CONTENT

WELCOME

It is a pleasure for us to welcome all of you to the SFB 940 Spring School 2013 »Approaches to volition«. During the next two days, we will convene here at the NH Hotel in the centre of Dresden to discuss a wide variety of approaches to the volitional control of emotions, motivation and action as well as the means to study them.

Symposia on philosophical, developmental, functional, action-oriented, computational, and neuroimaging approaches to volition will be held by international experts who will present the latest developments in their fields and thereby provide a common background for the attending PhD students upon which they can develop and advance their own studies and projects. The accompanying workshops will impart knowledge on neuroanatomy and key skills in data analysis.

In addition, this Spring School features two special issues (*Science Biographies* and *Women in Science*) which aim to stimulate reflection and discussion about careers in science in general and female careers in science in particular as well as to provide advice and help.

We are thus pleased that we could bring together researchers from diverse fields and several countries. We would like to thank the invited speakers and the organizers of the workshops who came here to share their knowledge, expertise, and experiences with the students of our PhD program MGK volition.

We would also like to thank the PhD students themselves who will have the opportunity to meet leading international experts in the fields of volition, but also to present and discuss their own research within an international and interdisciplinary context. We hope that the SFB Spring School will foster your further achievement.

We wish you a most stimulating meeting and 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 (Wednesday 20 March 2013)

Workshop 1(Neuroanatomy): University Hospital C.G. Carus, TUD, Medizinisch Theoretisches Zentrum (Fiedlerstr. 42), Hörsaal 1

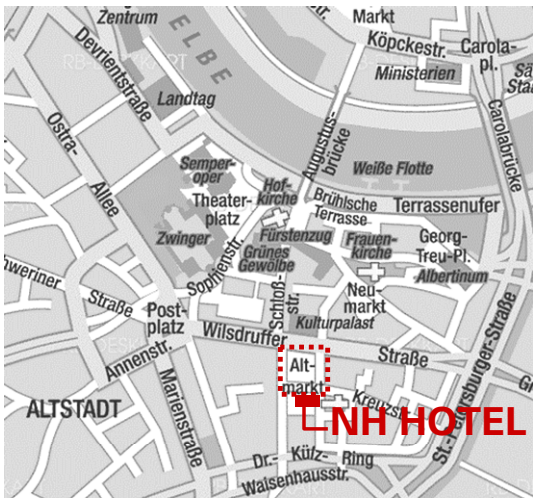
Workshop 2 (MatLab): TUD, Willersbau, Room A 222

Workshop 3 (Computational Modeling): TUD, Willersbau, Room B 221

Spring School (Thursday 21 March and Friday 22 March 2013)

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

Symposia: Room "August der Starke"
Poster sessions: Room "Semper 3"



Spring School Social Evening (Thursday 21 March 2013)

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

Spring School Dinner (Friday 22 March 2013)

La Osteria, Kreuzstraße 1, 01067 Dresden

PROGRAM AND TIME TABLE

Wednesday 20 March 2013

Workshop 1:	Neuroanatomy Lab Course Richard Funk, József Jászai (Faculty of Medicine C.G. Carus, TU Dresden, Germany)
Workshop 2:	Introduction to MATLAB Kersten Diers (TU Dresden, Germany)
Workshop 3:	Bayesian Computational Modeling Alvaro Guevara (TU Dresden / Universidad de Costa Rica, Costa Rica)

Thursday 21 March 2013

Symposium 1:	Philosophical Approaches Henrik Walter (Charité Berlin, Germany)
Symposium 2:	Functional Approaches Thomas Goschke (TU Dresden, Germany)
Special Issue:	Science Biographies
Symposium 3:	Action-oriented Approaches Patrick Haggard (University College London, UK)

Poster Session I

Friday 22 March 2013

Symposium 4:	Computational Approaches Randall O'Reilly (University of Colorado Boulder, USA)
Symposium 5:	Developmental Approaches Yuko Munakata (University of Colorado Boulder, USA)
Special Issue:	Women in Science
Symposium 6:	Neuroimaging Approaches Birte U. Forstmann (University of Amsterdam, Netherlands)

Poster Session II

PROGRAM AND TIME TABLE

	Wed 20 Mar 2013	Thu 21 Mar 2013	Fri 22 Mar 2013
09:00	Workshop 1: **Neuroanatomy Lab Course** Workshop 2: **Introduction to MatLab** Workshop 3: **Computational Modeling**	Symposium 1 **Philosophical Approaches**	Symposium 4 **Computational Approaches**
10:00		Break	Break
11:00		Symposium 2 **Functional Approaches**	Symposium 5 **Developmental Approaches**
12:00		Lunch	Lunch
13:00		**Science Biographies**	**Women in Science**
14:00			
15:00		Break	
16:00		Symposium 3 **Action-oriented Approaches**	Break Symposium 6 **Neuroimaging Approaches**
17:00		**Poster Session I**	**Poster Session II**
18:00			
19:00		Social Evening	Dinner
20:00			

WORKSHOP 1: NEUROANATOMY (Wednesday 09:00-17:00)

NEUROANATOMY LAB COURSE

Richard Funk, József Jászai

Institute for Anatomy, Faculty of Medicine C.G. Carus, Technische Universität Dresden

Understanding macroscopic structure of the *central nervous system* (CNS) is the basis for learning pathways, functional circuits subserving higher cognitive function. Therefore, the study of external and internal morphology of the CNS in a wet lab (i.e. dissection-room) significantly facilitates learning of functional systems (in lecture courses or in computer labs) that makes up the most significant portion of many neuroanatomical courses. Without previous visual experience, it is an extremely difficult task to overcome.

The neuroanatomy course provides a broad overview of the structure of the CNS dealing with representative levels of the neuraxis, with a principal focus on issues relevant to further understanding of functional aspects the nervous system. The main objectives of the course are to (1) provide the students with a basic working knowledge and nomenclature of the central nervous system and (2) to present the basic functional neuroanatomy required to understand the functional systems. These objectives are achieved by use of fixed specimens of whole brains in a step-by-step dissection procedure and brain sections to provide a general overview of the 3-D structure of the brain.

Course venue: University Hospital C.G. Carus, Medizinisch Theoretisches Zentrum (MTZ), Hörsaal 1, Fiedlerstraße 42

WORKSHOP 2: MATLAB (Wednesday 09:00-17:00)

INTRODUCTION TO MATLAB

Kersten Diers, Amir Javadi

Institute of Differential and Personality Psychology, Technische Universität Dresden
Section of SystemsNeuroscience, Technische Universität Dresden

The course will provide an introduction to Matlab, a computing environment and programming language widely used in psychology and the neurosciences. The course consists of four sessions (90 min each) and covers basic concepts as well as their scientific applications. During the two morning sessions, we will a) give a general overview of the program and its components, b) discuss in some detail how Matlab handles data representation, processing and visualization, and c) give a general introduction to scientific programming. During the afternoon sessions, students will choose one of several real-world problems that can be solved based on the knowledge acquired in the previous sessions, and are encouraged to develop and present own solutions to these problems. Tutors will assist, if necessary. The course is suited for all students without requiring any previous Matlab or programming experience.

Course dates:

Friday, March 8, 09:15 AM - ca. 05:00 PM
Wednesday, March 20, 09:15 AM - ca. 05:00 PM

Courses will be identical.

Course venue: Technische Universität Dresden, Willersbau, Room A222

WORKSHOP 3: COMPUTATIONAL MODELING (Wednesday 09:00-17:00)

BAYESIAN COMPUTATIONAL MODELING

Alvaro Guevara

Section of SystemsNeuroscience, Technische Universität Dresden
Escuela de Matemática, Universidad de Costa Rica, Costa Rica

A current trend in cognitive sciences corresponds to Bayesian data analysis techniques in order to make inferences from recorded data. To this day, nevertheless, most of the statistics curriculum in undergraduate psychology and neuroscience programs still centers around the classical (frequentist) approaches, thus causing most students to perceive Bayesian analysis as an advanced and rather complicated approach.

The goal of this workshop is to introduce the attendees into the Bayesian mentality for data analysis and demonstrate its applicability in experimental designs. The workshop will consist of an introductory morning session, with theoretical results and worked examples, followed by a hands-on practical afternoon session, in which the morning examples will be further explored. It is designed for students in cognitive sciences with no major mathematical and/or statistical training; for the practical session, though, previous exposure to MATLAB would prove very useful.

Course venue: Technische Universität Dresden, Willersbau, Room B 221

SYMPOSIUM 1: PHILOSOPHICAL APPROACHES (Thursday 09:00-10:30)

THE WILL: FROM METAPHYSICAL PROBLEMS TO EMPIRICAL CHALLENGES

Henrik Walter

Department of Psychiatry and Psychotherapy, Division of Mind and Brain Research, Charité – Universitätsmedizin Berlin

In this talk, I will give a short overview on the metaphysical problems of free will in philosophy and will present some of the ideas and concepts that are the basis for philosophical discussions. The metaphysical problem of free will is whether and how determinism and chance do impair our status as morally responsible beings. The empirical challenge is how we can understand and explain the capacity for intentional and controlled action in general and for morally relevant action in particular.

In order to become aware of the differences between the philosophical and the empirical approach, it is helpful to make explicit some of the conceptual misunderstandings plaguing interdisciplinary discussions. The same or at least very similar words are used to refer to different concepts. I will pinpoint some of those basic confusions in order to make interdisciplinary discourse more transparent and easy. These freedom of will versus freedom of action, free will versus will in general, free will as a moral concept versus volition as a capacity, akrasia (weakness of the will) versus little willpower, and will as a driving force versus volition and motivation.

Finally, we will discuss how empirical investigations may lead to conceptual change in philosophy.

SYMPOSIUM 2: FUNCTIONAL APPROACHES (Thursday 11:00-12:30)

INTENTIONS, CONTROL DILEMMAS, AND THE DYNAMIC REGULATION OF COGNITIVE CONTROL

Thomas Goschke

Institute of General Psychology, Technische Universität Dresden

After having been a topic of philosophical debates for millennia, in the past two decades volition has become a central research topic in psychology and cognitive neuroscience. In this research, volition is not conceived of as an undetermined "free will" but investigated from a naturalistic perspective, which aims to functionally decompose volition into basic cognitive control mechanisms (e.g., anticipation of future consequences, flexible reconfiguration of response dispositions, response inhibition, and emotion regulation).

Despite impressive progress in elucidating the neurocognitive mechanisms underlying cognitive control, fundamental questions remain unresolved: How do conscious intentions control voluntary action? Which mechanisms underlie self-control and the ability to overcome habitual or emotional responses in favor of long-term goals? How is cognitive control itself "controlled" and dynamically adapted to changing task demands? This lecture addresses these questions from the perspective of an integrative theoretical framework according to which goal-directed action in a changing environments confronts agents with a set of antagonistic adaptive challenges ("control dilemmas"), e.g., to shield goals from distraction vs. to flexibly switch between goals (*shielding-shifting-dilemma*); to focus attention on goal-relevant stimuli vs. to monitor the environment for potentially significant stimuli (*selection-monitoring-dilemma*); to exploit learnt reward contingencies vs. to explore novel but potentially more rewarding actions (*exploitation-exploration-dilemma*). This functional framework raises the central, yet neglected question of how the balance between complementary control modes and associated control parameters is dynamically regulated. I will discuss recent evidence on the role of conflicts, emotions, and stress in the dynamic regulation of cognitive control.

SYMPOSIUM 3: ACTION-ORIENTED APPROACHES (Thursday 15:30-17:00)

"FREE WILL" AND "FREE WON'T"

Patrick Haggard

Institute of Cognitive Neuroscience, University College London, UK

Several converging lines of evidence suggest that volition is as much about intentionally inhibiting actions as about initiating them. I accordingly make a distinction between negative volition, and positive volition, and outlines some of the ways that these may interact. Studying negative volition has proved methodologically tricky for two reasons. First, the internally-generated nature of volition makes it difficult to control the inputs to the system. Second, the absence of behavioural outputs makes it difficult to measure the operations of the system objectively.

In this talk, I will outline some of the computational and neural models that can be used to investigate the interactions between positive and negative volition. I will use neurophysiological and patient data to suggest that the voluntary decision to act or not depends on a series of identifiable, and temporally-specific brain processes. Finally, the specific importance of these processes for responsibility for action will be considered.

SYMPOSIUM 4: COMPUTATIONAL APPROACHES (Friday 09:00-10:30)

HOW ADAPTIVE CONTROL EMERGES FROM MULTIPLE INTERACTING BRAIN SYSTEMS

Randall O'Reilly

Department of Psychology and Neuroscience, Institute of Cognitive Sciences, University of Colorado Boulder, USA

Everyone seems to agree that the prefrontal cortex (PFC) plays a critical role in executive control. But often it is treated as somewhat of a homunculus – a "little person" in the head that mysteriously manifests the very same intelligence that we seek to understand in the first place.

In ongoing work, my colleagues and I have been attempting to deconstruct this homunculus, by understanding how adaptive cognitive control emerges from the interactions of multiple specialized brain systems, including the basal ganglia and associated subcortical affective systems, the parietal cortex, and the hippocampus, all interacting with different subregions of the vast PFC system. We use biologically-based computational models to understand how these systems interact in complex ways to produce adaptive overall behavior. This talk will present an overview of the current state of our models, and some exciting new directions of current research.

SYMPOSIUM 5: DEVELOPMENTAL APPROACHES (Friday 11:00-12:30)

DEVELOPMENTAL TRANSITIONS IN THE DYNAMICS OF COGNITIVE CONTROL: IMPLICATIONS FOR MEMORY AND INTERVENTION

Yuko Munakata

Department of Psychology, Institute of Cognitive Sciences, University of Colorado Boulder, USA

Children show dramatic improvements in cognitive control over the first decade of life. Many theories have focused on quantitative changes that occur with development, but we have discovered that children show a qualitative shift in the dynamics of cognitive control, from a reactive form, where control is engaged only as needed in the moment, to a proactive form, where control is engaged in anticipation of needing it.

Although this shift is generally viewed as adaptive, with proactive control conferring benefits to children's behavior, there are cognitive trade-offs, such that the development of proactive control also confers costs, to memory retrieval processes. The shift from reactive to proactive control also has implications for interventions to improve children's inhibitory control; our work suggests that supporting reactive processes is effective in children prior to the shift, while training proactive processes is effective in children after the shift.

SYMPOSIUM 6: NEUROIMAGING APPROACHES (Friday 16:00-17:30)

MODEL-BASED NEUROIMAGING

Birte U. Forstmann

Faculty of Social and Behavioral Sciences, Programme Group Developmental Psychology, University of Amsterdam, The Netherlands

Cognitive neuroscientists study how the brain implements particular cognitive processes such as perception, learning, and decision-making. Traditional approaches in which experiments are designed to target a specific cognitive process have been supplemented by two recent innovations. First, formal models of cognition can decompose observed behavioral data into multiple latent cognitive processes, allowing brain measurements to be associated with a particular cognitive process more precisely and more confidently. Second, cognitive neuroscience can provide additional data to inform the development of cognitive models, providing greater constraint than behavioral data alone.

In this talk, I will argue that these fields are mutually dependent. I will present a series of model-based neuroimaging experiments including data from ultra-high resolution 7T structural and functional magnetic resonance imaging and diffusion weighted imaging. The experiments set out to understand the fronto-basal ganglia network in strategically adjusting response thresholds by combining neuroimaging data with parameters from a mathematical model for response times. The results will be discussed in light of cortico-basal ganglia networks implementing flexible adaptive behavior.

SPECIAL ISSUE I: SCIENCE BIOGRAPHIES (Thursday 13:30-15:00)

KARRIERE IN DER WISSENSCHAFT – ABER WIE?

Angelika Buske-Kirschbaum[1], Birte U. Forstmann[2], Thomas Goschke[1], Alexander Strobel[1]

[1] Technische Universität Dresden, Germany
[2] University of Amsterdam, The Netherlands

Doktoranden entscheiden sich zumindest für einige Jahre für eine Tätigkeit in der Wissenschaft und für nicht wenige ist das gleichzeitig der Startpunkt einer akademischen Laufbahn. Welche Möglichkeiten und Probleme erwarten aber Wissenschaftler im Laufe einer akademischen Karriere? Welche Rolle spielt die Wahl des Promotionsthemas? Wie und in welcher Form kann man sich Hilfe und Unterstützung organisieren? Gibt es absehbare Durststrecken? Oder ist die Laufbahn am Ende doch nicht wirklich planbar? Wie sieht es mit der Vereinbarkeit von Familie und akademischen Beruf aus? …

Im Rahmen der *Science Biographies* werden vier Wissenschaftler von Ihrem z.T. recht unterschiedlichen akademischen Werdegang berichten. Im Anschluss an die Vorträge besteht Gelegenheit zu Fragen und Diskussion mit den Referenten. Die Veranstaltung wird in deutscher Sprache durchgeführt.

SPECIAL ISSUE II: WOMEN IN SCIENCE (Friday 13:15-14:15)

HINTERGRÜNDE UND UMSETZUNG VON GLEICHSTELLUNGSMAßNAHMEN AN DER TU DRESDEN

- IMPULSVORTRAG -

Hildegard Küllchen

Technische Universität Dresden

In ihrem Impulsreferat wird Frau Dr. Küllchen die Hintergründe und Grundlagen der Arbeit zur Gleichstellung von Mann und Frau verdeutlichen, bereits vorhandene Maßnahmen an der Technischen Universität Dresden vorstellen und auf die Forschungsorientierten Gleichstellungsstandards der Deutschen Forschungsgemeinschaft eingehen. Sie plädiert für das beherzte Ergreifen von Chancen, das Kommunizieren eigener Erfolge sowie die selbstverständliche Einbindung von Wissenschaftlerinnen in die Scientific Community, ohne den Blick auf vorhandene hinderliche Mechanismen zu verlieren.

Leitend für ihre Arbeit ist ein Zitat von Simone de Beauvoir: „Frauen, die nichts fordern, bekommen das, was sie fordern: Nichts." An den Vortrag schließen sich eine Diskussion sowie die Gelegenheit für Fragen und den Austausch mit Frau Dr. Küllchen an. Die Veranstaltung richtet sich an alle interessierten Teilnehmerinnen und Teilnehmer der Spring School und wird in deutscher Sprache durchgeführt.

Dr. Hildegard Küllchen, Pädagogin mit den Arbeits- und Forschungsschwerpunkten Schule, Berufsorientierung und -findung, Frauen in der Wissenschaft sowie Feministische Wissenschaft. 1997 Promotion in Bielefeld, Referentin und Moderatorin in der Lehrerfortbildung Nordrhein-Westfalens zu den Themen Koedukation, geschlechtsspezifische Sozialisation, Fachwahlmotive und Leistungsmotivation, Zukunftsvorstellungen von Jugendlichen, Berufsorientierung für Mädchen im Gymnasium. Seit 2004 bestellte Frauenbeauftragte der Technischen Universität Dresden.

SPECIAL ISSUE II: WOMEN IN SCIENCE (Friday 14:15-15:30)

DAS WOMEN-IN-SCIENCE-PROGRAMM DES SFB 940: INHALTLICHE UND STRUKTURELLE ÜBERLEGUNGEN

- WORKSHOP -

Angelika Buske-Kirschbaum[1], Anja Strobel[2]

[1] Institute of Biological Psychology, Technische Universität Dresden
[2] Institute of Process-Oriented Assessment, Technische Universität Dresden

In der Veranstaltung werden zunächst die Ergebnisse einer Erhebung präsentiert, die unter den Doktorandinnen und Post-Doktorandinnen des SFB 940 durchgeführt wurde und den Bedarf der Wissenschaftlerinnen sowohl an Inhalten als auch den dafür geeigneten Veranstaltungsformen eines Women-in-Science-Programms ermitteln sollte. Was erwarten die Wissenschaftlerinnen von einem solchen Programm? Wie hoch ist der Bedarf? Geht es eher um Austausch, Beratung und Vorbilder, oder ist vielmehr pragmatische Unterstützung z.B. bei der Betreuung von Kindern nötig? Wesentliche Schwerpunkte werden herausgegriffen und anschließend in Kleingruppen bearbeitet und konkretisiert, um innerhalb des Programms passgenaue Angebote erstellen zu können. Die Veranstaltung richtet sich an die Doktorandinnen und Post-Doktorandinnen des SFB 940 und wird in deutscher Sprache durchgeführt.

POSTER SESSION I (Thursday 17:00-18:30)

A – Mechanisms of Volitional Control

A2 (1): Effect Anticipation and the online control of stimulus-based action – an fMRI study (Steffi Frimmel)

A2 (2): An integrative role of the posterior temporo-parietal junction in explicit goal-directed behavior (Katharina Zwosta)

A3 (3): Implicit and explicit adjustments of cognitive control in dual-task performance (Caroline Gottschalk)

A4 (4): Prospective memory development across childhood and adolescence - exploring the effects of cue salience and implementation intentions (Anett Kretschmer)

A5 (5): Volitional emotion regulation: the costs of control (Kersten Diers, Fanny Weber)

A6 (6): Decomposing willpower: ignoring distraction, resisting temptation and enduring aversiveness (Rosa Steimke)

B – Modulators of Volitional Control

B1 (7): Emotional modulation of cognitive control: effects of positive affect and reward cues on the shielding-shifting balance (Ulrike Schulz, Irena Domachowska)

B1 (8): The multidimensional nature of flexible task-control (Uta Zimmermann)

B2 (9): The more the merrier? Towards a better understanding of an effective modulation of perceptual breadth of attention (Christina Heitmann)

B3 (10): To work or not to work: anticipatory brain activation in NAcc and VTA encode effort differentially (Nils B. Kroemer)

B5 (11): Stress enhances the velocity of information processing in a Simon task as revealed by a diffusion modeling approach (Robert Miller)

B5 (12): The flexible regulation of cognitive control in dual-task performance in conditions of acute psychosocial stress (Susann Schade)

B5 (13): Seasonal changes in conflict adaptation in patients with seasonal allergic rhinitis (SAR) – preliminary results (Katharina Trikojat)

POSTER SESSION I (Thursday 17:00-18:30)

EFFECT ANTICIPATION AND THE ONLINE CONTROL OF STIMULUS-BASED ACTION – AN FMRI STUDY

Steffi Frimmel, Uta Wolfensteller, Hannes Ruge

Institute of General Psychology, Technische Universität Dresden

A fundamental prerequisite of goal-oriented behavior is to correctly recognize associations between events, such as for instance, between a certain action (pressing a green button) in a certain context (the coffee maker in the cafeteria) and a certain subsequent event (coffee). Previous behavioral studies have shown that such associations between events can be linked up very fast.

The present study investigated the brain activation dynamics linked to the initial incremental strengthening of associations between stimuli (S), response (R), and effect (E) during an early and short period of learning of novel instructed arbitrary S-R-E-mappings using functional magnetic resonance imaging. In order to directly compare different types of action control we manipulated the type of association that could be acquired, including the full S-R-E association, and the two partial associations between R and E and between S and R associations. The results suggest that picking up a triple S-R-E association specifically enhanced activation related to action control in the supplementary motor area (SMA). Thereby the present study corroborates and extends previous findings on the involvement of the SMA in the retrieval of learned action-effect associations.

POSTER SESSION I (Thursday 17:00-18:30)

AN INTEGRATIVE ROLE OF THE POSTERIOR TEMPORO-PARIETAL JUNCTION IN EXPLICIT GOAL-DIRECTED BEHAVIOR

Katharina Zwosta, Hannes Ruge, Uta Wolfensteller

Institute of General Psychology, Technische Universität Dresden, Germany

Goal-directed behavior requires making associations between a certain action, a certain situation and the resulting effect, thus enabling flexible response selection in different situations according to the anticipated goal state. In contrast, stimulus-based behavior relies on associations between a certain situation and a certain action without effect anticipation.

In the present fMRI study we directly manipulated the degree of explicit goal-directedness through instruction using non-incentive visual effects that appeared contingently if a certain response was produced in a specific situation. We compared an effect-based instruction where subjects were explicitly instructed to produce a specific effect color with an otherwise identical stimulus-response-rule-based condition where stimulus-response mappings were instructed. A cluster in the right posterior temporo-parietal junction (pTPJ) comprising the angular gyrus showed stronger activity in the effect-based condition. Functional connectivity analyses resulted in stronger functional coupling between the right pTPJ and caudate head, hippocampus, cerebellum, rostrolateral prefrontal cortex, orbitofrontal cortex and occipital cortex during effect-based blocks. Our results hint at an important role of the pTPJ during goal-directed behavior and we conclude that explicit goal-directed behavior is mediated by a network of several regions that are integrated by the pTPJ.

POSTER SESSION I (Thursday 17:00-18:30)

IMPLICIT AND EXPLICIT ADJUSTMENTS OF COGNITIVE CONTROL IN DUAL-TASK PERFORMANCE

Caroline Gottschalk[1], Gesine Dreisbach[2], Rico Fischer[1]

[1] Institute of General Psychology, Technische Universität Dresden
[2] Institute of General and Applied Psychology, Universität Regensburg

The simultaneous handling of two tasks requires an adaptive regulation of cognitive control to shield prioritized primary task processing from crosstalk-interference caused by secondary task processing. The flexibility of primary task-set shielding was investigated by location-dependent manipulations of between-task crosstalk-interference proportions (i.e., high vs. low crosstalk location).

In Experiment 1, participants implicitly learned to dynamically adjust the extent of primary task-set shielding in a location-specific manner: In Block 2, task-set shielding was increased at the location associated with higher between-task interference. Additional cues, validly indicating the interference level in the next trial did not help to further optimize task-set shielding (Experiment 2). However, cues indicating the location of subsequent stimulus-presentation resulted in an instant adjustment of task-set shielding also in the first part of the experiment (Experiment 3). These results highlight the role of situation-based (implicit) and cue-based (explicit) regulations of cognitive control in primary task-set shielding in dual-tasks.

POSTER SESSION I (Thursday 17:00-18:30)

PROSPECTIVE MEMORY DEVELOPMENT ACROSS CHILDHOOD AND ADOLESCENCE – EXPLORING THE EFFECTS OF CUE SALIENCE AND IMPLEMENTATION INTENTIONS

Anett Kretschmer[1], Mareike Altgassen[1,2]

[1] Institute of Developmental Psychology, Technische Universität Dresden
[2] Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands

The primary aim of the present research project is to investigate volitional control processes that may underlie prospective memory (PM) development across childhood and adolescence. Until now, most PM research focused on the intention initiation and execution phases of PM, whereas very little is known about the influence of intention formation on the ability to remember these intentions at a later (time-)point.

The present studies aim to close this gap. Specifically, the impact of implementation intentions (if-then plans) on PM will be investigated while varying volitional control demands. The first three studies focus on possible beneficial effects of implementation intentions on PM, while studies 4 and 5 address possible detrimental effects. Applying a cross-sectional design, 9, 12 and 15 years old children are included. The present poster will present preliminary results of study1 which targets the effects of implementation intentions (between-subject factor) on PM performance under high vs. low PM cue salience (within-subject factor). As ongoing activity children work on a 2-back working memory task. For the PM task children are to respond to specific target cues that are either presented in the same (high volitional control demands) or in a different format than ongoing task items (low volitional control demands).

POSTER SESSION I (Thursday 17:00-18:30)

VOLITIONAL EMOTION REGULATION: THE COSTS OF CONTROL (Project A5)

Kersten Diers[1], Fanny Weber[2], Henrik Walter[3], Sabine Schönfeld[2], Burkhard Brocke[1], Alexander Strobel[1]

[1] Institute of Differential and Personality Psychology, Technische Universität Dresden
[2] Institute of Clinical Psychology and Psychotherapy, Technische Universität Dresden
[3] Department of Psychiatry and Psychotherapy, Charité - Universitätsmedizin Berlin

Project A5 investigates the effectiveness and potential costs of the inhibition of prepotent emotional responses. As prototypical examples of volitional control, different cognitive emotion regulation strategies (distraction, detachment, reinterpretation, and allowance) will be compared with respect to their behavioral and neural effectiveness, i.e. their success in changing emotional processing. An additional focus of the project is the temporal dynamics, which will be measured along a prolonged timescale in order to examine the potential costs of volitional emotion regulation. Such costs may be operationalized as paradoxical immediate and delayed regulatory after-effects in the activation of the amygdala, a core brain structure involved in emotional processing and regulation. We report the results of two pilot studies. Using behavioral, psychophysiological and imaging data, we show how volitional regulation can alter emotional processing.

In particular, we find that amygdala activation is decreased, and inferior frontal activation increased, during detachment from unpleasant visual stimuli as compared to passive viewing of unpleasant stimuli. In addition, we demonstrate that emotion regulation strategies are not only associated with specific spatial, but also specific temporal activation patterns. We finally discuss how the results of the pilot experiments contribute to the optimization of the final experimental paradigm.

POSTER SESSION I (Thursday 17:00-18:30)

DECOMPOSING WILLPOWER: IGNORING DISTRACTION, RESISTING TEMPTATION AND ENDURING AVERSIVENESS

Rosa Steimke[1,2,3,4], Christine Stelzel[1,2,3,4], Marcus Rothkirch[1], Lena Paschke[1,2,3,4], Vera Ludwig[1,2,3,4], Robert Gaschler[1,3], Ima Trempler[1], Thomas Goschke[5], Norbert Kathmann[2,3], Henrik Walter[1,2,3,4]

[1] Department of Psychiatry and Psychotherapy, Charité – Universitätsmedizin Berlin
[2] Berlin School of Mind and Brain, Berlin
[3] Institute of Psychology, Humboldt Universität zu Berlin
[4] Berlin Center for Advanced Neuroimaging, Charité – Universitätsmedizin Berlin
[5] Institute of General Psychology, Technische Universität Dresden

Willpower is defined as the ability to reach long-term goals despite distractions, temptations or aversive effects. Here we developed a new paradigm testing all three functions in one task: Healthy participants (n = 110) were cued on which side of the screen a target letter ('E' or 'F') would be briefly flashed after a variable interval and had to decide on its identity. Within the cue-target interval four kinds of distractors were presented: erotic and neutral distractors contralateral to the target and disgusting and neutral distractors ipsilateral to the target location.

An effect of temptation (erotic versus neutral), aversiveness (disgusting versus neutral) and distraction (neutral versus no distractor) was indicated by significantly increased error rates and reaction times. In addition, aversive distraction was associated with higher gaze distance from the target position during the distractor presentation, whereas temptation was associated with more looking around on the screen. Both were associated with larger pupil diameter. Factor analysis revealed that the three contrasts do not load on a single factor, indicating that these three components tap independent aspects of willpower.

POSTER SESSION I (Thursday 17:00-18:30)

EMOTIONAL MODULATION OF COGNITIVE CONTROL: EFFECTS OF POSITIVE AFFECT AND REWARD CUES ON THE SHIELDING-SHIFTING BALANCE

Ulrike Schulz, Irena M. Domachowska, Anette Bolte, Hannes Ruge, Thomas Goschke

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The current research will investigate the neurological mechanisms of how cognitive control is modulated by emotional and reward processes. Increasing evidence shows that emotions modulate the balance between complementary cognitive functions - goal shielding and switching. In particular, positive affect has been shown to shift this balance towards a greater flexibility and a broader scope of attention, as indicated by facilitated set-switching, but higher distractibility. On a neural level, there is evidence that the balance between stable maintenance and flexible switching depends on interactions between the basal ganglia and lateral prefrontal cortex. However, there is little knowledge about the relation between reward and positive affect in the modulation of cognitive control. In the first study we will use a modified set-switching task (Dreisbach & Goschke, 2004) and event-related fMRI to test whether positive emotional stimuli and reward cues elicit similar activation patterns in reward-related brain areas and whether this activation predicts the hypothesized changes in the cognitive functions.

POSTER SESSION I (Thursday 17:00-18:30)

THE MULTIDIMENSIONAL NATURE OF FLEXIBLE TASK-CONTROL

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The objective of our research starts with initial findings in task-switching suggesting a cognitive vulnerability for antagonistic task-control in humans. Dreisbach & Goschke (2004) show increasing distractibility when people become more flexible. That's why, our system might be vulnerable for controlling antagonistic states of stability and flexibility. But, we also could have the opportunity to prevent dichotomic states inducing synergistic task-control.

Based on such a multidimensional view, the present study aims to characterize differences between antagonistic and synergistic task-control. We have used hemodynamic brain imaging shared with behavioral analyses. 82 subjects (mean age 26) performed a task-switching-paradigm with the requirement to frequently switch between a letter- and digit-categorization. Targets for both categories appeared in advance of the task-decision. While target-preparation, subjects could estimate the upcoming flexibility. We've controlled the anticipation by cueing the current and future task-transition, probabilistically. The procedure was embedded in an event-related so called partial-trial-design. Imaging data indicate BOLD-differences in upcoming flexibility cued more or less while target-preparation. Based on BOLD-insights in flexibility, behavioral data show evidence for synergistic task-control. Under present task-demands, preparing more upcoming flexibility is associated with reduced distractibility when transition-cueing becomes invalid. The results support a multidimensional framework for flexible task-control (Ruge et al. 2011).

POSTER SESSION I (Thursday 17:00-18:30)

THE MORE THE MERRIER? TOWARDS A BETTER UNDERSTANDING OF AN EFFECTIVE MODULATION OF PERCEPTUAL BREADTH OF ATTENTION

Christina Heitmann, Roland Deutsch

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Studies on the modulation of attentional breadth differ in operational details of the induction method as well as the block length of the measurement task. Unfortunately, there is little research on how these two parameters influence modulatory effects. To close this gap, the aim of this study is two-fold: (1) to compare tasks with different operational details in their ability to effectively modulate attentional breadth, and (2) to examine which measurement-block length is optimal to observe modulatory effects.

We therefore used three different kinds of tasks to manipulate perceptual breadth of attention, which was measured via Navon's letters task. a) The Navon task itself was used to manipulate attentional focus via procedural priming; b) a visual search task induced a broad vs. narrow scope of attention; and c) affective pictures were used as mood and motivational induction to steer attentional focus. Block length of the Navon task was varied on three levels within participants.

POSTER SESSION I (Thursday 17:00-18:30)

TO WORK OR NOT TO WORK: ANTICIPATORY BRAIN ACTIVATION IN NACC AND VTA ENCODE EFFORT DIFFERENTIALLY

Nils B. Kroemer[1], Alvaro Guevara[1], Iuliana Ciocanea Teodorescu[1,2], Caroline Burrasch[1], Franziska Wuttig[1], Andrea Kobiella[1], Michael N. Smolka[1]

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Complex decision-making involves anticipation of future rewards to potentially bias effort for obtaining them. We employed an instrumental-motivation task developed by Bühler et al. (2010) that uses different reward-level cues before a motor response phase lasting 3 s. Specifically, we investigated whether we can predict the motor effort (i.e., pressing a button) beyond reward value and utility (defined as a function of button presses, reward, and effort) from anticipatory cue activation of nucleus accumbens (NAcc) and ventral tegmental area (VTA) on a trial-by-trial basis.

Therefore, we extracted time courses from 46 participants and used a multilevel design as implemented in HLM6. Both anticipatory responses of NAcc and VTA strongly scaled with reward values. Moreover, anticipatory responses were stronger during high-effort trials in NAcc but tended to be weaker in VTA, and reward and effort modulated their functional connectivity. Critically, a model using average utility and residual effort showed exactly the same differential pattern. We conclude that whereas both regions encode reward value and utility similarly, they appear to serve complementary functions in effort processing: stronger anticipatory activation in the VTA indicated low effort (effort discounting) in trials whereas stronger activation in the NAcc indicated high effort (incentive salience).

POSTER SESSION I (Thursday 17:00-18:30)

STRESS ENHANCES THE VELOCITY OF INFORMATION PROCESSING IN A SIMON TASK AS REVEALED BY A DIFFUSION MODELING APPROACH

Robert Miller, Clemens Kirschbaum, Franziska Plessow

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Psychosocial stress has recently been reported to alter cognitive control processes by enhancing one[1]s goal shielding ability at the expense of cognitive flexibility (Plessow et al., 2011). In order to unveil more subtle stress effects, and furthermore, to resolve interpretational ambiguity with regard to stress effects on human information processing in general, a reanalysis of Plessow and colleagues data was performed: Ratcliff[1]s diffusion model (Ratcliff, 1978) was used to estimate 7 distinct parameters from accuracy and reaction time data of each of 48 participants.

This data was obtained in a Simon task, which had to be completed after encountering either the Trier Social Stress Test, or a placebo protocol. Intriguingly, our analysis revealed substantial effects of stress condition on the mean and variance of speed of information accumulation across all Simon trials (d = .57, and d = .27). Congruency within trials altered non-decision time significantly, but did not interact with the experience of psychosocial stress. Response threshold parameters, which are commonly conceived as indicators for the dynamic adjustment of executive processes also remained unaltered. Our results show, that stress exhibits more fundamental effects on information processing that are distinct from its impact on cognitive control in the strict sense.

POSTER SESSION I (Thursday 17:00-18:30)

THE FLEXIBLE REGULATION OF COGNITIVE CONTROL IN DUAL-TASK PERFORMANCE IN CONDITIONS OF ACUTE PSYCHOSOCIAL STRESS

Susann Schade[1], Rico Fischer[2], Clemens Kirschbaum[1], Franziska Plessow[1]

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In dual-task performance, recent research showed increased between-task interference reflecting more parallel task processing in conditions of acute stress. In the present study, we investigated whether this evidence of increased between-task interference under stress represents a stress-related impairment of task shielding or a resource-saving strategy of favouring a more parallel over a more serial task-processing mode.

To test this, 56 healthy participants were exposed to a well-established psychosocial stress-induction protocol (Trier Social Stress Test) or a standardized control situation prior to a dual task. In different blocks, participants were instructed to perform the dual task either in a parallel or in a serial task-processing mode allowing to increase or to reduce between-task interference, respectively. After successful stress induction, as indicated by salivary cortisol and α-amylase, the stress group displayed a flexible instruction-specific adaptation of the amount of between-task interference that did not differ from the control group. The finding that stressed participants can flexibly adopt both, a resource-saving parallel and a resource-consuming serial task-processing mode, speaks against a stress-induced impaired control regulation in dual tasks. Instead, we suggest that stress represents a trigger for a context-sensitive adjustment of cognitive control.

POSTER SESSION I (Thursday 17:00-18:30)

SEASONAL CHANGES IN CONFLICT ADAPTATION IN PATIENTS WITH SEASONAL ALLERGIC RHINITIS (SAR) – PRELIMINARY RESULTS

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Patients with symptomatic allergic rhinitis often complain about subjective impairments in cognitive functioning, while objective evidence for such deficits is still rare. One fundamental aspect of cognitive functioning, important for effective goal-directed behavior, is the flexible adaptation to varying or conflicting situational demands. In this longitudinal pilot study we investigated conflict processing and dynamic adjustments of cognitive control processes in patients with seasonal allergic rhinitis (SAR).

Using a Simon-paradigm, 41 SAR patients and 42 healthy controls were tested during and out of a symptomatic allergy phase. We further explored potential associations of altered control adjustments with aspects of allergic disease and affect. Results showed that patients experience a season-dependent slowing of information processing as well as context-specific changes in dynamic control adjustment. During allergy season patients showed a general slowing in reaction time and enhanced conflict adaptation in trial-to-trial modulation, whereas out of allergy season they showed a reduction in the conflict adaptation effect. The variation in the amount of conflict adaptation was further associated with changes in self-reported anxiety and depression during symptomatic allergy phases. These findings indicate that changing environmental demands are accompanied by changes in the speed of information processing and by specific adjustment of conflict processing in patients with SAR.

POSTER SESSION II (Friday 17:30-19:00)

C – Dysfunctions of Volitional Control

C3 (1): Cognitive flexibility in adolescent patients with anorexia nervosa (Daniel Geisler)

C3 (2): Self-control in adolescent patients with anorexia nervosa (Franziska Ritschel)

C3 (3): Subliminal and supraliminal processing of rewarding stimuli and food stimuli in patients with anorexia nervosa: a project proposal (Ilka Schober)

C3 (4): Explicit emotion regulation in anorexia nervosa: a project outline (Maria Seidel)

C4 (5): Fronto-striatal dysregulation of motivational and cognitive flexibility (Ricarda Evens, Yuliya Stankevich)

C4 (6): Neural substrates and neuroplasticity of interoception (Nina I. Maslowski)

Z – Central Facilities

Z2 (7): Utilization of simultaneously acquired EEG/fMRI data for functional connectivety analysis (Fabian Baum)

Z2 (8): A large-scale multivariate analysis of instruction-based learning Holger Mohr)

F – Associated Fellows

F1 (9): Approaching attention based user interfaces: combining eye movements, EDA & ECG parameters to define optimal points in time to interrupt a working person (Josephine Hartwig)

F2 (10): The development of intentional remembering across the lifespan: behavioral and neural insights (Alexandra Hering)

F3 (11): Deficits in cognitive control and relationship to frequency and subjective controllability of worries: concept of a functional neuroimaging study (Kevin Hilbert)

F4 (12): Goal framing influences automatic approach and avoidance behaviors (Kevin Smith)

POSTER SESSION II (Friday 17:30-19:00)

COGNITIVE FLEXIBILITY IN ADOLESCENT PATIENTS WITH ANOREXIA NERVOSA

Daniel Geisler[1], Franziska Neidel[1], Marion Breier[1], Johannes Zwipp[1], Johanna Hass[1], Christian Panse[1], Dirk Schmidt[2], Amir H. Javadi[3], Stephan Bender[1], Michael N. Smolka[2,3] , Stefan Ehrlich[1]

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Patients with anorexia nervosa (AN) have been described to show rigid approaches to changing rules. Subsequently, reduced cognitive flexibility has been proposed as a trait marker for AN. To date, most studies investigating cognitive flexibility in AN have focused on chronically ill adult patients and therefore do not allow for dissociating trait markers from state markers. The aim of the current study is to investigate the impairment of cognitive flexibility in adolescent patients and young recovered patients.

The ongoing study currently includes 14 patients with acute restrictive AN (mean age 15.3 years), 11 weight-recovered AN (mean age 21.7 years) and 15 healthy female controls (mean age 16.9 years). All participants completed a probabilistic reversal learning task while lying in an fMRI scanner. Participants were instructed to maximize their monetary reward and the underlying implicit task-rules changed repeatedly in order to provoke adaptation of the participants' behavior. Our preliminary analysis suggest that cognitive flexibility of adolescent patients with acute AN and young recovered patients is not impaired. In contrast, recent studies in adult patients with chronic AN repeatedly found impaired set shifting. However, even older recovered AN patients show (if at all) only mildly impaired cognitive flexibility. Taken together, our study suggests that reduced cognitive flexibility may not be a vulnerability factor for AN development, but might become an important aspect of chronic AN.

POSTER SESSION II (Friday 17:30-19:00)

SELF-CONTROL IN ADOLESCENT PATIENTS WITH ANOREXIA NERVOSA

Franziska Ritschel[1], Daniel Geisler[1], Luisa Flohr[1], Marion Breier[1], Franziska Neidel[1], Johanna Hass[1], Ilka Schober[1], Stephan Ripke[2,3], Michael Smolka[2,3], Veit Rössner[1], Stefan Ehrlich[1]

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Patients with anorexia nervosa (AN) are characterized by a very low body weight and still manage to give up immediate rewards (food) for long term goals (slim figure), which might indicate an unusual level of self-control. The aim of the current study was to compare delay discounting in healthy control subjects, patients suffering from acute anorexia and recovered AN participants (cross-sectional design). In addition we re-assessed acute patients after short-time weight restoration (longitudinal design).

We used a monetary delayed reward choice task, assessing the temporal discounting factor (k), which indicates whether an individual prefers a given present reward to a relative higher future reward. The area under the curve (AUC) indicates response consistency. Individual k– and AUC-values were compared using an ANOVA. When analyzing the full sample of the cross-sectional analysis while covarying for age, we found no group differences for k-value. Recovered AN and healthy participants had significantly different AUC-values. After matching the sample for age we saw trend-level effects for both parameters. Furthermore, the longitudinal analysis showed no significant differences. The findings of our preliminary study do not support large differences in temporal delay discounting between patients with AN and healthy controls. A previous pilot study found decreased delay discounting in adult AN patients (Steinglass et al., 2012). Differences between our study and the previous results may be explained by the different age range and chronicity of the patient samples. Future studies using disorder-specific stimuli may help to clarify the role of decreased delay discounting in AN.

POSTER SESSION II (Friday 17:30-19:00)

SUBLIMINAL AND SUPRALIMINAL PROCESSING OF REWARDING STIMULI AND FOOD STIMULI IN PATIENTS WITH ANOREXIA NERVOSA: A PROJECT PROPOSAL

Ilka Schober, Gerit Pfuhl, Maria Seidel, Franziska Ritschel, Daniel Geisler, Veit Rössner, Stefan Ehrlich

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It has been established that subliminal presented rewarding stimuli affect executive control functions and motivation. However it was found that supraliminal presented food pictures disrupt the working memory ability in patients with anorexia nervosa whereas subliminal presented food stimuli had no effect. The aim of this study is to investigate whether subliminal presented food stimuli elicit the same reward-related brain regions in patients with anorexia nervosa (AN) as in healthy controls.

With this study we would like to shed light on the question whether patients with AN have a general dysfunction of reward related processing or whether appetitive reactions towards primary rewards (food) are altered due to a secondary volitional over-regulation. Forty-five female patients with AN, forty-five female patients recovered from AN and forty-five female healthy controls will complete an event-related fMRI paradigm. This paradigm consists of four runs where neutral, social-rewarding or food pictures are presented in an either subliminal or supraliminal way. While participants attend to the visual stimuli, electro dermal activity as a measure for the emotional arousal and eye-tracking to control participants attention to the stimuli, is assessed. In a longitudinal study arm, acute patients with AN will complete the paradigm again after a 10% weight recovery. Details and problems of implementation will be presented and discussed.

POSTER SESSION II (Friday 17:30-19:00)

EXPLICIT EMOTION REGULATION IN ANOREXIA NERVOSA: A PROJECT OUTLINE

Maria Seidel[1], Ilka Schober[1], Gerit Pfuhl[1], Franziska Ritschel[1], Daniel Geisler[1], Laura Soltwedel[1], Veit Rössner[1], Kersten Diers[2], Alexander Strobel[2], Stefan Ehrlich[1]

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Self-regulation and the control of behavior is a prerequisite for achieving important long-term goals and maintaining health. Up to now research has mainly been focusing on the mechanisms of failures of volitional control such as obesity, gambling or addictions in general. However, excessive volitional control might also have its costs. Inhibiting thoughts or behavior may result in negative affect, obsessive thought about the controlled stimulus or behavioral problems.

The symptomatology of Anorexia Nervosa (AN) displays elevated emotional control clearly through the extraordinary ability of suppressing feelings of hunger, and the avoidance of natural rewarding stimuli such as food. Components of other high cognitive control mechanisms are also visible in a variety of AN behaviors, such as extreme commitment to high performance or cognitive inflexibility. The study therefore aims at testing and comparing the ability of AN patients to regulate positive and negative emotions. Explicit emotion regulation ability will be investigated via behavioral assessment (arousal ratings) as well as psychophysiological (SCR) and neural activity (fMRI). The experiment is a modified version of Walter and colleagues emotion regulation paradigm (2009) and instructs participants to watch stimuli with randomly positive (40), negative (40) or neutral (20) valence and either down-regulate or not-regulate the emotion elicited by the visual stimuli via detachment strategies. A cross-sectional sample of 45 acute AN patients, 45 recovered patients and 45 healthy control women will be assessed. The project outline will be evaluated and progress of implementation presented.

POSTER SESSION II (Friday 17:30-19:00)

FRONTO-STRIATAL DYSREGULATION OF MOTIVATIONAL AND COGNITIVE FLEXIBILITY

Ricarda Evens[1,2], Yuliya Stankevich[1,2], Oliver Riedel[1], Alexander Storch[3], Ulrike Lüken[1,2]

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Our project investigates the balance between flexibility and stability and its neural correlates in patients with Parkinson's disease (PD) assuming a central role of fronto-striatal circuits. PD is characterized by dopamine depletion affecting the nigro-striatal dopaminergic projections. This depletion is progressive and features a spatio-temporal asymmetry: while dorsal-striatal circuits are already affected in early PD, the degeneration only later progresses to more ventral parts. Functionally the dorsal part seems to be related to cognitive (rule-based) flexibility whereas the ventral part is rather linked to motivational (reward and punishment related) flexibility. Patients with early PD will be assessed with two fMRI tasks on two days with a medication-on and –off condition. We hypothesize that dopaminergic effects on cognition follow an inverted u-shaped function, with both excessive and insufficient dopamine levels impairing performance.

We expect that patients without dopamine replacement therapy (DRT) show deficits in cognitive flexibility as measured by a delayed response and switching task while motivational flexibility as measured by a reversal learning task will be comparable to healthy controls (DRT-off). Concerning fMRI data deficits in cognitive flexibility will be accompanied by decreased dorsal-striatal activity compared to healthy controls. However, with medication (DRT-on) dopamine in the depleted dorsal parts is compensated, leading to a normalized cognitive flexibility. In contrast, DRT-on will overdose ventral-striatal circuits resulting in enhanced reward and reduced punishment sensitivity compared to healthy controls. To assess the individual progression of dopamine depletion in patients and its interaction with DRT effects a longitudinal design (24-months follow-up) was chosen.

POSTER SESSION II (Friday 17:30-19:00)

NEURAL SUBSTRATES AND NEUROPLASTICITY OF INTEROCEPTION

Nina I. Maslowski[1,2], Hans-Ulrich Wittchen[1,2], Ulrike Lüken[1,2]

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Interoception is central to human affective and self-regulatory processes and plays an important role for the etiology and maintenance of anxiety disorders and subclinical anxiety-related phenomena, e.g. anxiety sensitivity (AS; Domschke et al., 2010). Regarding neural correlates, the insular cortex supposedly represents a key structure in the neural network supporting interoception (Craig, 2009).

Within this dissertation project, the neurobiological substrates underlying altered interoception in anxiety prone individuals and panic disorder (PD) patients are investigated, combining basic and clinical approaches to further characterize neural pathways of interoceptive processing. Neuroplasticity in the interoception network as a proposed mechanism for the effect of interoceptive exposure, a crucial component of cognitive behavioral therapy in PD, is examined. Studies 1 and 2 investigated the neural substrates of interoception in non-clinical samples, employing novel cue-exposure paradigms that specifically address different interoceptive modalities (cardiovascular, respiratory). The paradigms successfully probed the interoception network and identified modality-specific and –nonspecific components. Study 3 (ongoing) examines the neural activity in the interoception network related to an interoceptive training in PD patients and subjects with heightened AS. Results may provide a better understanding on how specific psychotherapeutic treatments change the brain. Future studies should address the influence of interoceptive processes on emotion regulation and effects of a combined neurofeedback approach, in addition to and supplementing clinical applications.

POSTER SESSION II (Friday 17:30-19:00)

UTILIZATION OF SIMULTANEOUSLY ACQUIRED EEG/FMRI DATA FOR FUNCTIONAL CONNECTIVITY ANALYSIS

Fabian Baum, Hannes Ruge, Uta Wolfensteller

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Functional connectivity analysis (FCA) of fMRI data is a common procedure nowadays since it provides information about interaction between different regions of the brain. There exist more or less standardized methods like DCM or PPI which can contribute a lot to building a model about the process of investigation. Less clear is the situation with simultaneously gained EEG/fMRI data.

There are several ways of fusing and mining the data holding different results and not much research has been spent on how EEG/fMRI data can be used to further improve FCA. In a first step EEG only experiment was conducted in order to extract pure Event Related Potentials (ERP) using a rapid learning of novel mental representations paradigm (Ruge & Wolfensteller, 2013). In a second step a simultaneous EEG/fMRI study using the same paradigm will be performed. For rejection of MR related artifacts (such as the Gradient or Pulse artifact) in the EEG dataset, data of Experiment 1 will be used as a reference. Both EEG and fMRI data will be fused using the EEG informed fMRI analysis method, which in a first step extracts ERP component amplitudes on a single trial level. In a second step those parameters are utilized as regressors for parametric fMRI analysis.

POSTER SESSION II (Friday 17:30-19:00)

A LARGE-SCALE MULTIVARIATE ANALYSIS OF INSTRUCTION-BASED LEARNING

Holger Mohr, Uta Wolfensteller, Hannes Ruge

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In contrast to trial-and-error learning, learning by instruction allows humans to acquire new stimulus-reaction rules very quickly. After the presentation of a new set of rules, humans are capable of passing the abstract representation of rules on to a more automated system within only a small number of practice trials. Significant differences between early and late practice trials were found in fMRI activation patterns at group level by using standard univariate Statistical Parametric Mapping (Ruge and Wolfensteller, 2009).

By applying recently developed large-scale multivariate pattern analysis techniques for rapid event-related designs (Mumford et al., 2012), we explore the within-subject predictability of early vs. late practice trials.

POSTER SESSION II (Friday 17:30-19:00)

APPROACHING ATTENTION BASED USER INTERFACES: COMBINING EYE MOVEMENTS, EDA & ECG PARAMETERS TO DEFINE OPTIMAL POINTS IN TIME TO INTERRUPT A WORKING PERSON

Josephine Hartwig

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Working on a PC means to be constantly available for others via mail or other applications. However, being interrupted during a phase of high mental workload is costly, performance-wise as well as emotionally. Therefore, an algorithm might be implemented to time interruptions, thereby lowering the costs. One approach to reach this goal is to interrupt when a subtask is finished (see e.g. Adamczyk & Bailey, 2004). Unfortunately, this means to implement the tool for each used software (Iqbal & Bailey, 2010).

To gain independence of software specific algorithms, general parameters are necessary that signal low or high mental workload. The following study aims at finding these parameters in eye movements, EDA and ECG. In the first experiment, differing levels of difficulty of sentence sorting tasks are established. The second incorporates irrelevant probes into these tasks, investigating reactions modulated by the given difficulties. Within the third experiment different levels are mixed. As eye movement measurement is the least intrusive, data gained by this means will be analyzed regarding correlations with data from EDA and ECG. An algorithm will be developed based solely on eye movements that will be able to interrupt a user at opportune moments. Finally, this algorithm will be tested against interruptions at inopportune and randomized moments.

POSTER SESSION II (Friday 17:30-19:00)

THE DEVELOPMENT OF INTENTIONAL REMEMBERING ACROSS THE LIFESPAN: BEHAVIORAL AND NEURAL INSIGHTS

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Intentional remembering also known as prospective memory (PM) refers to the ability to remember and successfully execute delayed intentions in the future. Its development is characterized by an inverted U-shaped pattern. However, the underlying neural mechanisms are still unclear. The aim of the present study was to investigate event-related potentials (ERP) that are associated with different aspects of PM across the lifespan, e.g. cue detection.

We examined three age groups: adolescents, young adults, and older adults. All participants completed a computerized word categorization PM task. Additionally, participants had to remember to press a certain key when the words appeared in a certain color. Cue detection was manipulated by varying the salience (how easy it was to detect the cue based on color) of the PM cue. Behavioral results revealed main effects of age and salience for PM performance. Focusing on age-related changes of ERPs we analyzed the occipital-parietal N300 associated with cue detection and the prospective positivity that is linked to intention retrieval processes. Results support the behavioral pattern of PM development across the lifespan. Furthermore, they also suggest that this pattern might be associated with neural changes in cue detection and retrieval processes across the lifespan.

POSTER SESSION II (Friday 17:30-19:00)

DEFICITS IN COGNITIVE CONTROL AND RELATIONSHIP TO FREQUENCY AND SUBJECTIVE CONTROLLABILITY OF WORRIES: CONCEPT OF A FUNCTIONAL NEUROIMAGING STUDY

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Uncontrollable worries are the core feature of generalized anxiety disorder (GAD). Past studies have linked the frequency of worries, unsuccessful worry suppression and subjective uncontrollability of worries. However, no study to date investigated whether high worriers show objective deficits in cognitive control that can be related to the perceived uncontrollability of worries.

The planned study aims to test this hypothesis and will investigate whether the neural correlates of hypothesized cognitive control deficits can be linked to neural perturbations already known for the disorder, e.g. from studies on emotion regulation deficits. N=15 high and N=15 low worriers will perform an established task-switching paradigm (O'Doherty et al., 2003) that allows the differentiation of cognitive control and reward or punishment. During this task, fMRI data will be collected and analyzed with SPM8, applying a region-of-interest (ROI) approach for areas implied for cognitive control (anterior cingulate cortex, orbitofrontal cortex, dorsolateral prefrontal cortex) and an exploratory whole-brain analysis. Estimated beta values of these areas will be correlated to questionnaires measuring self-perceived cognitive control abilities. On success, the paradigm at hand will be applied to a clinical sample of GAD patients and a healthy control comparison group. This might help to provide new insights into the aetiopathogenesic mechanisms central to the core feature of GAD with possible implications for treatment.

POSTER SESSION II (Friday 17:30-19:00)

GOAL FRAMING INFLUENCES AUTOMATIC APPROACH AND AVOIDANCE BEHAVIORS

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On a motivational level, behaviors can be categorized according to whether they serve the purpose of approaching or avoiding objects or states. Similarly, goals can be framed as either the pursuit of a potential gain, or the avoidance of a potential loss. Although there is abundant evidence that goal framing impacts the preference for approach/avoidance-focused deliberate strategies, very few studies (e.g. Förster, Higgins, & Idson, 1998) investigate whether goal framing also affects automatic approach/avoidance behaviors.

We used a modified Manikin task to investigate whether gain vs. non-loss goals influence approach/avoidance behaviors when perceptual feedback on distance regulation is provided and on a trial-by-trial basis. Participants had to either move a Manikin towards or away from a target that signaled either the possibility to win points, or the danger of losing points. This goal framing was randomized across trials. Participants were faster to approach gain-targets, and faster to move away from loss-targets. Consequently, our results provide evidence that goal framing automatically affects behavioral tendencies which serve distance regulation, even when the goal framing is realized on a trial-by-trial basis.

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