed to improving. In Experiment 2 we replicated these findings and further showed that subjects regarded an action as less morally justified and held the agent more morally responsible for a negative effect when the negative outcome was intended by the agent rather than the positive one. When morally evaluating actions with multiple effects, people take both the causal structure as well as agents' mental states into account.

COOPERATION IN ASYMMETRIC DILEMMAS

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For millennia, humans cooperate successfully and there is little doubt that everything our species has achieved since is owed to our abilities to establish and maintain cooperation. In general, the evolutionary advantage of cooperation lies in the surplus it usually creates compared to human enterprises that are approached alone. At the same time, if people cooperate to create a surplus they will inevitably face the challenge to distribute what they created. If hunters cooperate to bring down big game, they must decide who takes which parts of the animal. If workers and employers form a firm, the revenue is divided into wages or profits. Not surprisingly, distributions are not always equal. The central question of this research is how equal vs. unequal distributions affect peoples' willingness to cooperate. In a series of incentivized experiments with the public goods dilemma (total $N > 1300$), we orthogonally varied the marginal per capita returns from the public good and the symmetry of the payoff structure. Both, lower returns and asymmetric (i.e. structurally unequal) payoffs decreased the level of cooperation. Furthermore, mediation analyses suggest that asymmetric payoff structures decrease trust and fairness evaluations which in turn lead to lower levels of cooperation. In sum, this research suggests that people generally cooperate because the cake will be bigger. But if they divide it unequally, it may never be baked in the first place.

DOUBLE MORAL STANDARDS IN CLOSE RELATIONSHIPS

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In a self-serving fashion, people often endorse more lenient moral standards for themselves than for others (i.e., moral hypocrisy). However, under some conditions, the reversed pattern in the form of moral hypercrisy may emerge as well. We argue that hypercrisy, that is, the other-serving endorsement of more lenient moral standards for others versus the self, is a prevalent phenomenon in close relationships. In two studies ($N = 567$), across two different cultures, participants judged various hypothetical transgressions within the relationship more leniently for their romantic partners (Study 1) and close friends (Study 2, preregistered) than for themselves. We further examined whether perceptions that one individual's needs can only be fulfilled at the other's expense (i.e., relationship-specific zero-sum beliefs) would moderate this effect. As predicted, the hypercrisy effect was significantly reduced for participants with high zero-sum beliefs. These results suggest that divergent moral standards for the self compared to others in the form of moral hypercrisy may be more prevalent than previously thought. Importantly, such other-serving morality may contribute to positive relationship dynamics. At the same time, the present findings underscore the detrimental consequences of zero-sum beliefs.

FEEDBACK (INDIVIDUAL TALKS)

COGNITIVE MECHANISMS UNDERLYING FORMATIVE FEEDBACK

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Formative assessment and feedback has become an increasingly used tool to enhance learning yet there is little evidence concerning the aspects of feedback information that students in higher education utilise when provided with various types of feedback. Another open issue regards whether different knowledge representations are acquired dependent on the feedback provided. Previous research indicated that the provision of feedback fosters the learning of abstract rules while no feedback enhances memorisation of item-specific information. Using an artificial language learning task we investigated the role of feedback timing on the learning process. The talk will describe a series of experiments demonstrating the importance of timely feedback delivery in various scenarios. Using receiver operating characteristics (ROC) the contribution of rule- and item-specific representations was assessed in these experiments. Results indicated that timely feedback led to a high proportion of rule-representations and a low proportion of item-based knowledge while for delayed feedback the opposite pattern was observed. These results suggest that timely feedback is a necessary prerequisite for successful learning of abstract knowledge that can be transferred to novel situations.

THE EFFECT OF PERFORMANCE FEEDBACK ON THE TESTING EFFECT

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Memory performance is enhanced after testing compared to restudying (i.e. testing effect). Providing feedback in the form of presenting the full material again after the retrieval attempt (test-potentiated encoding - TPE) further increases memory retrieval. So far, the repeated presentation of the material was combined in some studies with positive or negative feedback depending on the initial retrieval attempt, thus combining the effects of TPE and performance feedback. This study aimed to evaluate whether explicit positive or negative feedback further enhances memory performance beyond the beneficial effect of TPE without feedback. Healthy German native speakers (N=40, 24 females, 20-30 yrs.) learned 210 weakly associated German cue-target word pairs by either restudying or testing (two repetition cycles) after a first exposure to the full material. Depending on the accuracy of the retrieval attempt, the tested word pairs were followed by positive or negative feedback (50%) or no feedback (50%). All trials were followed by another presentation of the full word pair (TPE). As baseline condition, 35 word pairs were only presented once. One day later, a cued recall test was performed. Results replicated the testing effect, showing considerably better memory performance for tested compared to restudied items after 24 hours. Furthermore, higher memory performance was found for tested items when participants received feedback compared to items without feedback. This effect was independent of feedback valence. These findings suggest a beneficial effect of feedback on later memory performance when learning is improved by retrieval practice.

THE MEMORY CONFORMITY EFFECT IN SEMANTIC MEMORY. HOW DOES INFORMATION FROM OTHER PEOPLE INFLUENCE ANSWERING GENERAL KNOWLEDGE QUESTIONS?

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People often take into consideration others' opinions and suggestions when they are reminding themselves general knowledge facts. The main aim of our experiments was to investigate how cues provided by external sources influence participants' answers to general knowledge questions. It was also of interest whether people are able to discriminate between reliable and unreliable sources of information and, then, use them respectively. In Experiment 1, a list of difficult questions with answers was sequentially displayed. Participants' task ($N = 24$) was to decide whether the answer to a given question is true or false. Some questions were presented with cue allegedly coming from one of the two previous participants. It turned out that conforming to the reliable social source improved participants' test performance, whereas conforming to the unreliable source did not impair it. However, participants were equally inclined to incorporate cues from both sources, regardless of their accuracy. We hypothesised that better knowledge would help to effectively discriminate the sources. For this reason, in Experiment 2 ($N = 60$) the learning phase was added and participants studied the correct answers. In one group, participants read the questions with the answers, in the other group they generated an answer to each question or guessed it, what was followed by corrective feedback. Such experimental manipulation allowed to distinguish the effect of two different learning strategies on conformity behaviour and to check whether generation of answers in the learning phase would be beneficial for discriminating sources.

YOU'VE GOT THE POWER: FRONTAL-MIDLINE THETA NEUROFEEDBACK TRAINING AND ITS TRANSFER TO COGNITIVE CONTROL PROCESSES

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Frontal-midline (FM) theta activity (4-8 Hz) is proposed to reflect a mechanism for cognitive control, which is needed for working memory (WM) maintenance, manipulation, or interference resolution. Interestingly, modulation of FM theta activity via neurofeedback training demonstrated transfer to some but not all types of cognitive control. Therefore, the present study investigated whether FM theta neurofeedback training enhances performance and modulates underlying EEG characteristics in a mainly proactive control recruiting delayed match to sample (DMTS) task and a mainly reactive control engaging Stroop task. Moreover, we explored the duration of transfer over two posttests. Over the course of seven 30-minute neurofeedback training sessions, a FM theta training group ($n = 17$) exhibited a larger FM theta increase compared to an active control group ($n = 18$) who upregulated randomly chosen frequency bands. In a posttest performed 13 days after the last training session, the training group showed better WM performance measured in the DMTS task that was additionally predicted by FM theta increase during training as revealed by linear regression analyses. Contrarily, transfer to the Stroop task was not significant, suggesting that neurofeedback training might enhance primarily proactive and barely reactive control processes. In a posttest one day after training, group differences in both tasks were not significant. Surprisingly, training-induced improvements in WM performance were accompanied by attenuated FM theta activity, indicating less demands on cognitive control as a function of training. Together, the present findings show that neurofeedback training shows transfer to cognitive control that manifests late after training.

INCREASING REWARD PROSPECT PROMOTES COGNITIVE FLEXIBILITY: DIRECT EVIDENCE FROM VOLUNTARY TASK SWITCHING WITH DOUBLE REGISTRATION

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Recent research has suggested that sequential changes in the prospect of performance-contingent rewards may influence the balance between cognitive flexibility and stability: whereas constant high reward prospect seems to promote cognitive stability, increasing reward prospect has been shown to promote flexible behavior in voluntary task switching paradigms. Previous studies, however, confounded cognitive flexibility regarding voluntary task choices with control processes during task execution. We present two experiments ($n = 30$ each) to dissociate these two processes by means of a double registration procedure, in which task choice is registered prior to task execution. The data yielded clear evidence for reward-driven modulation of the flexibility-stability balance already at the level of task choices, with higher voluntary switch rates when reward prospect increased as compared to situations in which reward prospect remained high. These results thus confirm that the prospect of performance-contingent reward can indeed promote either cognitive stability or flexibility depending on the immediate reward history.

PARTNER REACTIONS AFFECT TASK SET SELECTION: THE ROLES OF SPECIFIC IMITATION AND ABSTRACT TASK SET COMPATIBILITY

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It is easier to select one of two competing task sets when anticipating a partner to perform the same task. Does this compatibility benefit depend on the partner performing the very same response as oneself or is it sufficient for him to select the same abstract task set but perform it on different stimuli and therefore produce different responses? Based on the theory of event coding, it was hypothesized that task sets are integrated into people's event representations and therefore even abstract task set compatibility can affect subjects' responses. In three experiments, 24 subjects either named pictures or read words, and following the subject's response a partner responded by performing the same or the opposite task, using either the same or different stimuli. In Experiment 1, the partner used the same picture-word combinations as the subject and thus compatible trials implied a complete response imitation. Compatibility benefits were observed. In Experiment 2, the partner used his own stimulus set, therefore producing responses that differed from those of the subject in both compatible and incompatible trials. No compatibility benefits were found. As this result leaves the possibility that the tasks were too difficult, Experiment 3 replicated Experiment 2 with a smaller number of stimuli. This time, compatibility effects were found. These results indicate that a partner's abstract task set can be represented and facilitate task set selection, but only when the tasks are not too demanding.

METHODOLOGY (INDIVIDUAL TALKS)

THE EXTENDED CROSSWISE MODEL: VALIDATING AN EXPERIMENTAL APPROACH TO CONTROLLING SOCIAL DESIRABILITY

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The Crosswise Model (CWM; Yu, Tian & Tang, 2008) is an indirect questioning technique designed to control for socially desirable responding in surveys on sensitive topics. The Crosswise Model is based on an experimental approach and provides demonstrably more valid prevalence estimates for sensitive attributes than conventional direct questions (Hoffmann, Diedenhofen, Verschuere, & Musch, 2015). It also elicits higher levels of trust and understanding among participants than other indirect questioning techniques (Hoffmann, Waubert de Puiseau, Schmidt, & Musch, 2017). The Extended Crosswise Model (ECWM; Heck, Hoffmann, & Moshagen, 2017) has recently been proposed as an advancement of the method. This model allows detecting several forms of response bias without loss in statistical efficiency. In a first practical application of the ECWM, we assessed the prevalence of islamophobia among a sample of German university students by asking 1508 students to answer a questionnaire in either a direct questioning or the ECWM format. As expected, the ECWM provided higher prevalence estimates for islamophobia than a direct question, indicating that the model successfully controlled for socially desirable responding. An assessment of model fit revealed that there was no specific response bias in favor of one of the two answering options, lending further support to the validity of the prevalence estimate obtained. Our results underline the importance of controlling for socially desirable responding, and make the ECWM appear as a promising approach for future surveys on sensitive topics.

USING COGNITION LAB TO BRIDGE BETWEEN ‘IN-LAB’ AND LAB-EXTERNAL STUDIES

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This paper aims to improve the understanding of the value of cloud-based experiment management systems for cognitive research and education. Using Cognition Lab as an example will explain the difference between web-based experiment and cloud-based experiment management software. While web-based experiments use the internet to recruit large populations of anonymous participants at low costs and sometimes study the internet itself, cloud-based systems are offering cloud-based experiment management systems as a service to be used in or outside of a lab. Cloud-based services help to bridge between ‘in-lab’ settings and lab-external studies without having to switch technology. Design time, run-time, and data processing functions are all accessible via one central web console. This facilitates the management and execution of single lab studies as much as it helps to orchestrate multi-device and multi-lab study designs. The same tests can run on dedicated test stations in a lab, or on the participant’s device at home. To illustrate the use of cloud-based technology with named participants, two case studies performed with Cognition Lab are presented where the ability to reach participants at home.

RETRODICTIVE VALIDITY AS RATIONAL CRITERION FOR CHOICE OF PSYCHOLOGICAL RESEARCH METHODS

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Experimental psychologists need to decide on measurement methods and analysis strategies. The best choice is often difficult to intuit, and common practice or community consensus prevail as criteria. In this theoretical contribution, we propose to compare measurement methods by their ability to recover the effect of well-known manipulations in independent benchmark experiments. We term this property "retrodictive validity" and demonstrate that it extends classical measurement criteria such as validity and reliability. This approach allows selecting the least noisy among different valid methods for measuring/analysing a psychological construct of interest. Beyond methods comparison, there are many further applications: power analysis, cost-benefit analysis for study protocols, quality assurance, and training. Analysis methods based on computational models may be particularly beneficial for ensuring high retrodictive validity, for example psychophysiological modeling, sequential sampling models, and latent variable models such as structural equation models and item-response models. However, the framework is not limited to such methods and can be applied across many branches of psychology, including operationist approaches and theory-free decisions such as setting outlier criteria.

USING ANTICLUSTERING TO CREATE EQUIVALENT STIMULUS SETS IN EXPERIMENTAL PSYCHOLOGY

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In within-subject designs, it is desirable that stimuli presented in the different experimental conditions are as similar as possible. In recognition memory, for example, word sets presented under different instructions should not differ substantially in overall familiarity; differences in responses should be attributable to the experimental manipulation and not to the material. However, the creation of equivalent stimulus sets presents researchers with a difficult problem, especially when experiments employ many stimuli. We present a method that facilitates and automates this process. It is based on the theory of cluster analysis and can be applied whenever researchers have access to quantitative data describing the properties of their stimuli (e.g., the length of word stimuli). Usually, clustering methods are used to create sets of elements that are as different as possible; we show that the objective of creating similar stimulus sets can be formulated as an "anticlustering" problem that reverses the objective of classical clustering methods. To be widely applicable by researchers in psychology, we implemented anticlustering as a free and easy-to-use software package ("anticlust") for the statistical programming language R. A case study on the Chicago face data base illustrates the usage of the package. Tests on simulated as well as real data show that the anticlustering method produces satisfying results, obtained in a completely automated manner.

EFFICIENTLY TESTING SENSITIVE ATTRIBUTES: A SEQUENTIAL RANDOMIZED RESPONSE TECHNIQUE

Martin Schnuerch (University of Mannheim, Germany)

Social desirability biases constitute a pervasive problem in surveys assessing sensitive attributes as they typically lead to underestimation of the true prevalence. To overcome these biases, the Randomized Response Technique (RRT) increases individuals' anonymity by adding random noise to each answer. It thus encourages respondents to answer truthfully and has been repeatedly shown to produce better prevalence estimates than direct-questioning formats. Due to the random noise, however, traditional RRT analysis is associated with low statistical power, resulting in large required sample sizes when aiming to detect small prevalence rates. As a remedy, we introduce a design that combines the RRT with Wald's Sequential Probability Ratio Test (SPRT). In contrast to traditional analysis, sequential statistical procedures continuously monitor the data during the sampling process and terminate when a predefined criterion is met. Sequential analysis may thus substantially reduce the required sample size without increasing long-term error rates. We show how to implement the SPRT for common RRT variants in standard statistical software. Moreover, we demonstrate analytically and by means of simulations that on average it requires approximately 50% smaller samples than traditional analyses. Finally, we illustrate the efficiency of the proposed sequential RRT with an empirical example.

MAPPING THE COGNITIVE PROCESSES UNDERLYING SELF-REPORTED RISK-TAKING PROPENSITY

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The assessment of people's risk-taking propensity is often carried out by means of self-report measures. To date it is unclear how people arrive at their ratings. We present a series of studies aimed at closing this gap. Based on the assumption that people retrieve information from their autobiographical memory to form their judgments, we use "aspect listing" as a process-tracing tool. We model the influence of the number of aspects listed in favor of taking risks, and against taking risks; the order of aspects; and the strength of evidence of these aspects. In a first study ($N = 50$), we explored basic properties of the aspect-retrieval process and how it relates to participants' self-reported risk-taking propensity. We found that the evidence strength of the first three aspects listed each had a high correlation with the risk-taking propensity rating ($.38 \leq r \leq .51$), whereas the aspects listed later each had a correlation around zero, suggesting that aspects retrieved early may likely be drivers of the ratings. Based on this information we conducted systematic simulation analyses to compare several cognitive models, which we test in a preregistered second study ($N = 250$). Finally, a preregistered third study ($N = 250$) consists of a retest after two months, in order to quantify the extent to which the stability of self-reported risk-taking propensity hinges on the stability of the retrieved aspects. Our results shed light onto the cognitive processes of self-reported risk-taking propensity and thus have implications for the interpretation of these measures.

CAN IMITATION, OBSERVATION, AND JOINT ACTION BE SOCIALLY MODULATED? A CROSS-PARADIGM & META-ANALYTICAL PERSPECTIVE (SYMPOSIUM)

Oliver Genschow (University of Cologne, Germany)

Carina Giesen (Friedrich Schiller University Jena, Germany)

In the last decades, social phenomena including automatic imitation, observational learning, and joint action and their underlying psychological processes became “hot” topics in scientific psychological research. Thus, researchers developed social variants of prominent cognitive paradigms, such as the joint Simon task, the observational stimulus-response binding paradigm, or the imitation-inhibition task—to name just a few examples. These paradigms not only allow for studying the cognitive underpinnings of social key topics. Also, they are particularly insightful, because their findings challenge the explanatory power of (so far) purely cognitive accounts. Evidence for the social nature of these paradigms comes from studies that test the influence of certain “social” moderators (group membership, interdependence, etc.). Strikingly, at the backdrop of the current crisis of confidence in psychological research, a critical examination on the robustness of these moderating effects is currently missing. In this symposium, we aim at filling this gap by critically assessing the degree to which social moderators actually influence social variants of prominent cognitive paradigms (joint Simon task; imitation-inhibition task; observational stimulus-response binding task). All contributors will explain the nature of each paradigm and review recent evidence. Specifically, all contributors commit to a meta-analytical approach and will unpack their “social file drawer” and present data on social factors that did or did not moderate the effect of interest. This paves the way for an in-depth discussion of possible underlying psychological processes that are common to all of the presented effects and come with high explanatory power across all of these paradigms.

TO WHICH DEGREE IS IMITATION FACILITATED BY A FOCUS ON OTHERS?

Oliver Genschow (University of Cologne, Germany)

It is known that individuals imitate a wide range of different behaviors. Different theories suggest that factors related to a focus on others, as compared to a focus on the self, facilitates imitative behavior. However, this claim has never been systematically investigated. In the present research, we fill this gap and test the basic assumption within three steps. First, we tested whether personality traits related to self-other focus influence imitative behavior. To this end, we ran a high-powered study and assessed imitative behavior with two different tasks. That is, we assessed mimicry by means of action observation (Chartrand & Bargh, 1999) and automatic imitation with the imitation-inhibition task (Brass et al., 2002)—a reaction time based task that measures imitation on a trial-by-trial basis. In addition, we measured participants' self-construal, individualism and collectivism, as well as need to belong as measures of self-other focus. The results indicate that none of the scales correlates with any of the assessed imitative behavior. Second, we ran two additional studies in which we experimentally manipulated self-other focus. These studies reveal partial support for the idea that a focus on others indeed facilitates imitation in the imitation-inhibition task. Third, we ran a meta-analysis on published as well as unpublished studies and tested the influence of self-other focus on imitative behavior. The overall effect supports the basic idea that a focus on others facilitates imitative behavior.

ON MOST OCCASIONS, WE INTERACT WITH OTHER INDIVIDUALS AND DO NOT ACT IN ISOLATION

Roman Liepelt, Markus Raab
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On most occasions, we interact with other individuals and do not act in isolation. However, cognitive research has only recently began to transfer individual experimental task setups to socialized versions of traditional cognitive paradigms. In this talk, we provide a series of experiments aimed at testing social and non-social moderators of the Joint Simon effect using a social variant of the standard two-choice Simon task ($n=32$). Two participants shared a visual Simon task, so that each person basically performed complementary parts of the task, which transfers the paradigm into a go/no-go Simon task for each person. Before running this Joint Simon task, we set both participants either in a cooperative or a competitive state by means of a dyadic game, a manipulation aimed at testing a possible transfer of cognitive processing states across two different tasks. We found significant Joint Simon effects for participants that were in a cooperative state and for participants that were in a competitive state. The Joint Simon effect for participants being in a cooperative state was significantly larger than for participants being in a competitive state. These findings suggest a transfer of cognitive states from one shared task to another shared task. We discuss the findings in terms of domain-specific and domain-general accounts of the Joint Simon effect.

OUR LIFE IS FULL OF SITUATIONS WHERE WE WORK TOGETHER FOR A SHARED GOAL

Pamela Baess (University of Hildesheim, Germany)

Our life is full of situations where we work together for a shared goal. Recent research has addressed this by splitting up established cognitive conflict paradigms (e.g. Simon task) between a pair of co-actors in such a way that each participant responds to only half of the trials. However, one other source of conflict arises from the differentiation between the responding agents, i.e. is it you or me?. Therefore, we established a variant of a Go/NoGo paradigm with a simple color differentiation task between a pair of co-actors using task-irrelevant faces (one for each co-actor, stranger's face) as background stimuli. In a forerunner study (Baess & Prinz, 2017), we have reported an own-face advantage for one's own face, which was modulated by the joint Go/NoGo task setting and familiarity of the co-actors. Here, we will present the results of 2 experiments combining both, task-irrelevant agent correspondence and spatial correspondence (Simon task). Background faces with the relevant color dot were shown on the left or right side of the screen. Two different sources for correspondence, i.e. agent-identity and spatial stimulus-response compatibility were assessed in a joint and individual Go/NoGo task setting. An agent-identity correspondence effect was yielded for the joint as well as the individual Go/NoGo task setting, albeit more pronounced in the joint Go/NoGo task setting. However, the spatial correspondence effect was only yielded in the joint Go/NoGo task setting. Results are discussed in regard to relevance of two sources of correspondence in joint action.

IT TAKES TWO TO TANGO: TESTING SOCIAL MODERATORS IN TWO VARIANTS OF THE OBSERVATIONAL STIMULUS-RESPONSE BINDING TASK

Carina Giesen (Friedrich Schiller University Jena, Germany)

Observing how someone responds to a stimulus results in incidental stimulus-response (SR) bindings. These observationally acquired SR bindings can be retrieved on a later occasion and thus will bias current response tendencies towards re-execution of the observed response. I will present and review evidence from two experimental approaches to investigate social moderators on retrieval of observationally acquired SR bindings. The first approach, a dyadic interaction paradigm in which two co-actors respond in alternating fashion, indicates that retrieval of observationally acquired SR bindings are modulated by social relevance. For instance, they were contingent on some form of chronic (romantic relationships) or situational (cooperation/competition) interdependence between co-actors. Further evidence supports that perceived similarity between co-actors is an underlying mechanism which mediates retrieval effects in the dyadic paradigm. The second approach is a video-based version in which responses are observed on screen. This approach appears to be immune to social moderators: Manipulation of visual perspective, similarity, partner salience, partner relevance, and group membership had no modulatory effect on retrieval of observationally acquired SR bindings in the video-based paradigm. Together, these findings suggest that only the dyadic paradigm produces genuine "social" effects that can be modulated with appropriate manipulations. Implications for the suitability of both paradigms to study observational learning and joint action phenomena are discussed.

A MINIMAL GROUP APPROACH

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Oliver Genschow
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Marcel Brass
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A prominent idea in the literature is that we are more inclined to imitate people that are more like us. However, while it is well-established that bottom-up similarity is an important modulator of automatic imitation, the contribution of top-down similarity is less clear. One potential reason for this is that research on top-down similarity has so far been restricted to situations in which we do not have to choose who we imitate. Therefore, in three experiments, we tested whether social group membership influences who we imitate in situations with one in-group and one out-group member. More specifically, we assigned participants to a “blue” or “green” group based on their political orientation and tested whether this modulated automatic imitation of simultaneously presented blue and green hands. Across the three experiments ($N = 39$; $N = 39$; $N = 66$), we found no evidence that group membership modulated automatic imitation, neither when the hands made different movements (Experiment 1), nor when they made identical movements (Experiment 2 and 3). This was true even though explicit (Experiment 1) and implicit (Experiment 2) measures both indicated that participants were positively biased towards their in-group. Overall, these results indicate that group membership does not determine who we imitate in situations with both in- and out-group members.

UNCOVERING COGNITIVE PROCESSES USING MOUSE-TRACKING: NOVEL EXTENSIONS AND APPLICATIONS (SYMPOSIUM)

Pascal J. Kieslich
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Mouse-tracking – the recording and analysis of mouse movements while participants decide between different options presented as buttons on a computer screen – is becoming a popular process tracing method in psychological research. Typically, mouse movements are used as an indicator of commitment to or conflict between choice options during the decision process. Based on this assumption, researchers have employed mouse-tracking to gain a closer understanding of real-time cognitive processing in many psychological domains. This symposium pursues three goals. First, we introduce mouse-tracking to interested experimental psychologists, outlining the theoretical assumptions behind the method and introducing technical implementations. One talk will present a new software package for conducting mouse-tracking experiments online (Henninger). A further talk presents an R package for performing advanced analyses and visualizations of mouse-tracking data (Kieslich). Second, the symposium presents novel applications of mouse-tracking. This includes one of the first applications of mouse-tracking within clinical populations that investigates social perception in Borderline Personality Disorder (Hepp) and exemplary applications in the other talks, including decisions under risk, social dilemmas and judgmental biases. Third, the symposium presents methodological extensions of mouse-tracking. This includes the combination of eye- and mouse-tracking to jointly model information acquisition and evaluation (Frame). A further talk presents different methods for identifying changes of mind and compares their validity in several experiments (Palfi). The symposium will end with a panel discussion of all speakers that will discuss methodological challenges and future directions for mouse-tracking research.

MOUSETRAP-WEB: MOUSE-TRACKING IN THE BROWSER

Felix Henninger (University of Koblenz-Landau, University of Mannheim, Germany)
Pascal J. Kieslich (University of Mannheim, Germany)

Mouse-tracking is a versatile method for monitoring the development of cognitive processes over time, particularly the temporal development of choices and the degree of conflict between response options. 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 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 online study builder. It provides a graphical interface for constructing experiments without requiring programming skills, and allows for the easy implementation of mouse-tracking studies. Mousetrap-web also integrates with the mousetrap R package for processing, analysis and visualization of the collected data. We also discuss the 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. Our software is available free of charge as open source from <https://github.com/felixhenninger/mousetrap-web>.

MOUSETRAP: OPEN-SOURCE TOOLS FOR ADVANCED ANALYSES OF MOUSE-TRACKING DATA

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Dirk U. Wulff (University of Basel, Switzerland)
Felix Henninger (University of Koblenz-Landau, Germany)
Jonas M. B. Haslbeck (University of Amsterdam, Netherlands)
Michael Schulte-Mecklenbeck (University of Bern, Switzerland)

The recording and analysis of mouse movements has become a popular method in psychological research to investigate the temporal development of preferences and the competition between response alternatives. In a typical mouse-tracking study, participants decide between different options that are presented as buttons on a screen. During this task, their cursor movements are continuously recorded. In this contribution, we present novel methods for analyzing mouse-tracking data as a means to test psychological theories. These include tools for the spatial clustering of trajectories, the mapping of trajectories onto prototypes, and assessing the temporal order with which different areas of interest were visited in a trial. In addition, we offer tools for visualizing movement trajectories via animations and heatmaps. These analyses and visualizations allow for answering different research questions, such as which option was initially preferred in a trial and determining if and how often participants changed their mind. In addition, they can be used to determine if movement trajectories are homogeneously distributed across trials or whether different types of movements are present in the data. This question is a core issue in many mouse-tracking studies that use trajectory shapes to determine whether dynamic models (assuming a continuous competition in all trials) or dual-process models (assuming a mix of trials with little and high conflict) better describe a decision process in a specific task. All methods are implemented in the mousetrap R package, which is freely available from <http://pascalkieslich.github.io/mousetrap/>.

AN APPLICATION OF MOUSE-TRACKING TO PSYCHOPATHOLOGY RESEARCH: IMPRESSION FORMATION IN BORDERLINE PERSONALITY DISORDER

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Pascal J. Kieslich

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Individuals with Borderline Personality Disorder (BPD) show negative first impressions of others based on self-report measures, which is thought to reflect cognitive schemas that others are threatening. We hypothesized that this tendency for negative evaluations of others should also be reflected in participants' computer mouse movements. We expected that negative evaluations of others should entail relatively straight trajectories, whereas trajectories for positive evaluations should be more curved or show changes of mind. The material included videos of 52 target individuals who briefly spoke about their personal preferences. We presented these videos to a group of BPD raters ($n=36$), a healthy control group ($n=36$), and a social anxiety control group ($n=30$). After viewing each video, raters were presented with eight adjectives (positive and negative, counterbalanced) and selected whether an adjective applied to the target person by clicking a 'yes' or 'no' button while their mouse movements were tracked. Contrary to our expectations, individuals with BPD did not show more conflict in their mouse movements specifically when making positive choices, but showed more conflict in all their decisions. This was reflected by greater maximum absolute deviations for all trials for the BPD versus the two control groups and by a greater overall percentage of change of mind trajectories when using a prototype approach to analyze the data. Results can be interpreted as corroborating studies that suggest BPD individuals consistently self-report lower confidence in decision tasks.

MODELING MULTIPLE PROCESS-TRACING METRICS IN RISKY DECISIONS INVOLVING ON-LINE AND OFF-LINE INFORMATION ACQUISITION

Mary Frame, Alan Boydstun, Joseph Hout
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Process-tracing metrics, which include eye and movement tracking, are valuable for characterizing cognitive processes that cannot be captured using outcome-focused metrics. Eye-tracking fixations indicate attention and information acquisition over time, and movement-tracking has been leveraged in decision-making research to model cognitive conflict, evidence accumulation, and preference reversals. However, there has been limited research collecting both of these metrics simultaneously (Koop & Johnson, 2013), and even less work modeling these multiple metrics on a common framework to examine their interactions and interdependencies over time (Blaha, et al., 2017). Our research provided evidence that simultaneous eye and movement tracking data provide insights into attention fluctuation and perceptual updating over the course of trials and the embodiment of this shifting attentional focus in hand and arm movements. We collected concurrent movement and eye tracking data during a risky decision-making task where participants received either congruent or contradictory choice recommendations on stock options. Outcome, risk, and recommended choice were either presented on-line during the trial, off-line prior to the trial, or both, between blocks. This allowed us to separate evidence accumulation and evaluation from the decision phase more explicitly. We modeled the differences in trajectories depending on whether information was evaluated in a perceptual encoding phase separated from movement versus evaluation during movement execution. Eye-tracking provided additional insights into perceptual updating of movements by revealing which information participants attended to during each trial, and the interdynamics of eye and movement-tracking provided greater insight into action updating based on continuous perceptual evaluation.

TRACKING CHANGES OF MIND THROUGH MOUSE MOVEMENTS

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The recording and analysis of computer mouse movements provide us with a window through which we can observe the dynamics of decision-making. In the current research project, we assess the potential of several analysis techniques of mouse-tracking data that aim to detect how often people change their mind in choice tasks. This includes a number of established mouse-tracking indices, such as the number of movement reversals along the horizontal axis. We also provide several newly developed methods for detecting changes of minds (CoMs), including one method based on dividing the screen into different areas of interest, one method that explores the movements along the horizontal axis in more detail and one method that assigns trajectories to different prototypes based on their similarity. To evaluate the methods, we conducted two mouse-tracking experiments that included manipulations to experimentally induce CoMs in one of two conditions. We examined how sensitive each of the CoM measures was to the experimental manipulations. In addition, we assessed the extent to which each method agrees with human raters who determined the number of CoMs by visually inspecting each movement trajectory. Results suggest the new methods outperform the established indices but that depending on the task under investigation and the criterion for evaluation (agreement with human raters vs. sensitivity to experimental manipulation) different methods are superior. We will discuss when each method can be employed to gain information about decision-making processes.

TESTING YOUR MEMORY: CURRENT RESEARCH ON THE FORWARD TESTING EFFECT AND THE BENEFITS OF UNSUCCESSFUL RETRIEVAL (SYMPOSIUM)

Bernhard Pastötter (University of Trier, Germany)

David R. Shanks (University College London, UK)

Testing can have a number of beneficial effects on long-term memory and learning. For instance, a direct benefit of testing, referred to as the backward testing effect in the literature, is the finding that retrieval practice of previously studied information can improve its long-term retention more than restudy does. However, there are also indirect benefits of testing, including the forward testing effect and the benefits of unsuccessful retrieval. The forward testing effect describes the finding that retrieval practice of previously studied information enhances learning and retention of subsequently studied other information. The benefits of unsuccessful retrieval refer to the finding that generating errors in impossible recall tests can enhance subsequent feedback learning and thus improve long-term memory. The speakers of the symposium will present their ongoing research on the forward testing effect and the benefits of unsuccessful retrieval, addressing both theoretical and practical aspects of these effects. So doing, the symposium will directly connect with the keynote "Testing your memory: The many consequences of retrieval on long-term learning and retention" presented by David Shanks. The symposium will end with a panel discussion on the effects of testing on memory and learning, moderated by keynote speaker David Shanks.

THE FORWARD TESTING EFFECT IS RELIABLE AND UNRELATED TO WORKING MEMORY CAPACITY

Bernhard Pastötter, Christian Frings
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The forward testing effect refers to the finding that retrieval practice of previously studied information enhances learning and retention of subsequently studied other information. The present research questions were whether the forward testing effect (a) is related to student learners' working memory capacity and (b) is reliable in a test-retest design. Two experiments were conducted (Experiment 1: $n=240$, Experiment 2: $n=64$). Participants studied three lists of items in anticipation of a final cumulative recall test. In the testing condition, participants were tested immediately on lists 1 and 2 after initial study, whereas in the restudy condition, they restudied lists 1 and 2. In both conditions, participants were tested immediately on list 3. The results of both experiments showed a forward testing effect, with interim testing of lists 1 and 2 enhancing list 3 recall. Additionally, Experiment 1 showed that the forward effect is unrelated to working memory capacity, whereas Experiment 2 showed that the effect is correlated between two experimental sessions using different item materials. Together, these findings suggest that the forward testing effect is both reliable and robust.

RESET OF ENCODING CONTRIBUTES TO THE FORWARD EFFECT OF TESTING

Oliver Kliegl, Karl-Heinz T. Bäuml
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The forward effect of testing refers to the finding that recall testing of previously learned material can promote learning of new material. The present study reports the results of two experiments ($n = 120$ in both experiments), which examined whether the size of the forward effect varies with the new material's serial learning position. In each experiment, participants studied three lists of unrelated items. They were tested immediately on lists 1 and 2 (testing condition), or restudied the same lists of items (restudy condition). In both conditions, participants were tested immediately on list 3. Results of both experiments show enhanced list-3 recall in the testing condition, relative to the restudy condition, thus replicating the basic forward effect of testing. More important, the forward effect was more pronounced for early than middle and late list-3 items, and serial position curves in the testing condition were largely identical across lists 1, 2, and 3. The findings are consistent with the view that testing induces a reset of encoding, making encoding of the newly studied list as effective as encoding of the initially studied lists.

METACOGNITIVE JUDGEMENTS CAN MODIFY FUTURE LEARNING: THE ROLE OF COVERT RETRIEVAL

Veit Kubik, Torsten Schubert, Alp Aslan
(Martin Luther University Halle-Wittenberg, Germany)

Judging how likely a learned item will be recalled in the future alters one's memory for this particular information. These Judgements of Learning (JOLs) seem to enhance memory and eventually induce covert retrieval attempts under specific conditions, in particular when JOLs are solicited in response to only a part of the learned information, compared to the full information. Here we investigated whether such metacognitive judgements modify future learning of new materials, compared to a restudy and a testing condition. Participants studied five lists of 20 German nouns in anticipation of a final cumulative recall test. After the presentation of the first four lists, participants either restudied the list, made JOLs based on complete items, made JOLs based on incomplete items (i.e., items' first 2–3 letters), or they were tested on incomplete items. After learning List 5, participants were instructed to freely recall only this last list. Results demonstrated that, compared to restudy, testing and making JOLs based on incomplete items potentiated recall performance of List 5 and attenuated the number of intrusions from Lists 1–4 to a similar magnitude. In contrast, compared to restudy, JOLs based on complete items did not reveal any effects on future recall of List 5 or the amount of prior list intrusions. The present study indicates that, similar to overt testing, metacognitive judgements can reduce proactive interference, and thereby enhance future learning, to the extent that they elicit covert retrieval attempts.

SPATIAL LEARNING IN CHILDREN: TESTING ENHANCES SUBSEQUENT LEARNING OF SPATIAL INFORMATION IN YOUNGER AND OLDER PRIMARY SCHOOL CHILDREN

Alp Aslan, Veit Kubik (Martin Luther University Halle-Wittenberg, Germany)

Research with adults has shown that testing previously studied information can enhance learning and retention of subsequently studied new information. Here, we examined whether this forward testing effect (FTE) occurs in children's spatial learning. Younger ($n = 28$; 7–8 years) and older ($n = 28$; 9–10 years) primary school children studied four successively presented 3×3 arrays, each composed of the same nine objects. The children were asked to memorize the locations of the objects which differed across the four arrays. Following presentation of each of the first three arrays, memory for the arrays' object locations was tested using a reconstruction task (testing condition), or the arrays were re-presented for additional study (restudy condition). Array 4 was presented and tested in both the testing and the restudy condition. Results revealed superior location memory for Array 4 in the testing condition, relative to the restudy condition. In addition, participants in the testing condition also made fewer confusion errors during reconstruction of Array 4; that is, they tended to misplace objects less to locations where they had been presented previously, indicating that testing reduced the build-up of proactive interference. Importantly, both effects were similar in size in the two age groups, suggesting developmental invariance of the FTE in the age range considered. The findings highlight the importance of testing for enhancing young children's learning and retention of spatial information.

THE ROLE OF ERROR MAGNITUDE IN ERRORFUL GENERATION EFFECTS

Tina Seabrooke, Tim Hollins, Andy Wills, Chris Mitchell
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Incorrectly guessing the English translations of foreign vocabulary produces better recognition of the correct translations than an equivalent period of study time. Three experiments examined whether this errorful generation effect is driven by the magnitude of the error. In each experiment, participants studied the English translations of Finnish words. On Generate trials, the participants first guessed the category (four-footed animal or item of clothing), before guessing the translation. Within-category errors were defined as trials in which participants guessed the correct category but wrong translation, while cross-category errors were trials in which participants guessed both the wrong category and translation. On Read trials, participants simply studied the intact word pairs for the trial duration. In Experiment 1 ($N = 72$), within-category errors produced better recognition of the correct translations than either cross-category errors or Read trials. Experiment 2 ($N = 88$) replicated this target recognition effect, but showed that it does not extend to associative recognition. In Experiment 3 ($N = 46$), self-reported recognition judgements were partially aligned with target recognition; participants correctly gave higher recognition judgements for within-category errors than cross-category errors. However, Read targets received the highest recognition judgements even though they were recognised most poorly. These results speak against error magnitude accounts of errorful generation effects, where larger (cross-category) errors would be expected to produce better target recognition than smaller (within-category) errors.

EMOTION 2 (INDIVIDUAL TALKS)

PSYCHOPHYSIOLOGICAL REACTIONS TO DISCOMFORT IN AUTOMATED DRIVING

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To exploit the potential of vehicle automation and ensure broad public acceptance, driving comfort is considered a key issue. The research aim of the KomfoPilot project at Chemnitz University of Technology was to identify psychophysiological reactions to uncomfortable automated driving situations, which could serve as a basis for detecting and subsequently reducing discomfort in real-time during driving. A total of 40 participants, aged between 25 and 84 years, experienced three highly automated trips in a driving simulator, including six potentially uncomfortable situations per trip. Perceived discomfort was reported continuously using a handset control. Heart Rate (HR) and Skin Conductance Level (SCL) were assessed by the smartband Microsoft Band 2; pupil diameter and eye blinks were measured using the SMI Eye Tracking Glasses 2. Results showed specific reactions during situations that provoked moderate to high discomfort. The eye blink rate decreased and pupil diameter increased in uncomfortable situations that were visually monitored. SCL did not show specific effects, which, however could partly be attributed to measurement deficiencies of the smartband. HR decreased consistently during uncomfortable situations, which could be related to the phenomenon "preparation for action". No psychophysiological reactions were observable for longer lasting and slowly evolving situations with lower reported discomfort. We conclude that situations provoking moderate to high discomfort elicit specific measurable psychophysiological reactions. The results serve as a basis for developing a real-time discomfort detection algorithm and will be validated in a subsequent driving simulator study as well as on-road.

SPATIAL AND EMOTIONAL ERP-EFFECTS IN MULTISENSORY EMOTIONAL FACE/SOUND-CUEING

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So far, emotional spatial cueing studies used either auditory (Zimmer et al., 2015; 2016) or facial cues (Liu et al., 2015) and indicated independent of modality that fearful/angry stimuli attract our spatial attention as mirrored in P3-activity. Further, non-emotional multisensory studies indicated enhanced spatial cueing effects with multisensory versus unisensory cues in fronto-parietal networks (Mastroberardino et al., 2015). Therefore, we asked if such multisensory effects could be transferred to emotional presence in facial-sound combinations. In an ERP-study, a left- or right sided facial-sound cue preceded a visual target (white triangle) on the same (valid) or opposite (invalid) side. The facial-sound cues consisted of either two matching stimuli (either both fearful or both neutral), or a mixed combination, e.g. a neutral face with fearful sound and vice versa. Twenty-five participants ignored the facial-sound cue and signaled the direction of the triangle (up/down) as fast and accurately as possible with a button press. Behavioral analysis showed that responses were faster for valid than invalid trials after matching fearful combinations but inverted in neutral combinations, whereas there was no validity difference in the one emotion combinations. ERP-data showed an early P3a-activity that increased for invalid targets, specifically after cues with two fearful parts or at least the fearful sound. In contrast, a later P3b-activity increased for valid targets as revealed by a main effect. Therefore, at early processing stages, the amount of emotional presence modulated the spatial P3a-effects whereas at later temporal stages, emotional influence on spatial processing rather decreased.

THE EFFECT OF INDUCED SADNESS AND MODERATE DEPRESSION ON ATTENTIONAL CONTROL

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Lauren Bellaera
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The experience of negative emotions often indicates that something is wrong and thus a focused approach is needed to solve the problem. However, a recent study by Gable and Harmon-Jones (2010) showed that sad images had a broadening effect on attention in a global-local letter task. They argued that sadness is associated with a failure to obtain goals, which broadens attention to aid the consideration of alternative options. Yet their findings are at odds with other studies showing that sadness either had no effect or even the opposite effect on attention. We will first report the results of a cross-cultural replication study that was aimed at replicating this broadening effect on attention. Results showed no effect on the global/local processing bias, neither by the sad pictures nor by the sad videos (Experiment 1 and 2). Results from a study using an Eastern-Asian sample further showed that this finding is not modulated by a culturally related processing bias (Experiment 3 and 4). We will then present a second study looking at how induced sadness (Experiment 5) or moderate depression (Experiment 6) influences the three functions of attention: alerting, orienting, and executive control. Results showed no effects on alerting or on orienting, but participants who were sad or moderately depressed showed less flanker interference (i.e., increased executive control) compared to participants who were neither sad nor depressed. Overall, these results suggest that sadness can affect attentional control, but more at the level of executive control than at the level of spatial processing.

WHEN IT HELPS AND HURTS TO WALK IN SOMEONE ELSE'S SHOES: EFFECTS OF VISUO-SPATIAL PERSPECTIVE-TAKING ON EMOTION RECOGNITION, PERCEPTION, AND EMOTIONAL CONTAGION

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Perspective-taking is an empathic process that helps humans to better understand the thoughts and feelings of their conspecifics. It is often argued that this greater understanding of other people's thoughts and feelings then contributes to more positive interpersonal relations. However, it is unclear why a better understanding should always result in beneficial social outcomes. Here, we investigated whether perspective-taking, manipulated in a visuo-spatial sense, affects how well participants understand both positive and negative emotional facial expressions of others, and which consequences this has for the perceiver. In three pre-registered experiments (total N = 642), we tested whether perspective-taking affects the recognition (as assessed with a behavioral measure; i.e., the emotional multi-morph task) and perceived intensity (assessed via self-report) of a variety of facial expressions (disgust, sadness, joy, and surprise), as well as their emotional contagiousness (also self-reported). Compared to egocentric control trials, we found that visuo-spatial perspective-taking increased the perceived intensity of both positive and negative emotional facial expressions (Experiment 2), and the emotional contagiousness only of negative, but not positive, expressions (Experiment 3). Contrary to our predictions, visuo-spatial perspective-taking did not improve emotion recognition speed, and recognition accuracy was only slightly better after perspective-taking (Experiment 1). These findings challenge the notion that perspective-taking is an unambiguously beneficial social cognition by showing that while it intensifies the perception of all emotional expressions, perspective-taking causes emotional contagion only for negative emotional states. The potential of perspective-taking to improve and harm interpersonal relations is discussed in light of these findings.

MALFUNCTIONING FEEDBACK LOOP DURING ULTRA-RAPID ITEM CATEGORIZATION IN INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

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Already in 1996, Thorpe showed that healthy individuals are able to categorize items even if the presentations were ultra-rapid (20ms). Furthermore, the enhanced perceptual hypothesis (Plaisted, 2000) assumes that this categorization processes may be impaired in individuals with autism spectrum disorder (ASD). This difficulty seems to be caused by abnormal categorization of atypical items, whereas semantic processing and the categorization process itself appear unimpaired. In accordance with the coarse-to-fine hypothesis, a typical member of a category can be recognized on a basic level, whereas an atypical item has to be processed on a subordinate level (Martinovic et al., 2008). Carmo et al. (2015) studied the process of categorization with very short presentation times (13 ms) and showed a different pattern of behavioral results for atypical items in longer presentations in individuals with ASD compared to healthy individuals, suggesting a malfunctioning feedback loop. To investigate this in more detail, in the current study we compared reaction times of two different categories (food/ animals) with short (33 ms) and long (83 ms) presentation rates. Participants were asked to discriminate whether each item belongs to a specific category. We found differences in RT and d' as a function of presentation times, item typicality, and item category. Notably, a specific RT advantage was observed for typical compared to atypical stimuli with long presentation times for individuals with ASDs ($N = 15$), but no such difference was evident in the matched controls ($N = 20$). Hence, these results support the notion of a malfunctioning feedback loop.

EXECUTIVE FUNCTIONING: CONTROL (INDIVIDUAL TALKS)

TEMPORAL DYNAMICS OF RESPONSE ACTIVATION IN THE STROOP AND REVERSE-STROOP PARADIGM

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In the classic Stroop paradigm participants are asked to identify the color in which a color-word is written. Interference effects can be observed when the task-irrelevant color-word is mapped to a different response than the task-relevant color (inconsistent trials). Facilitation occurs when color-word and color are mapped to the same response (consistent trials). In contrast, in the Reverse-Stroop paradigm participants are instructed to identify the color-word, while ignoring the color. In this case, typically only interference effects can be observed. Obtaining both Stroop and Reverse-Stroop effects usually requires substantial changes to the paradigms. Here we present an experimental design which allows investigating both effects and their respective time courses with minimal changes in the procedure. Further, it is possible to manipulate the stimulus-onset asynchrony (SOA) between the task-irrelevant stimulus (word or color prime) and the target stimulus (color or word target). In a series of experiments (small-N design, 8 participants, 80 trials per cell and subject) Event History Analysis shows that (1) both Stroop and Reverse-Stroop effects can be observed, (2) Stroop and Reverse-Stroop tasks show similarly shaped reaction time distributions, (3) the effects increase with prolonged SOAs, (4) color information is processed faster than word information, (5) Stroop effects are time-locked to the onset of the task-irrelevant word stimulus, whereas (6) Reverse-Stroop effects are time-locked to the onset of the task-relevant word stimulus. Overall, we conclude that there is a speed advantage for the processing of color information, while word information has a stronger interference effect than color information.

SHIFTING THE BALANCE: THE ROLE OF CONTEXT IN SHAPING METACONTROL POLICIES.

Roel van Dooren, Roberta Sellaro, Bernhard Hommel
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According to the Metacontrol State Model, human behavior can be described in terms of two counteracting systems: one promoting persistence, the other promoting flexibility. The ability to shift the balance between these two opposing systems is referred to as metacontrol. Within recent years, an abundance of literature has demonstrated that metacontrol states are relatively flexible and can change as a function of both long-term (e.g., genetic profile, cultural background) and short-term factors (e.g., mood, meditation). The aim of the current project was to extend previous observations by investigating whether such states, once established, can be bound to environmental cues. In order to test this prediction, we designed four experiments ($N > 55$ for each study), each comprising an induction- and a test phase. Within the induction phase, participants were led to believe that stimulus processing, as measured in terms of performance on conflict tasks (e.g., Simon task), was modulated by the presence of contextual information. Hereafter, participants were presented with a test phase, which was designed to test whether the mere presentation of previously shown cues allowed for a re-activation of the associated metacontrol state. Three out of four experiments provided converging evidence, showing that metacontrol states can be bound to contextual information. More specifically, the results indicated that the level of experienced conflict in the test phase was modulated by the associations formed within the induction phase. These results highlight the importance of contextual cues in shifting the persistence-flexibility balance towards one or the other cognitive control dimension.

RETRIEVAL ACCOUNTS OF SEQUENTIAL CONFLICT MODULATION

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Bernhard Hommel (Leiden University, Germany)
David Dignath (Albert-Ludwigs-University Freiburg, Germany)

A typical finding in response-interference tasks is the sequential congruency effect (SCE) characterized by a smaller congruency effect after previous incongruent trials compared to previous congruent trials. Traditionally, this effect has been accounted to top-down regulated cognitive control adjustments. However, this view has been challenged by theories of stimulus-induced retrieval of stimulus and response features. Here we tested an integrative account in which these theories play complementary rather than alternative roles: Abstract cognitive control states can be seen as a trial specific feature and thus are stored in trial specific event files. Therefore, control states can be retrieved in a subsequent trial when features overlap. Following this account, even repeating a response and conflict irrelevant context feature should retrieve the control state of the previous trial, leading to a larger SCE in context repeating trials as compared to context alternating trials. As predicted, in Experiment 1 ($N = 39$), a stronger SCE occurred when irrelevant context cues were repeated in subsequent trials of a prime-probe paradigm compared to alternating context cues. Importantly, the design eliminated stimulus - response repetitions and at the same time disentangled conflict and retrieval effects. The findings were conceptually replicated in Experiment 2 ($N = 48$) using a different stimulus set. The results provide strong evidence for a storage of control states in trial specific event files, together with stimulus, response, and context codes and thus promote an integration of top-down cognitive control and bottom-up episodic retrieval accounts of sequential conflict modulation.

DELIBERATION DECREASES THE LIKELIHOOD OF EXPRESSING DOMINANT RESPONSES

Torsten Martiny-Huenger (UiT The Arctic University of Norway, Norway)

I will outline a basic function of deliberation: that of decreasing the likelihood of expressing dominant responses. Furthermore, I will describe a minimalistic mechanism of how this function of deliberation could be implemented. To demonstrate the value of this function, I will reinterpret prior research in the area of decision-making and self-regulation that can be more parsimoniously explained by this function of deliberation. This reinterpretation includes attributing different decision-quality outcomes following deliberation to characteristics of the task instead of characteristics of deliberation. Finally, empirically, I will present three studies ($N = 173$) that use gambling choices with the specific task characteristic that dominant responses (operationalized by the size of framing effects) and decision quality (operationalized by expected value) are independent from each other. In line with the dominant-response reducing function of deliberation, inducing deliberation (as compared to spontaneity) reduced the likelihood of expressing dominant response while having no comparable effect on decision quality. The research will be discussed with respect to mechanisms of self-regulation and methodological issues regarding the attribution of observed behavioral effects following deliberation to characteristics of the deliberation process as compared to characteristics of the task context.

A LINEAR THRESHOLD MODEL FOR OPTIMAL STOPPING PROBLEMS

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Henrik Singmann (The University of Warwick, UK)

Samuel Gershman (Harvard University, United States)

Bettina von Helversen (University of Zurich, Switzerland)

In an optimal stopping problem, people encounter a sequence of options and are tasked with choosing the best one; once an option is rejected, it is no longer available. The optimal solution is to choose the first number that is above a position dependent threshold. Recent studies suggest that people's behavior in sequential search tasks is best described by a threshold strategy but their thresholds deviate from the optimal policy. We suggest that humans adapt their thresholds linearly, motivated by findings that humans tend to use linear functions to approximate more complex functions. We tested this hypothesis in an online shopping task and compared people's strategy between three models that define how thresholds are generated. We show that linear thresholds provide the best account of the data. To replicate our results and to test whether we can predict how participants adapt to different environments we conducted a second experiment, where we manipulated the distributions of ticket prices across three conditions (scarce: left skewed, normal, plentiful: right skewed). The linear threshold model captures participants' data accurately in all three conditions whereby the slope is adjusted to the environmental structure of the task. As predicted by the linear model, participants search longer in the plentiful than in the scarce environment. Overall, our work provides evidence that humans use linearity as a mental shortcut in optimal stopping tasks – understanding this heuristic enables predicting which environmental structures facilitate or impair human performance, providing a step towards a more complete theory of optimal stopping.

MONITORING OF PROXIMAL AND DISTAL EFFECTS AND ERRORS

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Our actions produce changes (i.e., effects) in the environment. The ability to detect these changes, to monitor these distal effects, is crucial not only in learning the relationship between actions and effects, but it is also a critical component of action control in the ideomotor framework. Thereby, effect monitoring is closely related to error monitoring, which also serves to monitor our own behavior and check for irregularities. In two experiments ($n=48$ each), we compared effect monitoring to error monitoring using a dual-task setup. Task 1 consisted of a three-choice button press, and action effects were displayed based on this response. Crucially, in some of the trials, a wrong effect was displayed after a correct response, and in some of the error trials, the correct rather than the erroneous effect was shown. Thereby, response-errors and effect-errors could be assessed separately. Task 2 was a simple discrimination task and served to measure the slowdown after response-errors and effect-errors. We found delayed responses after both, response-errors and effect-errors. Both these influences were additive, suggesting independent monitoring processes, one for proximal events, catching response errors, and one for distal events, checking for irregularities in the environment.

ATTENTION (INDIVIDUAL TALKS)

GAZE-CONTINGENT PARADIGM CHANGES BIAS IN SPATIAL ATTENTION IN HEALTHY OBSERVERS: AN INTERVENTION WITH POTENTIAL TO TREAT PATIENTS WITH SPATIAL NEGLECT

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Spatial neglect is a debilitating neurological disorder marked by reduced attention to contralesional stimuli. We developed a gaze-contingent intervention in which eye movements to one visual hemifield were reduced over the course of several hundreds of trials by removing the stimuli in this hemifield whenever participants made eye movements towards it. The stimuli in the other hemifield were unaffected by eye movements. The aim of this study was to determine whether this intervention had an effect on the deployment of attention of healthy participants as a first step towards application in patients. Changes in attentional allocation were measured in a change blindness task. Having found strong effects in a first experiment (N=24) in both eye movement and reaction time data, a further aim was to establish the longevity of the effects. We compared two groups (N=25 each): the first group received the intervention once, the second group repeatedly on three consecutive days. The change blindness task was administered before the intervention and at four points in time after the last intervention (directly afterwards, + 1 hour, + 1 day, and + 4 days). The results show long-lasting effects of the intervention, most pronounced in the second group. Here the intervention changed the bias in the visual exploration pattern significantly until the last follow-up. We conclude that the intervention shows promise for the successful application in neglect patients.

SPATIAL BIASES INDUCED BY MENTAL ARITHMETIC AND THE IMPACT OF TASK DIFFICULTY

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While plenty of research suggests that numbers are represented spatially, some recent studies extended this to mental arithmetic by showing that addition/subtraction problems shift attention to the right/left. Two experiments investigate a) how these attentional shifts during the calculation phase develop over time by manipulating the delay between the arithmetic problem presentation and the spatial attention measurement (Exp 1 & 2) and b) how arithmetic task difficulty modulates these effects by varying the carry/noncarry-property of the arithmetic problems (Exp 2). In both experiments, spatial attention was measured via a temporal order judgment task (TOJ) where participants needed to decide which of two lateralized stimuli was presented first. The baseline consisted solely of the TOJ task and in the arithmetic task participants were first presented with the two-digit arithmetic problem via headphones and performed the TOJ task after the delay (250, 750 & 1500 ms) before responding to the arithmetic task. Operation and delay were varied within subjects (Exp 1 & 2) and the carry/noncarry property was varied between subjects (Exp 2). We found attentional shifts to the left/right for subtraction/addition problems compared to the baseline suggesting that visuospatial attention mechanisms are recruited during mental (symbolic) calculation. While Exp 1 showed no significant interaction between operation and delay, Exp 2 hinted at a decrease of the attentional shifts over time, but mainly for noncarry problems. We assume that two-digit carry-problems involve additional processes that either mask or don't allow for an operation on the spatial magnitude representation that induces attentional shifts.

THE EFFECTS OF VALUE ON ATTENTION IN SEARCH TASKS: OPPOSING MECHANISMS OF SEARCH EFFICIENCY AND RESPONSE CAUTION

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One puzzling result in research on value-driven attentional capture is that in learning-transfer paradigms, effects of value-associated stimuli on attention are often seen in transfer, but not in learning. In many of these studies, search tasks have been used in the learning phase. Here, we set out to cast some light on why there have rarely been reports of value-related effects on attention in the learning phase, but – somewhat magically – respective distraction effects then appeared in the transfer phase. Our hypothesis was that, during learning, two processes producing opposite effects cancel each other out: a speeding-up effect due to faster search, and a slowing effect due to more careful responding for stimuli associated with (higher) value. In four experiments with $n = 24$ each ($N = 96$), using search tasks and tasks without search, we indeed found evidence for both of these mechanisms: A value-dependent acceleration of target search, and a value-dependent slowing of the response to the target, which, however, dissipates over time. Together, these results show that the absence of value-associated effects during acquisition of the stimulus-value associations in the learning phase of two-phase learning-transfer paradigms is due to two antagonist mechanisms: Firstly, an increase in efficiency and, consequently, search speed for value-associated targets that pop out the more strongly the higher their associated value, and, secondly, an increased caution in responding with increasing value associated to the target in order to avoid losses.

DEBUNKING THE MONKEY: SUSTAINED INATTENTIONAL BLINDNESS IN VIRTUAL REALITY

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Virtual reality (VR) might increase ecological validity as it allows to submerge into real-life experiences under controlled laboratory conditions. Visual attention research might particularly benefit from these methodological advances as previous studies have shown that cognitive demands differ significantly between 2D and 3D perceptual processes. This raises the questions if results gained by conventional 2D paradigms can be applied to real-world cognition. We studied sustained inattention blindness by means of the invisible gorilla paradigm. Participants were either confronted with a 2D or a 3D360° VR video of two teams passing basketballs. In the classical 2D study, only ~30% of the participants noticed a gorilla entering the scene as opposed to the realistic VR-condition, in which the detection rate was increased to ~70%. Our results might be explained by a difference in perceptual load in the 2D versus VR-condition. In the 2D-condition, participants have to calculate depth- information, which conversely can directly be inferred from the binocular disparity in the realistic VR-condition, leaving resources for further attentional processing. The concept of sustained inattention blindness thus might not be fully applicable to real-world conditions, challenging the standard assumption in psychological research that results from the laboratory generalize to real-world cognition.

PERCEPTION VERSUS ACTION: PROCESSING LEVEL OF DISTRACTOR INTERFERENCE IN MULTISENSORY SELECTION

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When repeatedly exposed to simultaneously-presented stimuli, associations between the stimuli are nearly always established, within as well as between sensory modalities. Such associations have been shown to guide our subsequent actions and might also play a role in multisensory selection. The aim of the present study was to investigate the processing level of crossmodal distractor interference that is induced by association learning in multisensory selection. We assessed whether perceptual associations or rather response associations in a multisensory interference task are crucial for subsequent interference in a crossmodal interference task. Experiment 1 proved existence of a crossmodal aftereffect of multisensory selection. Experiments 2 and 3 then revealed that this effect depended on the perceptual associations between features rather than on the association between a feature and its response. Establishing response compatibility between multisensory and crossmodal task only did not lead to an interference effect (Experiment 2). On the other hand, feature associations without response compatibility (this was obtained by changing response effectors) were able to elicit subsequent crossmodal interference (Experiment 3). This pattern of results suggests that associations in multisensory selection and crossmodal distractor interference predominantly work at the perceptual, rather than motor, level.

PERSISTENCE AND REPLACEMENT OF ATTENTIONAL SETS

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Processing of visual stimuli varies with attentional task demands (i.e., requirements of stimulus selection). This can be seen in effects of the attentional set of a context task on response performance in another (probe) task, presented occasionally. Presenting the probe task after (invalid) cues indicating the upcoming context task Wendt, Kähler, Luna-Rodriguez, & Jacobsen, (2017, *Front Psychol*) obtained evidence for cue-based adoption of task-specific attentional sets (i.e., narrower focusing of visual attention after cues indicating an Eriksen flanker task than a task that required a homogeneous/heterogeneous judgment concerning a letter string). By contrast, the probe task performance did not yield evidence for persistence associated with the attentional set of task executed on the preceding trial. Here, we report two novel experiments, extending our previous findings to a novel type of stimuli and pursuing the lack of the persistence effect in more depth. In Experiment 1, we replicated both the cuing effect and the lack of a persistence effect concerning the deployment of attention to the global and local levels of hierarchical (Navon) stimuli. To investigate whether persistence of the attentional set was prevented by preparation for the following task (i.e., by cue-based replacement of the attentional set) we presented, in Experiment 2, probe task trials without cues. In this experiment, the overall probe task performance was affected in accord with the attentional demands of the predecessor task (visual-spatial attention in Experiment 2a and local-global processing in Experiment 2b). Together, our results indicate flexible, cue-based replacement of otherwise persisting attentional sets.

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