CONTENT

WELCOME

It is our great pleasure to welcome you to the third SFB 940 Spring School. The first two Spring Schools centered on different approaches to volitional control and its dynamic regulation and neuromodulation. This year, based on the ongoing prolific research in the SFB projects and building on the outstanding contributions from invited speakers and PhD students alike to the past two Spring Schools, the focus will be on clinical as well as on philosophical and ethical implications of cognitive-affective neuroscience research. Further presentations will discuss findings of the most recent research in the field of volition and cognitive control.

Employing an interdisciplinary perspective is essential for a field as diverse and with as far-reaching consequences as neuroscience. Thus, experts with different research backgrounds and researchers from the SFB will convene to discuss their research and present their findings but also to challenge ideas and promote closer collaborations. Five invited speakers will give talks on (1) performance monitoring and adaptive control, (2) philosophical considerations of freedom and related empirical results, (3) lifespan development of adaptive neurocognitive representations, (4) risk mechanisms of psychiatric disorders and (5) neural representations of a cognitive map of state space. PhD students will present posters of their own research projects and will have the chance to engage in discussions of their work. This Spring School also features two Workshop Sessions (*Postdoc Abroad* and *Grant Application*), which focus on important facets of scientific careers and aim to provide information as well as to facilitate critical reflections and discussions.

Thus, this Spring School will once again bring together researchers from diverse fields in the study of volition to discuss their work in an interdisciplinary context. We would like to thank the invited speakers, who will share their ideas, knowledge, and expertise with the students of our PhD program. We also extend our thanks to the PhD students themselves for contributing presentations of their own research, and, last but not least, to the organizers of the workshops. We hope that the Spring School will excite interesting new ideas and explorations, and that this meeting will foster further achievements. We are looking forward to your feedback and wish all of you an inspiring and pleasant time!

Thomas Goschke
CRC Speaker/MGK Represent

Alexander Strobel
Chief MGK Coordinator

Clemens Kirschbaum
Deputy MGK Coordinator

LOCATIONS & MAP

Pre-conference Workshops

Tuesday 24 March 2015

Workshop 1 (Debating Club): TUD, BZW, Room A307

Workshop 2A (HLM I): TUD, ASB, Room 206abc

Wednesday 25 March 2015

Workshop 2B (HLM II) TUD, ASB, Room 206abc

Workshop 3 (Publication): TUD, BZW, Room A307

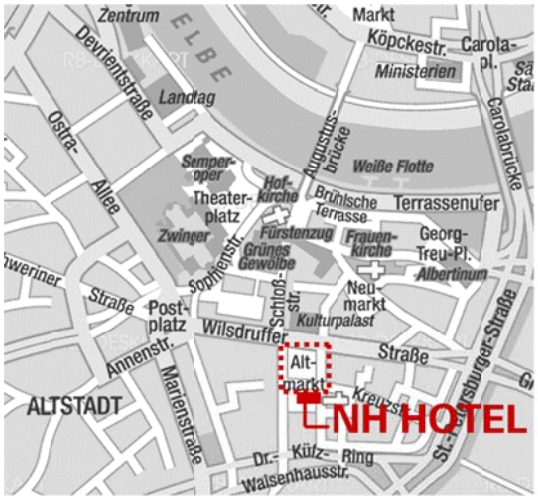
Workshop 4 (Functional Connectivity): TUD, SE2, Room 121

Spring School (Thursday 26 March and Friday 27 March 2015)

NH Hotel Dresden Altmarkt, An der Kreuzkirche 2, 01067 Dresden

Symposia: Room "Semper 1-3"

Poster sessions: Room "August der Starke"



Spring School Social Evening (Thursday 26 March and Friday 27 March 2015)

NH Hotel Dresden Altmarkt, An der Kreuzkirche 2, 01067 Dresden

PROGRAM & TIME TABLE

Tuesday 24 March 2015

Workshop 1:	Debating Club Ricarda Evens (TU Dresden, Germany)
Workshop 2A:	HLM I Stefan Diestel (International School of Management, Hamburg, Germany)

Wednesday 25 March 2015

Workshop 2B:	HLM II Stefan Diestel (International School of Management, Hamburg, Germany)
Workshop 3:	Publication Roland Deutsch (TU Dresden, Germany)
Workshop 4:	fMRI and functional connectivity Stefan Kiebel (TU Dresden, Germany)

Thursday 26 March 2015

Symposium 1:	Mechanisms of performance monitoring and adaptive control Markus Ullsperger (University of Magdeburg, Germany)
Special Issue:	Post-doc Abroad Ben Eppinger, Franziska Korb (TU Dresden, Germany)
Symposium 2:	Freedom and alternative possibilities. Philosophical considerations and empirical results Michael Pauen (Humboldt University of Berlin, Germany)
Symposium 3:	Lifespan development of adaptive neurocognitive representations: reciprocal interactions between cognition and motivation Shu-Chen Li (TU Dresden, Germany)

Friday 27 March 2015

Symposium 4:	Neural risk mechanisms of psychiatric disorders Andreas Meyer-Lindenberg (Central Institute of Mental Health, Mannheim, Germany)
Special Issue:	Grant Application Clemens Kirschbaum, Katja Beesdo-Baum, Stefan Scherbaum (TU Dresden, Germany)
Symposium 5:	Neural representation of a cognitive map of state space Nicolas Schuck (Princeton University, USA)

Poster Sessions

PROGRAM AND TIME TABLE

	Tue 24 Mar 2015		Wed 25 Mar 2015			Thu 26 Mar 2015	Fri 27 Mar 2015
09:00	Workshop 1: **Debating Club**	Workshop 2A: **HLM I**	Workshop 2B: **HLM II**	Workshop 3: **Publication**	Workshop 4: **fMRI Connectivity**	Symposium 1 **Markus Ullsperger**	Symposium 4 **Andreas Meyer-Lindenberg**
10:00							
11:00						Break	Break
12:00						**Post-doc Abroad**	**Grant Application**
13:00						Lunch	Lunch
14:00						Symposium 2 **Michael Pauen**	Symposium 5 **Nicolas Schuck**
15:00							
16:00						Break	Break
17:00						Symposium 3 **Shu-Chen Li**	**Poster Session I**
18:00							**Poster Session II**
19:00						Social Event	Social Event

WORKSHOP 1: DEBATING CLUB
Tuesday 09:00-15:00

DEBATING CLUB

Ricarda Evens

Institute of Clinical Psychology and Psychotherapy; Technische Universität Dresden, Germany

In this workshop we will use the form of an English Debating Club to approach different hot topics in the field of volition and cognitive control. Each debate starts with a matter of dispute (e.g. Should fMRI results be used to improve court decisions?) and two teams (pros/cons) compete against each other in a formal contest of argumentation. Everybody is welcome to participate in this workshop - no previous debating or native English skills are required! Goal of the workshop is to encourage participants to actively engage with the issues involved in our CRC, to practice free speech and argumentation skills in a cooperative and collegial atmosphere.

Course venue: Technische Universität Dresden, BZW, Room A307

WORKSHOP 2A+B: HLM
Tuesday 09:00-16:00 and Wednesday 09:00-13.00

MEHREBENENANALYSE MIT HLM

Stefan Diestel

International School of Management, Hamburg, Germany

Der Workshop zur „Mehrebenenanalyse mit HLM" zielt darauf ab, uns mit den grundlegenden Analyseschritten bei Mehrebenenmodellen bzw. „mixed models" mittels HLM vertraut zu machen. Dabei wird es neben einer allgemeinen theoretischen Einführung zu Mehrebenenmodellen und deren (potentiellen) Nutzen insbesondere auch um eine Vermittlung des praktischen Handwerkszeugs zur Berechnung entsprechender Modelle in HLM gehen. Der Schwerpunkt dieses Workshops liegt damit auf der praktischen Anwendung und Berechnung von Mehrebenenanalysen, die zunächst an exemplarischen Daten, sowie anschließend an eigene Datensätzen durchgeführt werden sollen. Deshalb wäre es für diesen Workshop von großem Nutzen, eigene Daten (im SPSS-Format) und Fragestellungen mitzubringen, welche man gerne mit Hilfe von Mehrebenenmodellen analysieren und beantworten möchte.

Course venue: Technische Universität Dresden, ASB, Room 206abc

WORKSHOP 3: PUBLICATION
Wednesday 09:00-15:00

PUBLICATION

Roland Deutsch

Chair of Social Psychology, Technische Universität Dresden, Germany

According to the great feedback and plenty of requests for a follow-up of the workshop "Publish or perish - Strategies on how to survive in academic psychology", given in 2014 by Matthias Kliegel, the current workshop will be a kind of repetitive as well as deepening.

Roland Deutsch will also focus on useful strategies to write and prepare a paper for submission. This will be practiced on the basis of the respective current projects of every participant. A second aim will be the discussion and practice of policies on how to handle revisions.

There will be enough time and possibility to debate further individual questions across the subjects of publications, submissions, revisions as well as formalities of examination regulations regarding the publications.

Course venue: Technische Universität Dresden, BZW, Room A307

WORKSHOP 4: FUNCTIONAL CONNECTIVITY
Wednesday 11:00-16:00

KONNEKTIVITÄTSANALYSEN VON fMRT-DATEN

Stefan Kiebel

Chair of Neuroimaging, Technische Universität Dresden, Germany

In dem halbtägigen Workshop werden die Teilnehmer in Theorie und Praxis über zwei etablierte Verfahren zur Konnektivitätsanalyse von fMRT Daten lernen. Das erste Verfahren ist die ‚psychophysiological interaction' (PPI), ein korrelationsbasiertes Verfahren, das trotz seiner relativen Einfachheit in Studien häufig für die Konnektivitätsanalyse verwendet wird. Das zweite Verfahren ist ‚Dynamic Causal Modelling' (DCM), welches ein Netwerkmodell an ausgewählte regions of interest anfittet um Aussagen über gerichtete Konnektivitäten treffen zu können. Die Teilnehmer werden einerseits Einführungen in die jeweilige Technik hören um dann selbst am Rechner die Verfahren in der Praxis mit Hilfe eines Beispieldatensatzes nachzuvollziehen.

Course venue: Technische Universität Dresden, SE2, 121

SYMPOSIUM 1:
Thursday 09:00-11:00

MECHANISMS OF PERFORMANCE MONITORING AND ADAPTIVE CONTROL

Markus Ullsperger

Department of Neuropsychology, Otto-von-Guericke University, Magdeburg, Germany

Performance monitoring -the ability to determine the necessity, type, and magnitude of adaptation by monitoring own actions and external events- is essential for successful goal-directed behavior in an uncertain world. In the first part of my lecture I will present the correlates of performance monitoring in the human brain. I will discuss major current theories of performance monitoring in the light of the evidence on the signals represented in several brain regions proposed to contribute to this function.

In the second part of the presentation, I will present recent findings from our group on the implementation of adaptation driven by performance-monitoring signals. I will focus on trial-by-trial adjustments in motor and attentional control and present findings from neuropsychopharmacological studies tackling the roles of the modulatory neurotransmitters serotonin and acetylcholine.

Chair: Max Wolff

SYMPOSIUM 2:
Thursday 14:00-16:00

FREEDOM AND ALTERNATIVE POSSIBILITES – PHILOSOPHICAL CONSIDERATIONS AND EMPIRICAL RESULTS

Michael Pauen

Berlin School of Mind and Brain, Humboldt-University of Berlin, Germany

According to a very strong and widely shared intuition, freedom requires the ability to do otherwise. Unfortunately, though, there seem to be no alternative possibilities if our world is governed by deterministic laws of nature. So do we have to give up on freedom and responsibility?

I will argue that this is not the case. Unlike many philosophers who think that there can be freedom in a deterministic world, I will argue that (a) freedom does require alternative possibilities and that (b) there are alternative possibilities in a deterministic world. I will also present empirical evidence showing that humans do have the ability to do otherwise under real-world conditions.

Chair: Max Görner

SYMPOSIUM 3:
Thursday 16:30-18:30

LIFESPAN DEVELOPMENT OF ADAPTIVE NEUROCOGNITIVE REPRESENTATIONS: RECIPROCAL INTERACTIONS BETWEEN COGNITION AND MOTIVATION

Shu-Chen Li

Lifespan Developmental Neuroscience Unit, Dept. of Psychology, TU Dresden, Germany

A synergistic conceptualization of development is to view an individual's development across the lifespan in terms of the development of self-regulated adaptive neurocognitive dynamics. Complex behavior such as goal-directed learning and decision making require self-regulated action and behavioral control, for which smooth operations are implemented through dynamic interactions between cortical monitoring, hippocampal memory, and subcortical motivational processes. Through its widespread projections, dopamine innervates frontal-hippocampal-striatal circuitry to serve as an interface regulating cognition and motivation. This talk provides an overview on age-related differences in the dopaminergic systems, and how they may affect the interplay of cognitive and motivational processes across the lifespan.

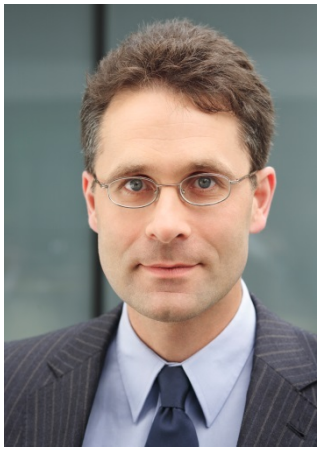
Chair: Yuliya Stankevich

SYMPOSIUM 4:
Friday 09:00-11:00

NEURAL RISK MECHANISMS OF PSYCHIATRIC DISORDERS

Andreas Meyer-Lindenberg

Central Institute of Mental Health, Mannheim, Germany



An important frontier that will have to be tackled by imaging genetics research is the integration of environmental factors. Even for highly heritable disorders such as schizophrenia, environmental risk factors are relevant and often have higher associated risk than common genetic variants.

In this presentation we discuss neuroimaging work that has begun to define neural mechanisms that might mediate environmental risk factors such as unstable social status (Zink et al., 2008), or urbanicity (Lederbogen et al., 2011). Interestingly, the results of this work converge with imaging genetics studies that have characterized risk variants that by themselves show a degree of gene environment interaction or correlation, such as 5-HTTLPR (Pezawas et al., 2005) or MAO-A (Meyer-Lindenberg et al., 2006). This convergence on a systems-level suggests neural mechanisms by which environmental adversity might be reflected in an inability to process negative emotions in the context of the processing of the social environment. This systems-level definition also aids in constraining new approaches to ameliorate environmental risk, either through environmental interventions (Lederbogen et al., 2011) or through molecular approaches such as prosocial neuropeptides (Meyer-Lindenberg et al., 2011).

Chair: Ricarda Evens

SYMPOSIUM 5:
Friday 14:00-16:00

NEURAL REPRESENTATION OF A COGNITIVE MAP OF STATE SPACE

Nicolas Schuck

Princeton Neuroscience Institute, Princeton University, USA

Should you sell your stocks whenever their price is falling or whenever your neighbor buys a new car? Obviously, making a choice requires to know and select the information that is most relevant for the current decision. Reinforcement learning theory presupposes that agents must therefore derive representations of the environment that are most efficient for action selection and learning. How and where these so called "states" arise in the brain is not yet fully understood, however. I will present several neuroimaging studies that were designed to address these questions. Our results indicate the existence of neural representations of Markovian states and that orbitofrontal cortex (OFC) is central for their representation and updating. Moreover, medial prefrontal cortex (MPFC) seems essential for balancing the shielding vs. updating of states when environmental statistics allow their reorganization. Using multivariate analysis of fMRI data, we show that the fidelity of the state information in OFC, and the similarity between different states as they are represented neurally, robustly relate to performance differences. In addition, representational changes in MPFC predict strategy shifts that reflect a changed state space. Our results suggest that internal state representations can be "read out" for a variety of tasks, and indicate that the content and geometry of the individual state space can be used to make predictions about individual performance characteristics.

Chair: Yuliya Stankevich

SPECIAL ISSUE II: SCIENCE BIOGRAPHIES
Thursday 11:30-13:00

POST-DOC ABROAD

Ben Eppinger, Franziska Korb

Chair of Lifespan Developmental Neuroscience, Technische Universität Dresden, Germany

Research stays become more and more prevalent in a scientific career. In the Collaborative Research Center, PhD students are encouraged and supported to go abroad for a research stay for several months. Going abroad for several years as a post-doc in order to work with another research group is considered to be a very fruitful experience and is widely recommended. In this workshop session, two more senior scientists are going to talk about their personal experience of being a post-doc abroad. Afterwards, the PhD students will have the chance to ask more detailed questions.

Chair: Ilka Böhm

SPECIAL ISSUE II: "PUBLISH OR PERISH" II
Friday 11:30-13:00

GRANT APPLICATION

Clemens Kirschbaum[1], Katja Beesdo-Baum[2,3], Stefan Scherbaum[4]

[1]Chair of Biological Psychology, Technische Universität Dresden, Dresden, Germany
[2]Institute of Clinical Psychology and Psychotherapy, Technische Universität Dresden, Dresden, Germany
[3]Behavioral Epidemiology, Technische Universität Dresden, Dresden, Germany
[4]Chair of General Psychology, Technische Universität Dresden, Germany

For a researcher, grant application is a recurring theme in their career and its success can markedly shape the working conditions in the following years. Since it is useful to get early experience with grant applications, three experienced researchers will talk about their tips for successful applications. In contrast to courses offering information on how and where to apply, this workshop session focuses on personal insights and tips based on gathered experience.

Chair: Fabian Baum

POSTER SESSION I
Friday 16:30-17:30
Room: August der Starke

Baum, Fabian (Z2):
Single trial coupling of co-registered EEG/fMRI data in an instruction based learning paradigm

Bluschke, Annet (A5):
Effects of neurofeedback in ADHD affect attentional selection but not response monitoring processes

Böhm, Ilka (C3):
Increased resting state functional connectivity in the fronto-parietal and default mode network in anorexia nervosa

Deza Araujo, Yacila I. (C3):
Increased discounting behavior in young men is associated with greater fronto-precuneous resting state functional connectivity

Diers, Kersten (A7):
The time-course of cognitive emotion regulation across prolonged time-scales

Domachowska, Irena (B1):
Affective modulation of attentional scope

Gärtner, Anne (Associate):
EREM – a new paradigm to assess cognitive emotion regulation success

Gottschalk, Caroline (A3)
Bottom-up priming of attentional control by onsets of stimuli?

Heitmann, Christina (B2):
No conflict adaptation in motivational conflicts

Hilbert, Kevin (Associate):
Level of habitual worrying and its relationship to impaired cognitive control in High and Low Worriers

POSTER SESSION I (Friday 16:30-17:30)

SINGLE TRIAL COUPLING OF CO-REGISTERED EEG/fMRI DATA IN AN INSTRUCTION BASED LEARNING PARADIGM

Fabian Baum, Uta Wolfensteller, Hannes Ruge

Chair of General Psychology, Technische Universität Dresden, Germany

Simultaneous EEG/fMRI data acquisition offers a great opportunity of implementing fMRI analysis methods that make use of rapidly changing activation dynamics recorded with EEG. Simultaneous recording was done to elucidate the temporal evolution of neural processes within trials underlying the rapid instruction-based learning of novel stimulus-response associations (Ruge & Wolfensteller, 2014). We combined the two data modalities via 'EEG-informed fMRI analysis' in which event related potentials (ERP) and BOLD data are fused on the single trial level. By adding stimulus-locked ERP components as additional regressors in the fMRI analysis, BOLD responses specifically related to stimulus-response learning processes can be identified. Analogously, by using the pre-response signals from response locked ERPs as regressors one might identify regions that are especially associated with response preparation processes. Finally, by entering post-response ERPs as regressors we aimed to identify brain regions that are especially associated with feedback processing. This way the fine-grained temporal process dynamics unfolding within individual trials can be uncovered that may have stayed hidden with just using one undifferentiated BOLD estimate for one single trial. We present first results from this type of analysis and provide recommendations for optimal data processing steps.

POSTER SESSION I (Friday 16:30-17:30)

EFFECTS OF NEUROFEEDBACK IN ADHD AFFECT ATTENTIONAL SELECTION BUT NOT RESPONSE MONITORING PROCESSES

Annet Bluschke, Veit Roessner, Christian Beste

Department of Child and Adolescent Psychiatry, Faculty of Medicine C.G. Carus, Technische Universität Dresden, Germany

In regards to ADHD symptomatology, theta/beta ratio neurofeedback training has been shown to lead to improvements in the domains of hyperactivity, impulsivity and particularly attention. Looking beyond these promising results on the behavioural level, however, the precise underlying neurophysiological mechanisms and effects are still unclear, especially as far as mechanisms of attention and action control are concerned. To examine this question, 25 paediatric patients with ADHD performed the Flanker task before and after 16 sessions (8 weeks) of theta/beta neurofeedback training. The Flanker task is an established measure of motor and attentional interference control in which the patients were required to respond according to the direction of a central arrow while ignoring (in)compatible flanking stimuli. Independent of flanker compatibility, we found significant post-neurofeedback improvements in accuracy, but not in reaction times. Neurophysiologically, perceptual and bottom-up attentional ERP correlates (P1 and N1) were enhanced after training, while no effect was seen for fronto-central correlates of cognitive control (N2). This pattern is in line with behavioural data. No changes were observed in an 8-week waiting list control group. These results suggest that theta/beta ratio neurofeedback training in ADHD leads to improvements in attentional selection processes, but not cognitive control processes. To broaden the effects of neurofeedback on cognitive control processes, modifications of the neurofeedback protocol could be considered.

POSTER SESSION I (Friday 16:30-17:30)

INCREASED RESTING STATE FUNCTIONAL CONNECTIVITY IN THE FRONTO-PARIETAL AND DEFAULT MODE NETWORK IN ANOREXIA NERVOSA

Ilka Boehm, Daniel Geisler, Joseph King, Sabine Clas, Juliane Hantke, Franziska Ritschel, Maria Seidel, Isabelle Hennig, Stefanie Huber, Eva Seeger, Jessika Weiss, Veit Roessner, Stefan Ehrlich

Department of Child and Adolescent Psychiatry, Translational Developmental Psychiatry Lab, Faculty of Medicine C.G. Carus, Technische Universität Dresden, Germany

The etiology of anorexia nervosa (AN) is poorly understood. Results from functional brain imaging studies of AN using task paradigms are difficult to reconcile. Task-related imaging studies often require a high level of compliance and can only partially explore the distributed complexity of brain function. In this study, resting state functional connectivity was used to investigate brain networks potentially relevant to understand the neural mechanisms underlying AN. Resting state fMRI data was obtained from 35 unmedicated female acute AN patients and 35 closely matched healthy female participants (HC) and decomposed using spatial group independent component analyses. We identified components covering the fronto-parietal "control" network, the default mode network (DMN), the salience network, the visual and the sensory-motor network. Group comparison revealed an increased functional connectivity between the angular gyrus and other parts of the fronto-parietal network in patients with AN in comparison to HC. Connectivity of the angular gyrus was positively associated with self-reported persistence in HC. In the DMN, AN patients showed an increased functional connectivity strength in the anterior insula in comparison to HC. Anterior insula connectivity was associated with self-reported problems with interoceptive awareness. The finding of an increased functional connectivity in the fronto-parietal network adds novel support for the notion of AN as a disorder of excessive cognitive control, whereas the elevated functional connectivity of the anterior insula with the DMN may reflect the high levels of self- and body-focused ruminations when AN patients are at rest.

POSTER SESSION I (Friday 16:30-17:30)

INCREASED DISCOUNTING BEHAVIOR IN YOUNG MEN IS ASSOCIATED WITH GREATER FRONTO-PRECUNEOUS RESTING STATE FUNCTIONAL CONNECTIVITY

Yacila I. Deza Araujo[1], Nils B. Kroemer [1,2,3,] Lydia Hellrung[1], Stephan Nebe[1] & Michael N. Smolka[1]

[1] Department of Psychiatry & Neuroimaging Center, Technische Universität Dresden, Germany
[2] The John B. Pierce Laboratory, New Haven, USA
[3] Psychiatry Department, Yale University, New Haven, USA

High impulsivity is a common observation in young individuals but the altered patterns of this behavior during adolescence and adult life have been pointed as a possible factor for the development of maladaptive behaviors. Several behavioral and neural studies using delay discounting paradigms have postulated that "impulsive choices" may be used to assess impulsive behaviors. However, the relationship between impulsivity and resting-state functional connectivity (rsFC) is barely explored. Here, we investigate if rsFC may be a biomarker that helps us to understand the underlining neural mechanisms of impulsive behavior and implement prevention strategies. One-hundred eighty-nine, healthy male subjects aged 18, underwent a 6-minutes resting-state fMRI scan. Participants were divided into "Low-impulsive" and "high-impulsive" groups according to a temporal discounting rate *k*. The imaging data were preprocessed and analyzed using FMRIB software library. Connectivity analysis was performed using independent component analysis (ICA) with temporal concatenation as implemented in FSL MELODIC. We found an increased connectivity between frontal regions and posterior parts of the default-mode network in impulsive young subjects. Our findings agree with previous studies which suggest heightened functional connectivity in key regions related to emotion regulation, reward sensitivity in impulsive subjects. In contrast, the "low-impulsive" group had an increased rsFC between subcortical areas and frontal regions.

POSTER SESSION I (Friday 16:30-17:30)

THE TIME-COURSE OF COGNITIVE EMOTION REGULATION ACROSS PROLONGED TIME-SCALES

Kersten Diers[1], Judith Schäfer[2], Fanny Weber[2], Burkhard Brocke[1], Sabine Schönfeld[2], Alexander Strobel[1]

[1]Chair of Differential and Personality Psychology, Technische Universität Dresden, Germany
[2]Chair of Clinical Psychology and Psychotherapy, Technische Universität Dresden, Germany

Cognitive emotion regulation does not act as a single unitary function but is likely composed of multiple concurrent and sequential processes. Consistent with this notion, recent evidence suggests that different brain regions exhibit distinct temporal patterns during emotional regulation. In this study, we aimed to investigate the temporal sequence of such regional activation patterns across a prolonged time-scale. We used a slow event-related paradigm while fMRI was measured. As an instance of cognitive reappraisal, participants were instructed to detach themselves from both neutral and negative IAPS pictures. Participants were also asked to permit any feelings that might arise in response to these stimuli, which served as an active control condition. We observed increased frontal and parietal activation during the 'detach' condition as compared to the 'permit' condition, and, conversely, decreased activation in response to negative stimuli in the bilateral amygdalae during emotional down-regulation in comparison to emotional allowance. This pattern, however, reversed after the cessation of stimulus presentation and task instructions: at this stage, we observed increased activation in the bilateral amygdalae during the regulation condition as compared to the control condition. These results demonstrate that time is an important factor in the course of cognitive emotion regulation, and may provide further evidence that its dynamics are not easily captured with conventional analysis approaches.

POSTER SESSION I (Friday 16:30-17:30)

AFFECTIVE MODULATION OF ATTENTIONAL SCOPE

Irena Domachowska, Hannes Ruge, Annette Bolte, Thomas Goschke

Chair of General Psychology, Technische Universität Dresden, Germany

When pursuing goals, one needs to focus attention on goal-relevant information and inhibit distracting stimuli. Previous studies have shown that positive affect may broaden the scope of attention and responsiveness to peripheral cues. In the current project we tested the hypothesis that positive affect broadens attention, but leads to higher distractibility. In Experiment 1, using Visual Search Task, participants had to categorize pop-out targets and ignore singleton distracters. Before every trial, either positive or neutral IAPS picture was presented. The results showed that positive affect indeed increased reaction times on trials in which distractors were present. The RT costs were even higher on incompatible trials, suggesting that the distractors were not only noticed, but also actively processed. Experiment 2 was a direct replication of Experiment 1, using functional magnetic resonance imaging to further examine the neural correlates of attentional capture. Greater activation in response to distracting stimuli following erotic pictures was found in anterior fusiform gyrus and temporal inferior lobes - areas previously shown to be associated with the modulátory impact of affective information on perceptual processes. The results suggest that affective stimuli influence visual attention and processing of distracting stimuli.

POSTER SESSION I (Friday 16:30-17:30)

EREM – A NEW PARADIGM TO ASSESS COGNITIVE EMOTION REGULATION SUCCESS

Anne Gärtner, Annika Dimitrov, Alexander Behnke, Alexander Strobel

Chair of Differential and Personality Psychology, Technische Universität Dresden, Germany

Successful emotion regulation plays an important role in our every-day life and is associated with greater well-being and life satisfaction. Research on emotion regulation has distinguished among emotion regulation strategies, finding that some are more adaptive than others. One generally adaptive strategy is cognitive reappraisal, which involves changing the meaning of an emotion-eliciting situation. Studies investigating cognitive reappraisal have defined regulation success as changes in a) subjective awareness or b) central physiological activation in certain brain areas or c) peripher-physiological activation as heart rate, skin conductance or facial muscle activity. However, up to now there is no paradigm that measures reappraisal success behaviorally, using for example response time data. In this pilot study, N=36 people had to reappraise (day 1) or permit (day 2) the emotional content of pictures before they solved a modified emotional cueing paradigm. In this task, a spatial cue (arrow in the middle of the screen, pointing left or right), an emotional cue (negative, neutral or positive picture presented scrambled and unscrambled on the left and right side of the screen, respectively), and a target stimulus (arrow on the left or right side of the screen, pointing left or right) were presented. Participants had to respond on the direction of the target stimulus. The presence of both a cognitive and an emotional cue enables to assess their costs and benefits separately, especially regarding the influence of cognitive reappraisal on these parameters. Furthermore, correlations to general emotion regulation frequency and trait negative emotionality are reported.

POSTER SESSION I (Friday 16:30-17:30)

BOTTOM-UP PRIMING OF ATTENTIONAL CONTROL BY ONSETS OF STIMULI?

Caroline Gottschalk, Rico Fischer

Chair of General Psychology, Technische Universität Dresden, Germany

The extent of attentional control can be regulated according to certain contextual demands. For example, contexts associated with high conflict frequency (e.g., 80% conflict trials presented at location above) involve stronger attentional control than contexts with low conflict frequency (e.g., 20% conflict trials presented at location below). The corresponding control set can be activated in a bottom-up manner when stimuli are presented at the specific context. Here we ask whether low level visual at-tention features are sufficient in activating the context-specific attentional control set. For example, the mere onset of a stimulus might disambiguate the relevant location context and thus, might serve as low level mechanism that activates the context-specific control setting. Therefore, task-relevant target stimuli and task-irrelevant dummy stimuli were presented, so that the onsets of stimuli at both contexts should compete for triggering the appropriate control setting. Results of three experiments with varied onset-intensity showed, that the mere onset of either stimulus is not sufficient to prime the context-associated attentional control set. Instead, the attentional control set becomes activated only after stimulus identification.

POSTER SESSION I (Friday 16:30-17:30)

NO CONFLICT ADAPTATION IN MOTIVATIONAL CONFLICTS

Christina Heitmann, Roland Deutsch

Chair of Social Psychology, Technische Universität Dresden, Germany

Conflict adaptation, the improved performance after a conflict trial, has been widely observed in tasks using stimulus-response incompatibilities which are solved within less than a second. Although it has been argued that higher-level conflicts trigger similar processes, to the best or our knowledge, no published research has yet investigated conflict adaptation in motivational conflicts. In this experiment, we examined whether motivational conflicts compared to non-conflicts lead to conflict adaption in the following trial. Participants' task was to repeatedly choose one of two valent situations which either formed an approach-approach-conflict, an avoidance-avoidance conflict, or no conflict (made up by a positive and a negative situation). Results revealed no conflict adaptation but, on the contrary, showed a general slowing of conflict solving after avoidance-avoidance conflicts. This result indicates that conflict adaption effects that were observed for stimulus-response conflicts are limited for these short time intervals and cannot be generalized to motivational conflicts.

POSTER SESSION I (Friday 16:30-17:30)

LEVL OF HABITUAL WORRYING AND ITS RELATIONSHIP TO IMPAIRED COGNITIVE CONTROL IN HIGH AND LOW WORRIERS

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Active worrying seems to have a negative effect on cognitive processes such as working memory. Uncontrollability of worry as observed in Generalized Anxiety Disorder and its subclinical expressions might be related to impaired cognitive control. However, no study to date investigated whether there is a relationship between habitual worrying and cognitive control deficits. The present study examines this hypothesis by comparing cognitive control functioning across different tasks and worry levels. N=30 high and N=32 low worriers matched on age, education and handedness completed three experimental tasks related to inhibition of non-emotional (flanker) or emotional (affective stroop) contents and to task shifting (switch task). Reaction times (RTs) and error numbers were analyzed. For all tasks, a significant task effect (conflict adaptation, shifting) was found for RTs and Errors (except for a trend of p=0.05 in Stroop RTs), but no interaction of group and task emerged. This result did not change when including sex, age, handedness, education, well-being, sleep quality or BDI or PSWQ scores as covariates. A main effect of group was present for the flanker task, with HW showing slower RTs across all conditions. The results indicate that while all tasks worked as intended, there is no relationship between habitual worrying and cognitive control abilities. Additionally, there seems to be no influence of the different functions of cognitive control or the presence of emotional content. As impaired cognitive control has been reported for acute worrying, the current data hints at only the process of worrying itself being related to cognitive control deficits. However, these results have to be replicated in a clinical population of GAD subjects.

POSTER SESSION II

Friday 17:30-18:30
Room: August der Starke

Lee, Ying (B3):
Sleepiness moderates the effect of L-DOPA on the arbitration between goal-directed and habitual control

Mohr, Holger (Z2):
Large-scale integration and segregation of functional brain modules during rapid learning processes

Neukam, Philipp (B4):
Effects of acute tryptophan depletion/loading on intertemporal choice

Ritschel, Franziska (Associate):
Neural correlates of self-control in patients with anorexia nervosa

Schäfer, Judith (A5):
Is trait resilience characterized by specific patterns of attentional control and emotion regulation?

Schulz, Ulrike (B1):
Modulation of cognitive flexibility by affective cues: The challenge of inducing (phasic) affect

Stankevich, Yuliya (C4):
The effects of subclinical depressive symptoms and dopaminergic medication on spatial learning and memory in Parkinson's disease

Vogel, Diana (Associate):
Exploring the dynamics of volition by dovetailing continuous measures and computational modelling: Examples from selective attention and ideomotor learning

Wolff, Max (C1):
Losing control: Error-related brain activity predicts everyday self-control failures

Zwosta, Katharina (A2):
Neurocognitive mechanisms of shielding goal-directed from habitual actions

POSTER SESSION II (Friday 17:30-18:30)

SLEEPINESS MODERATES THE EFFECT OF L-DOPA ON THE ARBITRATION BETWEEN GOAL-DIRECTED AND HABITUAL CONTROL

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Increasing dopamine levels promote goal-directed over habitual control of choice behaviour [Wunderlich et al., 2012], but as executive functioning impairments following sleep deprivation involve the dopamine (DA) system [Volkow et al., 2012], sleepiness could moderate the effects of dopaminergic manipulation. Here, we investigated if sleepiness moderates the effect of L-DOPA on the arbitration between goal-directed and habitual control.

Thirty healthy participants took L-DOPA or placebo on two separate visits and completed the Karolinska Sleepiness Questionnaire [Åkerstedt et al., 1996]. They then did a modified two-stage decision task [Daw et al. 2011] in the MRI scanner. Sleepiness was the average of KSS scores across visits. We estimated ω, the degree of goal-directed over habitual control for each individual per visit using model fitting and set up first level statistics of fMRI data as detailed in Daw et al. 2011. We then investigated if sleepiness moderated drug effect on ω and task-related brain activity using repeated measures ANCOVA.

We found significant interactions between drug and sleepiness on ω ($F(1,28) = 12.4$, $p = .002$) and vmPFC activity ($F(1,28) = 32.7$, $p < .001$). vmPFC activity was positively correlated with ω under placebo ($r = 0.58$, $p < .001$), but not under L-DOPA. Our observations are reminiscent of the 'inverted u-shape hypothesis' [Cools and D'Esposito, 2011], where L-DOPA benefitted sleepy individuals, that is, increased ω and vmPFC activity, but impaired alert individuals. Future studies should clarify the relationship between trait-like vulnerabilities to sleep loss [Van Dongen et al, 2004] and endogenous DA levels.

POSTER SESSION II (Friday 17:30-18:30)

LARGE-SCALE INTEGRATION AND SEGREGATION ON FUNCTIONAL BRAIN MODULES DURING RAPID LEARNING PROCESSES

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Graph theoretical approaches can be used to analyze whole-brain connectivity patterns between many predefined nodes. Recently, these methods have also been used to find task-related connectivity changes. Here, rapid learning processes were investigated in humans by means of large-scale connectivity analyses of functional MRI data. The dataset comprised 70 subjects which repeatedly learned novel stimulus-response associations within short periods of time. Connectivity between nodes was measured by the correlation coefficient of their respective residual fMRI time series after regressing out mean task-related activity. After partitioning the obtained functional network in a data-driven way into four modules (default mode network (DMN), fronto-parietal network (FPN), sensorimotor cortex (SMC), visual cortex (VC)), we found significant changes in the connection strengths between these four modules during the learning process. Connectivity between the DMN and SMC and between DMN and VC decreased, whereas connectivity between FPN and SMC and between SMC and VC increased significantly. Within modules, connectivity within the FPN decreased and connectivity within the VC increased significantly. Furthermore, increasing connectivity between the FPN and SMC was significantly correlated with decreasing response times. These results demonstrate that changes in global connectivity patterns occur already in the initial phase of learning. Specifically, learning was associated with stronger integration of fronto-parietal areas with sensorimotor areas, whereas the DMN was increasingly segregated from sensorimotor areas, thereby constituting an example of shifting balance between segregation and integration over time (cf. Sporns 2013, Curr.Opin.Neurobiol.).

POSTER SESSION II (Friday 17:30-18:30)

EFFECTS OF ACUTE TRYPTOPHAN DEPLETION/LOADING ON INTERTEMPORAL CHOICE

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The main research aims of project B4 are to investigate the modulatory effects of serotonin in decision-making contexts. There is evidence that differences in serotonin levels influence the discounting parameter (*k*) and also modulate activity in brain regions that are recruited for evaluating rewards and exercise cognitive control during intertemporal choices. Moreover, a variation in the promoter region of the gene encoding the serotonin transporter (5-HTTLPR) is hypothesized to contribute to behavioural responses and functional coupling of brain regions by affecting tonic serotonin levels. To this end, one aim of this study is to systematically investigate the role of serotonin on discounting behaviour during intertemporal choice using acute tryptophan depletion/loading and a balance condition. Additionally, to increase power only individuals who have homozygous genotype (ss or ll allele) of 5-HTTLPR participated in the study. We used fMRI and an intertemporal choice task in which delay and amount information were orthogonalized and presented separately in order to disentangle amount and delay information. We address the question whether low of central serotonin levels increases the discounting parameter and reduces neural signalling in the reward evaluation and cognitive control networks and vice versa for high central serotonin levels. Preliminary results from the current sample consisting of 15 ll-carriers and 15 ss-carriers will be presented and discussed.

POSTER SESSION II (Friday 17:30-18:30)

NEURAL CORRELATES OF SELF-CONTROL IN PATIENTS WITH ANOREXIA NERVOSA

Franziska Ritschel, Joseph A. King, Daniel Geisler, Eva Menningen, Maria Seidel, Ilka Böhm, Fabio Bernardoni, Stephan Ripke, Michael Smolka, Veit Rössner, Stefan Ehrlich

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Patients with anorexia nervosa (AN) abstain from immediate rewards (food) with seeming ease in their relentless drive for thinness, suggestive of an abnormally elevated level of self-control. The current study sought to identify the neural correlates of this everyday clinical observation while acutely ill patients (acAN) performed an intertemporal choice task in which monetary rewards were adapted to individual delay discounting during functional magnetic resonance imaging (fMRI). 32 female acAN (12-23) and 32 pairwise age-matched healthy controls (HC) performed task in which they made decisions regarding immediate and delayed reward options. Although patients did not differ from controls behaviorally in the tendency to prefer smaller sooner vs. larger later rewards, neural activity associated with decision making during intertemporal choice was abnormally decreased in frontoparietal control regions (left superior frontal sulcus, bilateral inferior parietal lobule) and a region of posterior cingulate cortex, known to be recruited when weighing decision alternatives. These findings suggest that acAN recruit less neural resources during reward-based decision making, possibly reflecting an engrained "habit" of inhibiting primary drives. To develop a richer understanding of this process, we are currently analyzing intertemporal choice data collected in the same acAN following partial weight restoration and comparably large sample of recovered patients. Based on these encouraging results, we propose to investigate reward-based decision making in AN using hybrid delay/effort discounting which tracks responding in real time (using mouse movements toward target choices) and in a more ecologically valid manner delivering rewards online.

POSTER SESSION II (Friday 17:30-18:30)

IS TRAIT RESILIENCE CHARACTERIZED BY SPECIFIC PATTERNS OF ATTENTIONAL CONTROL AND EMOTION REGULATION?

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Deployed soldiers are at increased for experiencing traumatic events and developing mental disorders compared to non-deployed soldiers. In this context, trait resilience defined as positive adaptation in the face of stressful events is of pivotal importance. Theoretical accounts suggest that emotion regulation and attention control may be involved in trait resilience. However, empirical evidence for this is scarce so far. Data stem from a large-scale longitudinal study investigating mental health and its determinants in soldiers before and after deployment in Afghanistan (n=358). Mental health was assessed with a military version of the Munich-Composite International Diagnostic Interview (M-CIDI) and supplemental questionnaires. For a subsample of n=200 soldiers complete data sets for this research question were available. Results revealed a positive association between attentional control and trait resilience (β=.41, $p<0.001$) and a negative association between dysfunctional emotion regulation and trait resilience (β=-.80, $p<0.001$). Additionally, we found evidence for attentional control predicting a differential association between emotion dysregulation and trait resilience (β=.04, $p<0.1$). Specifically, with increasing attentional control the negative association between emotion dysregulation and trait resilience is attenuated. Findings of this study support the assumption that functional emotion regulation and attentional control may promote trait resilience. This is in line with previous research indicating that attentional control and emotion regulation might be transdiagnostic protective factors against negative outcomes following adverse experiences.

POSTER SESSION II (Friday 17:30-18:30)

MODULATION OF COGNITIVE FLEXIBILITY BY AFFECTIVE CUES: THE CHALLENGE OF INDUCING (PHASIC) AFFECT

Ulrike Schulz, Hannes Ruge, Annette Bolte, Thomas Goschke

Chair of General Psychology, Technische Universität Dresden, Germany

Adaptive behavior requires both the rapid switching between different goals and to stick with and maintain a goal by shielding it from currently irrelevant information that may trigger alternative goals. Previous studies have provided evidence for an influence of positive affect on balancing these two complementary cognitive control functions. In particular, behavioral studies show that positive affect shifts the balance towards greater flexibility and a broader scope of attention as indicated by facilitated set-switching, but higher distractibility and reduced maintenance. However, some studies also highlight the fragility of this modulatory influence depending on specific experimental context conditions. Using emotional pictures, we initially aimed for replicating the differential effects of positive affect in two behavioral tasks. In study 1 and 2 we tested the complementary effects of reduced perseveration and increased distractibility in a set switching task modified for the purposes of a planned fMRI study. In study 3 we focused on the reduced maintenance capability in a continuous performance task. Taken together, all three studies reveal the complexity and fragility of emotional modulatory effects on cognitive control, but at the same time enable us to identify the constraints that yield most reliable modulatory effects in behavior.

POSTER SESSION II (Friday 17:30-18:30)

THE EFFECTS OF SUBCLINICAL DEPRESSIVE SYMPTOMS AND DOPAMINERGIC MEDICATION ON SPATIAL LEARNING AND MEMORY IN PARKINSON'S DISEASE

Yuliya Stankevich[1], Franka Thurm[2], Ricarda Evens[1], Oliver Riedel[1,3], Alexander Storch[4], Mareike Fauser[4], Shu-Chen Li[2], Ulrike Lueken[1,5]

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In Parkinson's disease (PD), depression and cognitive deficits are frequent sequelae and their relationship has been well documented. Depressed PD patients display deficits and impaired performance in tasks of executive functions compared to non-depressed PD patients. However, little is known about the effects on spatial learning in PD patients, depressive symptomatology, and their modulation by dopaminergic medication. In the present study, we examined the dopaminergic modulation of spatial learning and memory in relation to subclinical depressive symptoms in 34 PD patients. By means of a median split of the Montgomery-Asberg Depression Rating Scale (MADRS), we compared a group of PD patients with low depressive symptoms (ldPD) with a group of PD patients with high depressive symptoms (hdPD) regarding their spatial learning performance on- and off- dopaminergic medication. The results revealed a significant interaction effect between medication status and the degree of depressive symptoms, with the hdPD group showing reduced spatial learning performance off-medication compared to on. Present findings suggest that under dopaminergic substitution spatial learning is not affected in PD patients with subclinical depressive symptoms, whereas in a dopamine-insufficient state, depressive symptoms are followed by deficits in spatial learning. PD patients with subclinical depressive symptoms may exhibit alterations in dopamine system functionality and could be vulnerable to specific cognitive deficits which rely on striatal interactions.

POSTER SESSION II (Friday 17:30-18:30)

EXPLORING THE DYNAMICS OF VOLITION BY DOVETAILING CONTINUOUS MEASURES AND COMPUTATIONAL MODELLING: EXAMPLES FROM SELECTIVE ATTENTION AND IDEOMOTOR LEARNING

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One crucial – yet often neglected – aspect of goal-directed behavior is that it emerges from an incessant stream of thoughts and actions that evolve continuously over time. Our group explores these continuous dynamics by combining dynamic computational models of volition with continuous empirical measures and data analytical techniques. Here, we present two recent examples of our work. Example 1 is an application of our dynamic approach to the enduring debate whether or not selective attention incorporates inhibitory in addition to excitatory sub-processes. To this end, we built two dynamic neural field (DNF) models of attentional selection representing the diverging assumptions. Comparisons of modeled and human movement trajectories in an attentional set-switching paradigm revealed evidence for an amplificatory but no indication of an inhibitory attentional bias. Example 2 focuses on the role of action effects for action planning and selection as another facet of goal-directed behavior. We propose an integrative DNF model that has been implemented successfully to simulate one central ideomotor study and that will explain a number of key findings from the ideomotor literature. The model lays important groundwork for further investigations into the acquisition of both stimulus- and response-effect-compatibility and their impact on action planning and control. Together, these examples demonstrate that harvesting the continuity of thought and action through both computational modeling and empirical measurement provides a valuable extension to the study of volition and cognitive control.

POSTER SESSION II (Friday 17:30-18:30)

LOSING CONTROL: ERROR-RELATED BRAIN ACTIVITY PREDICTS EVERYDAY SELF-CONTROL FAILURES

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Self-control failures (SCFs) occur in most people's everyday lives, but the frequency and severity of SCFs varies between individuals. In the present study, we combined experience sampling and BOLD-fMRI to investigate the relationship between self-control failures (SCFs) and error-related brain activity.126 participants (67 females, 49 males, mean age = 22.24 years) underwent smartphone-based experience sampling for a week to assess everyday self-control. Participants reported the occurrence of conflicting desires, the strength of desire and conflict, and enactment of desires. Subsequently, participants performed a Counting Stroop task during BOLD-fMRI to obtain neural correlates of error-processing. Hierarchical linear modeling was used to investigate how error-related brain activity relates to everyday self-control. We found that SCFs were most likely to occur in situations where desire strength was high and/or conflict strength was weak, and that self-control was predicted by error-related brain activity.

POSTER SESSION II (Friday 17:30-18:30)

NEUROCOGNITIVE MECHANISMS OF SHIELDING GOAL-DIRECTED FROM HABITUAL ACTIONS

Katharina Zwosta, Hannes Ruge, Thomas Goschke, Uta Wolfensteller

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Goal-directed behavior is characterized by choosing actions in a certain situation according to the expected and desired outcome, thereby enabling flexible response selection in different situations depending on changing goals. In contrast, habitual behavior is based on inflexible stimulus-response associations often induced by overtraining. Previous studies indicate that different neural networks are selectively involved in both kinds of action control. However, it remains unclear how goal-directed behavior is shielded from habitual action tendencies when both systems compete. In the presented study we aim at investigating the resolution of conflict between goal-directed and habitual actions and interindividual differences that affect the ability to pursue goals in spite of competing habits. Therefore we devised a novel experimental paradigm in which habits are established by overtraining either approach or avoidance behavior and by putting these two types of habits in competition to goal-directed actions. Based on this design, we can also investigate the influence of individual differences in processes during learning from reward and punishment on later goal-shielding which might potentially be relevant for several mental disorders, like addiction or eating disorders. The results of the behavioral pilot studies and the outline of the planned fMRI study are presented.

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