TECHNISCHE UNIVERSITÄT DRESDEN

Have We Banished the Homunculus? Dynamic Regulation, Modulation, and Optimization of Cognitive Control

2015 DRESDEN SYMPOSIUM

17 – 19 July 2015

VOLITION AND COGNITIVE CONTROL

MECHANISMS MODULATORS DYSFUNCTIONS

DFG SFB 940

CONTENT

Welcome

It is a pleasure for us to welcome all of you to the

2015 Dresden Symposium
of the Collaborative Research Center (SFB 940)

"Have We Banished the Homunculus? Dynamic Regulation, Modulation, and Optimization of Cognitive Control"

The aim of the symposium is to bring together leading experts in the field of cognitive control, volition, and executive functions, who are invited to present empirical findings, theoretical perspectives and/or computational modeling work.

Despite considerable progress in elucidating the neurocognitive mechanisms of volition and cognitive control, it is still a fundamental, yet unresolved question how cognitive control is itself "controlled", i.e., how the balance between complementary control modes (stable shielding vs. flexible switching of goals; goal-directed focusing of attention vs. stimulus-driven attention capture; exploration vs. exploitation) is adapted to changing environments. From this perspective, the regulation of cognitive control can be conceived of as an optimization problem that confronts agents with fundamental "meta-control dilemmas", which require a context-sensitive adjustment of control parameters in the light of the complementary costs and benefits of different control modes. However, currently we have only a rudimentary understanding of how meta-control parameters are learnt and adjusted to changing contexts and how the balance between complementary control modes and different (e.g., habitual vs. goal-directed) action control systems is modulated by emotions, stress, reward and motivational states.

The symposium brings together leading experts in the field of cognitive control, volition, and executive functions, who are invited to present empirical findings, theoretical perspectives and/or computational modeling work with a focus on one the following questions:

- How can one explain in mechanistic terms how control processes are themselves "controlled", i.e., how cognitive control is dynamically regulated and adapted to changing contexts and task demands?

- How are complementary control processes and competing control systems modulated by motivation and reward? How is the balance between complementary control modes optimized based on their estimated costs and benefits? How are meta-control parameter settings learnt?

- Have we actually succeeded in "banishing the homunculus" from theories of volitional control by decomposing "the will" into a set of cognitive control mechanisms?

We wish you a most stimulating meeting and an inspiring and pleasant time.

Thomas Goschke
on behalf of the Managing Committee of the Collaborative Research Centre 940 (SFB 940)

Organising Committee:

Prof.Dr. Thomas Goschke, Spokesperson
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Prof. Dr. Roland Deutsch
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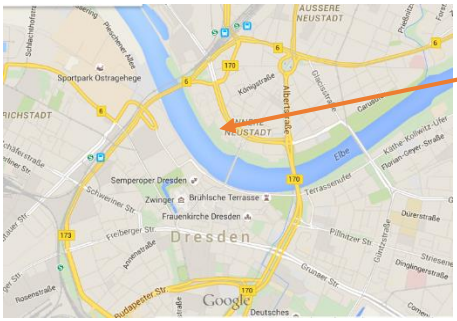
Locations & Maps

Symposium Friday 17 July – Sunday 19 July 2015

Welcome Evening Thursday 16 July 2015

Hotel Westin Bellevue

Große Meißner Str. 15 | 01097 Dresden | Tel + 49 (0) 351 8050



Conference lecture and dinner Sat 18 July 7PM

Restaurant Cuchi | Wallgäßchen 5 | 01097 Dresden

Program and Time Table

Thur 16 July 2015 19:00 Welcome Evening and Registration			
	Fri 17 July 2015	**Sat 18 July 2015**	**Sun 19 July 2015**
08:30	**Registration**		
09:00	**Thomas Goschke** Welcome / Introduction	**Nachshon Meiran** The Power of Instructions: Proactive Configuration of Stimulus–Response Translation	**Michael W. Cole** Brain network mechanisms of flexible cognitive control
09:30	**Frederick Verbruggen** Banishing the Control Homunculi in Studies of Action Control		
10:00		**Matthew Botvinick** The intrinsic cost of cognitive control	**Bradley Doll** Neural mechanisms of model-based and model-free control
10:30	**Nick Yeung** A trade-off between focused vs. distributed attention		
11:00		**Break**	**Break**
11:30	**Break**	**Etienne Koechlin** A computational approach to prefrontal executive function and adaptive behavior	**Closing discussion**
12:00	**Richard K. Ridderinkhof** Neurocognitive Mechanisms of Motivation and Perception-Action Coordination		
12:30		**Lunch**	
13:00	**Lunch**		**Lunch**
13:30			
14:00		**Daniel Durstewitz** Neuromodulatory control of prefrontal cortical attractor dynamics	
14:30	**Tobias Egner** **Exploring the interplay between memory, attention, and control**		
15:00		**Break**	
15:30	Break	**Aaron David Redish** Decision-making systems in a rat	
16:00	**Poster session**		
16:30		**Christine Stelzel** Modulating cognitive flexibility - neurocognitive effects of dopamine and motivational variables	
17:00			
17:30			
18:00			
18:30			
19:00	**Speakers &** **CRC Managing Board**	**Conference lecture** **& dinner at Restaurant Cuchi**	

Program and Time Table

Thursday 16 July 2015

19:00	Registration and Welcome Evening

Friday 17th July

8:30	Registration
9:00	**Thomas Goschke**: Welcome / Introduction
9:30	**Frederick Verbruggen:** Banishing the Control Homunculi in Studies of Action Control
10:30	**Nick Yeung:** A trade-off between focused vs. distributed attention
11:30	Break
12:00	**Richard K. Ridderinkhof:** Neurocognitive Mechanisms of Motivation and Perception- Action Coordination: A Theoretical Synthesis
13:00	Lunch
14:30	**Tobias Egner:** Exploring the Interplay between Memory, Attention and Control
16:00	**Postersession**
19:00	**Speakers and CRC Managing Committee**

Saturday 18th July

9:00	**Nachshon Meiran** The Power of Instructions. Proactive Configuration of Stimulus-Response Translation
10:00	**Matthew Botvinick** The intrinsic Cost of cognitive Control
11:00	Break
11:30	**Etienne Koechlin:** A computational approach to prefrontal executive function and adaptive behaviour
12:30	Lunch
14:00	**Daniel Durstewitz:** Neuromodulatory Control of prefrontal cortical attractor Dynamics
15:00	Break
15:30	**Aaron David Redish:** Decision-making systems in the rat
16:30	**Christine Stelzel**: Modulating cognitive flexibility - neurocognitive effects of dopamine and motivational variables
19:00	Evening Talk & Social Dinner at Restaurant Cuchi

Sunday 19th July

9:00	**Michael W. Cole:** Brain network mechanisms of flexible cognitive Control
10:00	**Bradley Doll:** Neural mechanisms of model-based and model-free Control
11:00	Break
11:30	Closing Discussion
13:00	Lunch

Banishing the Control Homunculi in Studies of Action Control

Verbruggen Frederick
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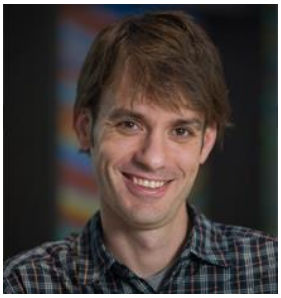

For centuries, human self-control has fascinated scientists and non-scientists alike. Current theories often attribute it to an executive control system. In early models of cognition, control was essentially attributed to a unitary "homunculus" pulling the levers to regulate lower-level systems when needed. In the last two decades, great efforts have been made to fractionate the executive controller and to determine how distinct control functions regulate behavior.

However, I believe that this work has not yet succeeded in banishing homunculus theories: even though many researchers no longer appeal to a single control homunculus, control is often attributed to an ill-defined set of specialized "black-box" homunculi that are assumed to do jobs like "response inhibition", "task switching", or "updating" without explaining how they do so. Furthermore, it is not always appreciated that control takes place across different timescales. These two issues hamper major advances. In my presentation, I will focus on the mechanistic basis for the executive control of actions. I will discuss a theoretical framework and some recent empirical work in support of it.

A trade-off between focused vs. distributed attention / Confidence and errors in decision making

Yeung Nick
Professor of Cognitive Neuroscience, Ph.D.

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In my talk, I will describe two lines of work bearing on the dynamic regulation and optimization of cognitive control. The first asks whether more control necessarily leads to better performance, with selective attention as a case study. Attentional processes are often proposed as a solution to presumed information overload, and experimental paradigms are designed to assess people's ability to focus on task-relevant stimuli and avoid interference from distracting task-irrelevant stimuli.

However, focusing attention may lead to bad outcomes in certain situations. I will describe research that explores the trade-off betwen focused vs. distributed attention, in which we aimed to develop tasks with similar perceptual and response requirements but that differentially depend on focused vs. distributed attention. The second line of research investigates how people's 'meta-level' ability to evaluate their decisions--in terms of detecting errors or judging confidence--can guide adaptive behaviour. I will describe investigations of the informational and neural basis of these metacognitive judgements, as well as studies of how confidence may guide future decisions.

Neurocognitive Mechanisms of Motivation and Perception-Action Coordination: A Theoretical Synthesis

Ridderinkhof K Richard
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The present analysis aims at a theoretical integration of, and a systems-neuroscience perspective on perception-action coordination (PAC). We set out to determine the common principles or lawful linkages between sensory and motor systems that explain how perception is action-oriented and how action is perceptually guided. To this end, we analyze the key ingredients to such an integrated framework, examine the architecture of dual-system conjectures of PAC, and endeavor in an analysis of the key characteristics, mechanisms, and phenomena of PACs.

This analysis will reveal that dual-systems views are in need of fundamental re-thinking, and its elements will be amalgamated with current views on action-oriented predictive processing into a novel integrative theoretical framework. From this framework and its neurocognitive architecture we derive a number of non-trivial predictions regarding conative, motive-driven PAC.

Exploring the interplay between memory, attention, and control

Egner Tobias
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Center for Cognitive Neuroscience, Duke University

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"Controlled processing" has historically been characterized as antagonistic to associative processing, with cognitive control defined as the top-down attentional override of habitual stimulus-response associations in memory. This has fostered a dichotomy where researchers attempt to explain cognitive phenomena as either reflecting top-down control or associative processes, which ignores the fact that controlled and associative processes must operate in concert to produce contextually optimal cognitive strategies. More generally, the conceptual relationship between the constructs of memory, attention, and control in contemporary psychology and neuroscience is arguably murky. In the present talk, I will sketch out a basic framework for this relationship and present some recent empirical work that addresses the interaction between memory, attention, and control operations from a variety of different angles. First, I will present studies investigating the relationship between working memory and attention, arguing for working memory as internally directed attention, which involves the same representations, resources, and mechanisms as attending to external stimuli. Second, I will present research into how memory and learning processes mediate the context-sensitive guidance of cognitive control settings. Finally, I will talk about recent work that asks how different control operations affect the encoding of stimuli into memory.

The Power of Instructions: Proactive Configuration of Stimulus–Response Translation

Meiran Nachshon
Professor, David Lopatie Chair in Psychology, Ph.D.

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Humans are characterized by an especially highly developed ability to use instructions to prepare toward upcoming events; yet, it is unclear just how powerful instructions can be. Although prior work provides evidence that instructions can be sufficiently powerful to proactively program working memory to execute stimulus–response (S-R) translations, in a reflex-like fashion (intention based reflexivity [IBR]), the results to date have been equivocal.
To overcome this shortcoming, we developed, and tested a novel paradigm (the *NEXT paradigm*) that isolates IBR effects even prior to first task execution. In each miniblock, participants received S-R mapping instructions for a new task.

Prior to implementing this mapping, responses were required to advance through screens during a preparatory (NEXT) phase. When the NEXT response was incompatible with the instructed S-R mapping, interference (IBR effect) was observed. This NEXT compatibility effect and performance in the implementation (GO) trials barely changed when prior practice of a few trials was provided. Additionally, a manipulation that encouraged preparation resulted in relatively durable NEXT compatibility effects (indicating durable preparatory

efforts) coupled with improved GO performance (indicating the success of these efforts).

In an experiment in which participants withheld responding during the NEXT phase, we found significant Lateralized Readiness Potentials that corresponded to the yet never performed task.
Finally, we examined the role of working memory in this form of preparation. Following previous findings, we found that working memory load impaired preparation (seen in GO trial performance) and has eliminated the NEXT compatibility effect. Paradoxically, individual differences in working memory capacity were barely related to either phenomenon, while high fluid intelligence was related to better preparation and ***smaller*** NEXT compatibility effects.

The intrinsic cost of cognitive control

Botvinick Matthew
Professor of Psychology, M.D., Ph.D

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The Law of Less Work states that when two courses of behavior lead to the same terminal reward, there will be a preference for the less effortful course of behavior.
This principle has been overwhelmingly validated in the case of physical effort. However, it has been also been widely assumed to hold for mental or cognitive effort. Although this idea has been used to explain a wide range of phenomena, there has been surprisingly little attempt to test it. Over the past several years, we've developed behavioural methods for studying the role of cognitive effort demands in decision making. The results collected so far provide clear validation for the notion that cognitive effort is subjectively costly.

People will, in fact, forego monetary reward in order to avoid demands for mental effort, an effect that cannot be explained in terms of error avoidance or minimization of time on task. The form of effort involved appears to be linked specifically to the mobilization of executive functions or cognitive control. Through a series of fMRI studies, we have tied control costs to activation of regions within medial and

lateral prefrontal cortex, and demonstrated an effect of control costs on subcortical reward processing.
In the most recent phase of research, we have studied effort-based decision making through the lens of economic labor supply theory, and also investigated potential links between cognitive demand avoidance and individual differences in self-control.

I will provide an overview of established findings, and relate them to a broader expected-value framework for understanding the interface of control and motivation.

"A computational approach to prefrontal executive function and adaptive behavior"

Kœchlin Etienne
Professor, Research Director, Ph.D.

Laboratoire de Neurosciences Cognitives, Départment d'Etudes Cognitives, Ecole Normale Supérieure Paris

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Neuromodulatory control of prefrontal cortical attractor dynamics in vivo

Durstewitz Daniel
Professor in Theoretical Neuroscience, Ph.D.

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According to the 'dual-state model' of prefrontal dopamine function which we had proposed many years ago, based on in-vitro electrophysiological findings and biophysical model simulations, dopamine adapts prefrontal cortical circuits to computational demands by regulating transitions among attractor states. Until recently, it was difficult to test this conjecture directly empirically since attractor states cannot be measured 'directly' but have to be inferred from observations of sufficiently high-dimensional experimental time series.

Due to recent advances in multiple single-unit recording techniques and statistical and machine learning tools, however, it became possible to assess neural trajectory flows and attractor dynamics empirically from in-vivo electrophysiological recordings in behaving animals. Following a brief introduction to the dual-state model, my talk will focus on such methods for extracting attractor dynamics, and their application to pharmacological manipulation of prefrontal network dynamics in vivo. I will also report some preliminary results on altered attractor dynamics in genetic animal models related to schizophrenia.

Decision-making systems in the rat

Redish Aaron David
Distinguished McKnight Professor, Ph.D.

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Decision-making entails a process that selects actions from past experiences (memory), sensory information (perception), and goals (motivation). In the mammalian brain, there are multiple neural systems that store, recall, and process these components differently.

We have developed new neuroeconomic tasks for use in rats which allow us to detect and separate these systems and to identify their underlying neural substrates.

Using neural ensemble recording techniques, we have been able to determine how these different systems process information. I will present what we know about how these different systems process information so as to engender behavior, particularly in situations where multiple systems can drive behavior.

Modulating cognitive flexibility - neurocognitive effects of dopamine and motivational variables

Stelzel Christine
Group leader of the "Volition and Motivation" research group
Ph.D.

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Cognitive control refers to the ability to adapt behavior according to rules, goals and intentions as an alternative to following prepotent behavioral tendencies.
This usually involves switching between representations of stimuli, responses and stimulus-response mappings ('cognitive flexibility'), an ability that is highly variable within and between individuals. In this talk, I will present data from functional imaging studies on different factors affecting cognitive flexibility. I will focus on the role of the neurotransmitter dopamine for switching between task sets. Reporting data from a molecular genetic as well as a pharmacological approach I will show dopaminergic effects on fronto-striatal processing for switching between task rules as compared to switching between response hands. These data provide converging evidence for an involvement of the dopamine D2 receptor in cognitive flexibility.
With respect to motivational modulations, I will present recent data comparing neurocognitive effects of potential financial loss vs. gain on flexibility in attentional control. The data show differential activity changes in task-and stimulus relevant regions depending on the type of incentive. I will conclude that the investigation of variability in cognitive flexibility is essential for understanding how individual differences in goal-directed behavior arise and may be modified.

Brain network mechanisms of flexible cognitive control

Cole Michael W.
Assistant Professor, Ph.D.

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The human brain is remarkably flexible, allowing rapid learning of a virtually infinite variety of possible tasks. Consider for instance the common proficiency of healthy adults at using complex new technologies (e.g., computers, smartphones), demonstrating the human brain's ability to rapidly reconfigure to a variety of possible novel task states.

A potential neural mechanism underlying such rapid instructed task learning may involve 'flexible hubs' – a set of fronto-parietal regions with brain-wide connectivity that changes according to task demands. These shifts in functional connectivity likely help coordinate the spatially disparate processes involved in task performance (e.g., processes in visual and motor regions during a novel visuo-motor task). I'll be proposing three neural mechanisms involving flexible hubs.

First, I'll provide evidence for high global brain connectivity of putative flexible hubs using resting-state functional connectivity MRI, along with evidence that individuals and groups (e.g., healthy vs. schizophrenia groups) with greater global connectivity of these regions have increased flexible cognitive control abilities.

Second, I'll cover evidence (based on multivariate pattern analysis of fMRI data) that flexible hub activity patterns specifying task rules transfer across task contexts, allowing practice in familiar task contexts to improve learning of novel tasks.

Finally, I'll describe recent evidence that putative flexible hubs shift their connectivity patterns according to task demands, possibly to implement current task goals. Together these findings support a flexible hub theory of flexible cognitive control and provide impetus for further development and testing of this theoretical framework in both basic and clinical science contexts.

Neural mechanisms of model-based and model-free control

Doll Bradley B
Postdoctoral Research Fellow, Ph.D

Center for Neural Science (CNS), New York University

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Considerable evidence suggests that multiple learning systems can drive decision behavior. Choice can proceed reflexively from previous actions and their associated outcomes, as captured by "model-free" learning algorithms, or flexibly from prospective consideration of outcomes that might occur, as captured by "model-based" learning algorithms.

While a great deal is know about how the brain implements model-free learning and choice, considerably less is known about the neural substrates of model-based learning, and still less about how the contributions of these learning systems to behavior are managed.

In this talk, I will describe fMRI, genetic, and behavioral experiments that investigate the neural mechanisms of these control systems, and how the balance between model-based and model-free learning varies across and within individuals.

Postersessions (alphabetic order)

Fabian Baum | TU Dresden
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The temporal dynamics of instruction-based stimulus-response-outcome learning revealed by event-related potentials

Ilka Boehm | TU Dresden
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Increased resting state functional connectivity in the fronto-parietal and default mode network in anorexia nervosa

Kersten Diers | TU Dresden
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The Temporal Dynamics of Volitional Emotion Regulation

Irena Domachowska | TU Dresden
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Neural correlates of affective modulation of attentional breadth

Ben Eppinger | TU Dresden
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Different momentums: lifespan age differences in the adaptive regulation of learning rates

Postersessions (alphabetic order)

Ricarda Evens | TU Dresden
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Increased resistance to distraction and its neurofunctional correlates in Parkinson's disease

Simon Frisch | TU Dresden | Jun.-Prof. for Methods in Psychology & Computational Modeling
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Combining Dynamic Modeling and Continuous Behavior To Explore Diverging Accounts of Selective Attention

Caroline Gottschalk | TU Dresden
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The activation of context-specific attentional control sets

Christina Heitmann | TU Dresden
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Conflict Adaptation in Motivational Conflicts

Joseph King | Universitaetsklinikum Dresden
Translational Developmental Neuroscience Section Department of Child and Adolescent Psychiatry
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Neural Correlates of Self-Control in Patients with Anorexia Nervosa

Postersessions (alphabetic order)

Klaus-Martin Krönke | TU Dresden
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Losing control: error-related brain activity predicts self-control failures

Kruschwitz Johann | Charité Berlin/ TUD
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The good and the bad: the brain´s response to emotion regulation during anticipation of ambivalent furture events

Michael Marxen | TU Dresden
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Regulating the Amygdala with Neurofeedback without instructed Strategy

Holger Mohr | TU Dresden
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Large-scale integration and segregation of functional brain modules during rapid learning processes

Marcus Möschl | TU Dresden
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The Effects of Age and Cognitive Control Demands on Intention Deactivation

Postersessions (alphabetic order)

Dirk Müller | TU-Dresden
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NICePype: A Web-based pipeline manager for processing neuroimaging data based on Nipype

Philipp Neukam | TU Dresden
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Effects of Acute Tryptophan Depletion/Loading on Intertemporal Choice

Franziska Ritschel | Universitätsklinikum Dresden
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Neural correlates of implicit emotion regulation in patients with anorexia nervosa

Susann Schade | TU Dresden
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Challenging stress-related impairment theories: The influence of acute psychosocial stress on delay discounting

Ulrike Schulz | TU Dresden
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Modulation of cognitive flexibility by affective cues

Postersessions (alphabetic order)

Maria Seidel | Universitätsklinikum Dresden
maria.seidel@uniklinikum-dresden.de

Poster 1: Influences of affect on rumination in anorexia nervosa

Poster 2: Explicit Emotionregulation in anorexia nervosa

Yiquan Shi | TU Dresden
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Decomposing the neural dynamics of cognitive flexibility: instructed global rule reversal vs. local task switching

Yuliya Stankevich | TU Dresden
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The effects of subclinical depressive symptoms and dopaminergic medication on spatial memory in Parkinson's disease

Ann-Kathrin Stock | Uniklinikum Dresden, Kinder- und Jugendpsychiatrie
Ann-Kathrin.Stock@uniklinikum-dresden.de

Investigating of the roles of dopamine and GABA for human action control by means of genetics and MR spectroscopy

Postersessions (alphabetic order)

Franka Thurm | TU Dresden
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Dopaminergic modulation of hippocampal and striatal spatial memory in Parkinson's disease

Katharina Zwosta | TU Dresden
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Neurocognitive mechanisms of shielding goal-directed from habitual actions

Postersessions (Assignment)

A **Combining Dynamic Modeling and Continuous Behavior To Explore Diverging Accounts of Selective Attention**

Simon Frisch, simon.frisch@tu-dresden.de
TU Dresden, Jun.-Prof. for Methods in Psychology & Computational Modeling

A **The Effects of Age and Cognitive Control Demands on Intention Deactivation**

Marcus Möschl, marcus.moeschl@tu-dresden.de
TU Dresden

A2 **Decomposing the neural dynamics of cognitive flexibility: instructed global rule reversal vs. local task switching**

Yiquan Shi, ssyyqq.s@gmail.com
TU Dresden

A3 **The activation of context-specific attentional control sets**

Caroline Gottschalk, caroline.gottschalk@tu-dresden.de
TU Dresden

A3 **Neurocognitive mechanisms of shielding goal-directed fom habitual actions**

Katharina Zwosta, katharina.zwosta@tu-dresden.de
TU Dresden

A5 **The Temporal Dynamics of Volitional Emotion Regulation**

Kersten Diers, diers@psychologie.tu-dresden.de
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A6 **The good and the bad: the brain´s response to emotion regulation during anticipation of ambivalent furture events**

Kruschwitz Johann, johann.kruschwitz@charite.de
Charité Berlin/ TUD

A7 **Regulating the Amygdala with Neurofeedback without instructed Strategy**

Michael Marxen, michael.marxen@tu-dresden.de
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B **Different momentums: lifespan age differences in the adaptive regulation of learning rates**

Ben Eppinger, Benjamin.Eppinger@tu-dresden.de
TU Dresden

B1 **Neural correlates of affective modulation of attentional breadth**

Irena Domachowska, irena.domachowska@tu-dresden.de
TU Dresden

B1 **Modulation of cognitive flexibility by affective cues**

Ulrike Schulz, uschulz@psychologie.tu-dresden.de
TU Dresden

B2 **Conflict Adaptation in Motivational Conflicts**

Christina Heitmann, christina.heitmann@tu-dresden.de
TU Dresden

B4 **Effects of Acute Tryptophan Depletion/Loading on Intertemporal Choice**

Philipp Neukam, philipp.neukam@tu-dresden.de
TU Dresden

B5 **Challenging stress-related impairment theories: The influence of acute psychosocial stress on delay discounting**

Susann Schade, susann.schade@tu-dresden.de
TU Dresden

Losing control: error-related brain activity predicts self-control failures

C1 Klaus-Martin Krönke, klaus-martin.kroenke@tu-dresden.de
TU Dresden

Increased resting state functional connectivity in the fronto-parietal and default mode network in anorexia nervosa

C3 Ilka Boehm, ilka.boehm2@uniklinikum-dresden.de
TU Dresden

C3 **Neural Correlates of Self-Control in Patients with Anorexia Nervosa**

Joseph King, joseph.king@uniklinikum-dresden.de
Universitaetsklinikum Dresden Translational Developmental Neuroscience Section Department of Child and Adolescent Psychiatry

Neural correlates of implicit emotion regulation in patients with anorexia nervosa

C3 Franziska Ritschel, franziska.ritschel@uniklinikum-dresden.de
Universitätsklinikum Dresden

C3 **Influences of affect on rumination in anorexia nervosa**

Maria Seidel, maria.seidel@uniklinikum-dresden.de
Universitätsklinikum Dresden

C3 **Explicit Emotionregulation in anorexia nervosa**

Maria Seidel, maria.seidel@uniklinikum-dresden.de
Universitätsklinikum Dresden

Increased resistance to distraction and its neurofunctional correlates in Parkinson's disease

C4 Ricarda Evens, ricarda.evens@tu-dresden.de
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The effects of subclinical depressive symptoms and dopaminergic medication on spatial memory in Parkinson's disease

C4 Yuliya Stankevich, yuliya.stankevich@tu-dresden.de
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Dopaminergic modulation of hippocampal and striatal spatial memory in Parkinson's disease

C4 Franka Thurm, franka.thurm@tu-dresden.de
TU Dresden

The temporal dynamics of instruction-based stimulus-response-outcome learning revealed by event-related potentials

Z2 Fabian Baum, baum@psychologie.tu-dresden.de
TU Dresden

Large-scale integration and segregation of functional brain modules during rapid learning processes

Z2 Holger Mohr, mohr@psychologie.tu-dresden.de
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NICePype: A Web-based pipeline manager for processing neuroimaging data based on Nipype

Z2 Dirk Müller, dirk.mueller1@tu-dresden.de
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Investigating of the roles of dopamine and GABA for human action control by means of genetics and MR spectroscopy

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