Programme and Abstracts

of the

4th Burghölzli Psychiatry Meeting

November 30th, 2017 / 13:30 – 19:00

(Foto Jan Conradi)

PROGRAMME

Tag der Forschung (in German)

Chair: Prof. Dr. Elmar Habermeyer

10:30-10:45 **Welcome address** of **Prof. Dr. Erich Seifritz** (Director of the Department of Psychiatry, Psychotherapy and Psychosomatics, PUK), **Prof. Dr. Elmar Habermeyer** (Director of the Department of Forensic Psychiatry, PUK), and **Prof. Dr. Dr. Thomas Grunwald** (Medical Director of the Swiss Epilepsy Clinic)

10:45-11:00 **Dr. Dominik Schori** (Head of Research and Development, Department of Nursing, Therapies, and Social Work, PUK) and **Dr. Sonja Mötteli** (Mental Health Care and Service Research, Department of Psychiatry, Psychotherapy and Psychosomatics, PUK): *Home Treatment - Ergebnisse des Qualitätsmonitorings und Evaluationskonzept*

11:00-11:15 **Prof. Dr. Egemen Savaskan** (Chief Physician, Department of Geriatric Psychiatry, PUK): *Leitlinienentwicklung in der Alterspsychiatrie*

11:15-11:30 **Dr. Gregor Berger** (Central Emergency Service, Department of Child and Adolescent Psychiatry and Psychotherapy, PUK): *Omega-3-Fettsäuren in der Psychiatrie: Mythen and Fakten*

11:30-11:45 **Dr. Steffen Lau** (Chief Physician of the ***Centre for Inpatient Forensic Therapy*** at the Rheinau site, Department of Forensic Psychiatry, PUK): *Was wissen wir über die Straffälligkeit schizophrener Patienten?*

11:45-12:00 **PD Dr. Marcus Herdener** (Head of the Center for Addictive Disorders, Department of Psychiatry, Psychotherapy and Psychosomatics, PUK): *Veränderungen des Glutamat-Systems bei Kokainabhängigkeit: Bedeutung für zukünftige Behandlungsoptionen*

12:00-12:15 **Prof. Dr. Hans-Jürgen Huppertz** (Head of Medical Image Processing, Swiss Epilepsy Clinic): *Volumetrische MRT-Auswertung bei Epilepsie und neurodegenerativen Erkrankungen*

12:15-13:30 **Lunch break with catering**

4. Burghölzli Psychiatry Meeting (in English)

Chairs: Dr. Nathalie Brackmann,
Prof. Dr. Birgit Kleim
Prof. Dr. Boris B. Quednow

13:30-13:45 **Welcome address** of **Prof. Dr. Boris B. Quednow** (Department of Psychiatry, Psychotherapy and Psychosomatics, PUK)

13:45-15:00 **Young scientist session I** (*Chair: Dr. Nathalie Brackmann*)

Dr. Giorgio Bergamini (Department of Psychiatry, Psychotherapy and Psychosomatics, PUK): *Effects of chronic social stress on parvalbumin GABA interneurons in the amygdala*

Sara Tomiello, MSc (Translational Neuromodeling Unit, University of Zurich and ETH Zurich): *A computational trial-by-trial EEG analysis of hierarchical prediction errors*

Pia Hollerbach, MSc (Department of Forensic Psychiatry, PUK): *Construct Validity of the German Version of the Psychopathy Checklist-Revised (PCL-R)*

Torsten Meyer, MD (Department of Psychiatry, Psychotherapy and Psychosomatics, PUK): *Ketamine Treatment in Major Depression: Predictive Power of Heart Rate*

15:00-16:30 **Coffee break** and **poster presentations (Z0 03)**

16:30-17:45 **Young scientist session II** (*Chair: Prof. Dr. Birgit Kleim*)

Dr. Andrei Manoliu (Department of Psychiatry, Psychotherapy and Psychosomatics, PUK): *Disentangling craving, valence and arousal in nicotine addiction with parametric functional magnetic resonance imaging (fMRI)*

Dr. Iliana I. Karipidis (Department of Child and Adolescent Psychiatry and Psychotherapy, PUK): *Simulating reading acquisition: A multimodal neuroimaging approach for early prediction of reading fluency*

Bruno Kluwe Schiavon, MSc (Department of Psychiatry, Psychotherapy and Psychosomatics, PUK): *Reduced cocaine use is associated with improved psychiatric symptoms and normalized glucocorticoid receptor expression within an one-year interval*

Dr. Marcus Grueschow (Laboratory for Social and Neural Systems Research, Department of Economics, University of Zurich): *Human noradrenergic conflict adaptation response predicts real-world stress resilience*

18:00-18:45 **Keynote lecture** (*Chair: Prof. Dr. Birgit Kleim*)
Prof. Dr. Dominique de Quervain (Division of Cognitive Neuroscience, Faculty of Psychology, University of Basel): ***Stress, Genes and Memory: new avenues in drug discovery***

18:45-19:00 **Awarding of the poster prizes** (*Chairs: Dr. Nathalie Brackmann, Prof. Dr. Birgit Kleim, and Prof. Dr. Boris B. Quednow*)

19:00 **Apéro riche**

Venue

Lecture Hall Z1 03, Building Z, Psychiatrische Universitätsklinik Zürich, Lenggstrasse 31, 8032 Zürich (tram 11/18 to Balgrist).

Organization Committee

Prof. Dr. Boris B. Quednow, KPPP, PUK
Prof. Dr. Birgit Kleim, KPPP, PUK
Prof. Edna Grünblatt, KJPP, PUK
Dr. Nathalie Brackmann, KFP, PUK
Dr. Anton Gietl, KAP, PUK
Dr. Matthias Schmutz, Swiss Epilepsy Clinic

Within each topic the abstracts appear in the order in which the submissions were received.

Topic A)

Cellular and Molecular Psychiatry: Systems Biology, Animal and Translational Models, Genetics, Neuropharmacology

1A)

Elucidation of D-amino acid oxidase activator (DAOA/G72) pathways in human cell lines

Vinita Jagannath, Eszter Schmidtné Kormos, Susanne Walitza, Edna Grünblatt

Department of Child and Adolescent Psychiatry and Psychotherapy, University Hospital of Psychiatry Zurich, University of Zurich, Switzerland

Introduction
Dysfunction of D-amino acid oxidase (*DAO*) and DAO activator (*DAOA*)/*G72* genes has been linked to the glutamate hypothesis of schizophrenia, which is based on the N-methyl-D-aspartate receptor (NMDAR) hypofunction. In addition to glutamate, NMDAR require the co-agonist D-serine to function. In schizophrenia, increased DAO activity lead to decreased D-serine causing NMDAR hypofunction. It has been hypothesised that DAOA binds to DAO and increases its activity, but its effect on DAO is controversial. Thus, the function of DAOA is yet to be elucidated. The aim of this study was to understand the effect of DAOA on DAO activity and NMDAR activity in human cell lines.

Methods
NMDAR activity was measured in DAOA transfected HEK293 cells stably expressing NMDAR subunits NR1 and NR2A (NR1/NR2A HEK293 cells) using whole-cell patch clamp. DAO activity was measured based on the release of hydrogen peroxide and its interaction with Amplex red dye in DAO and DAOA co-transfected human neuroblastoma SH-SY5Y cells, human astrocytoma 1321N1 cells, and human embryonic kidney HEK293 cells.

Results
We found that DAOA had no effect on NMDAR activity in NR1/NR2A HEK293 cells. We found that DAOA increases DAO activity only in HEK293 cells, but has no effect on DAO activity in SH-SY5Y and 1321N1 cells. This might be because of different signalling pathways in SH-SY5Y and 1321N1 cells than HEK293 cells, or due to lower DAO and DAOA overexpression in SH-SY5Y and 1321N1 cells versus HEK293 cells or due to different compartmentalisation of DAO and DAOA proteins in these cell lines.

Discussion
We found that DAOA had no effect on NMDAR activity in NR1/NR2A HEK293 cells. We found that DAOA increases DAO activity only in HEK293 cells, but has no effect on DAO activity in SH-SY5Y and 1321N1 cells. This might be because of different signalling pathways in SH-SY5Y and 1321N1 cells than HEK293 cells, or due to lower DAO and DAOA overexpression in SH-SY5Y and 1321N1 cells versus HEK293 cells or due to different compartmentalisation of DAO and DAOA proteins in these cell lines.

2A)

Induced pluripotent stem cells derived from plucked hair follicles for the modelling of attention-deficit hyperactivity disorder

Silvano Re, Kevin Maggi, Seema Mehta, Eszter Kormos, Gregor Berger, Anna Werling, Susanne Walitza, Edna Grünblatt

Department of Child and Adolescent Psychiatry and Psychotherapy, Psychiatric Hospital, University of Zurich, Zürich, Switzerland

Introduction
Attention-deficit hyperactivity disorder (ADHD) is a common psychiatric disorder in children and adolescents, but the etiopathology is still largely unknown. A personalized human neuronal cell model which reflects CNS development may help to elucidate the pathomechanisms of the disorders.

Methods
Keratinocytes derived from plucked human hair follicles were cultured in serum free conditions and reprogrammed with an integration free approach (Cytotune 2.0). The generated induced pluripotent stem cells (iPSC) were differentiated first into neural stem cells (NSC) and later into post-mitotic neurons. Mycoplasma contaminations assay and karyotyping were performed to guarantee the integrity of the cell culture.

Results
Immunocytochemistry and qRT-PCR confirmed the identity of the generated cell lines (keratinocytes, iPSC, NSC and mature neuronal cells). iPSC were successfully differentiated into mature neuronal cells which show spontaneous electrical activity (MEA recordings).

Discussion
The described approach provides an effective, easily accessible and less ethically controversial alternative for studying neurodevelopmental disorders than methods based on biopsies or postmortem brain tissue samples. Above all, this technique enables the study of living human cells by modelling complex disorders, such as ADHD, *ex vivo*. Growth and maturation alterations will be investigated to reveal the molecular pathways involved in ADHD, as well as drug treatment effects.

3A)

Psilocybin induces aberrant prediction error processing for tactile mismatch responses

Patricia Dürler, Katrin H. Preller, Philip J. Ashton, Philipp Stämpfli, Silvia Brem, Erich Seifritz, Franz X. Vollenweider

Neuropsychopharmacology and Brain Imaging , Department of Psychiatry, Psychotherapy and Psychosomatics, University Hospital for Psychiatry Zurich, Switzerland

Introduction
Predictive codes integrating bodily states and sensory inputs may give rise to self-awareness and a sense of agency. Distortions in these processes have been linked to psychiatric symptoms like schizophrenic delusions. However, the relationship between altered tactile prediction error (PE) processing and distorted self-experience and its underlying neuropharmacology have never been empirically studied. Therefore, we investigated the effect of psilocybin (Psi), known to induce alterations in self-experience, on tactile mismatch responses.

Methods
In this double-blind, randomized, placebo-controlled study, fifteen healthy participants received 0.2 mg/kg of the 5-HT2A/1A agonist Psi. Participants completed a roving oddball task while undergoing functional magnetic resonance imaging.

Results
In response to unpredicted stimuli significant decreases in brain activity in the Psi condition were detected in areas previously implicated in body awareness and tactile deviancy processing: thalamus, somatosensory cortex, and prefrontal areas.

Conclusions
This study shows that Psi alters the integration of tactile stimuli through aberrant PE signalling, potentially the underlying mechanism of Psi-induced alterations of self-experience. Furthermore, it points to the importance of the 5-HT2A/1A system in these processes and for the treatment of psychiatric disorders compromised by distorted self-experience.

4A)

Changes in resting-state global brain connectivity in LSD-induced altered states of consciousness are attributable to the 5-HT2A receptor

Katrin H. Preller, Charles Schleifer, Philipp Stämpfli, John H. Krystal, Franz X. Vollenweider, Alan Anticevic

Neuropsychopharmacology and Brain Imaging, Department of Psychiatry, Psychotherapy and Psychosomatics, University Hospital for Psychiatry Zurich, Switzerland

Introduction
Lysergic acid diethylamide (LSD) is a prototypical psychedelic drug with agonist activity at various serotonin (5-HT) and dopamine receptors. Despite the therapeutic and scientific interest in LSD, the specific receptor contributions in particular to changes in brain connectivity have not been studied yet.

Methods
In a double-blind, randomized, counterbalanced, cross-over study 24 healthy participants received either 1) placebo+placebo, 2) placebo+LSD (100 µg po), or 3) ketanserin - a selective 5-HT2A receptor antagonist (40 mg po)+LSD (100 µg po) in three different sessions. Resting-state fMRI scans were acquired 75 and 300 minutes after the second substance administration. We analyzed resting-state functional connectivity with a data-driven global brain connectivity (GBC) method to facilitate discovery.

Results
LSD administration caused widespread alterations of GBC across cortical and subcortical regions. LSD decreased GBC in fronto-medial and lateral areas, as well as basal ganglia, but increased GBC in the occipital, temporal, and parietal cortex. Similar patterns were found when comparing LSD with ketanserin+LSD. Negligible differences were observed when comparing ketanserin+LSD and placebo.

Conclusions
Results revealed that LSD induces widespread GBC alterations that are predominantly attributable to its agonistic activity onto the 5-HT2A receptor. While LSD reduces connectivity in attention networks, it increased connectivity across sensory areas. Present results inform psychedelics' mechanism of action pinpointing targets of therapeutic value and reinforce use of data-driven neuroimaging methods for pharmacological imaging.

5A)

*Effects of chronic social stress on parvalbumin GABA interneurons in the amygdala**

Giorgio Bergamini, Hannes Sigrist, Damaris Holder, Agata Panek, Diana Kukelova, Christopher Pryce

Preclinical Laboratory, Department of Psychiatry, Psychotherapy and Psychosomatics, Psychiatric Hospital, University of Zurich

Introduction
Chronic stress and depression are associated with altered processing of aversion and reward stimuli. The amygdala is implicated in the neural circuitry underlying these changes, but cellular mechanisms are poorly understood. Parvalbumin GABA interneurons (PV-INs) in the basolateral nucleus of the amygdala (BLA) are responsive to emotional stimuli, and could regulate activity in aversion neurons, reward neurons and communication between them. Here we report on effects of chronic social stress (CSS) on BLA PV-INs in mice.

Method
Mice were exposed to CSS or control handling (CON). Using immunofluorescence and confocal microscopy we investigated CSS effects on: number of PV-INs across the anterior-posterior BLA; intensity of PV expression; intensity of perineuronal nets (PNNs) surrounding PV-INs; aversion stimulus reactivity of PV-INs.

Results
PV-INs were most abundant at the mid-point of the BLA, where aversion and reward neurons are likely to be in close proximity. CSS resulted in an increase in the proportion of PV-INs with high PV expression in the BLA. Furthermore, in the BLA CSS mice show an increased number of PV-INs surrounded by PNNs. Using c-Fos as a marker of cell activity, fewer BLA PV-INs were responsive to an aversive stimulus in CSS relative to CON mice.

Discussion
The CSS effects of increased PV expression, increased PNN expression surrounding PV-INs, and decreased c-Fos reactivity to aversive stimuli, are all consistent with decreased PV-IN signalling, which would be predicted to result in loss of inhibition of glutamate principal aversion neurons and increased sensitivity to aversion.

***Accepted as a talk**

6A)

Serotonin modulates behavioural and neural computations underlying impulsive decision-making.

David M. Cole, Lionel Rigoux, Andreea O. Diaconescu, Christoph Mathys, Zoltan Nagy, Katharina Wellstein, Daniel Müller, Boris B. Quednow, Klaas E. Stephan

Translational Neuromodeling Unit, Institute for Biomedical Engineering, ETH Zurich & University of Zurich, Zurich, Switzerland

Introduction
Premature responding impulsivity (PRI) remains under-researched in humans, despite holding relevance for the behavioural and neurochemical aberrancies of multiple neuropsychiatric disorders. We thus sought to provide a computational-pharmacological neuroimaging assessment of PRI, hypothesising associations between serotonin (5-HT) levels and neurobehavioural encoding of computational quantities representing PRI and prediction errors (PEs) during adaptive learning in a variable reward environment.

Methods
Fifty healthy males completed two PRI-sensitive tasks with distinct probabilistic reward-gain and loss-avoidance outcomes during functional magnetic resonance imaging (fMRI), in a double-blind, placebo-controlled, crossover design with the selective 5-HT reuptake-inhibitor escitalopram (15mg). Probabilistic learning behaviour was analysed using Bayesian models of belief-updating, while decision-modelling computed (counter-)PRI 'waiting' behaviour. Computational neuroimaging analyses regressed individual participants' PEs and PRI quantities against their fMRI data. Group analyses then examined main effects and interactions of drug and task condition.

Results
Relative to placebo, escitalopram significantly increased participants' waiting behaviour before making a decision, specifically during loss-avoidance under uncertainty. A computational quantity representing dynamic PRI behaviour during decision-making activated a network of regions involved in motivational processing, including midbrain, bilateral anterior insula and dorsal anterior cingulate. Finally, we found a significant drug×task interaction in the encoding of outcome-related PEs in the serotonergic dorsal raphe nucleus of the brainstem.

Discussion
As hypothesised, increasing synaptic 5-HT reduced PRI behaviour in healthy humans. We also found that 5-HT modulates the encoding of context-specific PE learning signals in the key serotonergic midbrain nucleus innervating cortical regions that are robustly activated during PRI behaviour. Future model-based research should characterise PRI in neuropsychiatric contexts.

7A)

Multimodal opto-fMRI Analysis of Longitudinal SSRI Treatment in Mice

Horea-Ioan Ioanas, Bechara Saab, Markus Rudin

Institute for Biomedical Engineering, ETHZ

Introduction
The serotonergic system is widely implicated in affect regulation. Selective Serotonin Reuptake Inhibitors (SSRIs) are the foremost drug class for treating depression, and also find use in treating anxiety, phobia and other affective disorders. However, the lack of a mechanistic understanding of SSRI effects hinders advancements in serotonergic manipulation.
We present a multimodal analysis approach exposing acute and chronic effects of SSRI treatment on different nodes in a network representation of the serotonergic system - based on opto-fMRI data.

Methods
We image 8 C57BL/6 mice, with an optogenetically targeted Dorsal Raphe (DR), on 5 sessions: naïve, acute, chronic (2x), and after fluoxetine treatment. The data is linearly modelled to obtain activation maps, and analyzed for functional connectivity to obtain transmission strengths. The hypothesis of uniform activation scaling across all sessions is tested with a multivariate pattern.

Results
In all fluoxetine conditions, activation maps indicate a significant serotonergic excitability effect, while functional connectivity analysis indicates a trend towards increased serotonergic signal transmission. Multivariate pattern analysis shows that uniform scaling does not adequately capture chronic fluoxetine treatment effects. All analysis modes show a high inter-individual variability of fluoxetine effects.

Discussion
Our analysis suggests that fluoxetine affects both the auto-regulatory microcircuitry in the DR node, as well as the signal transmission at distal serotonergic synapses. Our findings challenge the autoinhibition-reduction hypothesis of SSRI function, but can be reconciled with it if a different baseline and burst modality of serotonergic activity is considered.

Topic B)

Theoretical Psychiatry: Behavioral Models, Computational Approaches, Humanities

1B)

On the Bayes Brain Paradigm.Modeling Schizophrenia as an Inhibition Failure of Feedforward & Feedback Reverberations in Recursive Bayes

Christoph Kuhn, Cornelius Bück, Thomas Müller

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Introduction

In order to describe the brain's processing of a sequence of data we propose the implementation of a simple recursive Bayes, whereby the posterior (the conception assigned after the evidence is taken into account) is set to be the prior (the conception before the evidence is taken into account) for the next data point represented by its likelihood. Moreover, we include both feedback connections augmenting a small amount of likelihood to the prior and feedforward connections augmenting a small amount of prior to the likelihood.

By variation of augmentation levels, we observe following reverberation patterns: (i) a considerably slow self-adjusting process of the pure recursive Bayes, (ii) an increase in speed and accuracy by a tiny augmentation, (iii) the destabilizing effect of a too-strong augmentation of likelihood, and (iv) the fixation on the wrong spot of a too-strong augmentation of prior.

We then highlight the connection of pattern (ii) to the physiology of the normal brain and the connection of patterns (iii) and (iv) to the pathophysiology of schizophrenia as an inhibition failure in its states of generating respectively strong perceptions (hallucinations) with jumping to rash conclusions and holding to ”unshakable” - but false - preconceived cognitive beliefs (delusions).

2B)

Modelling planed movement with Recursive Bayes and Feedforward & Feedback Reverberations. Implication of Inhibition Failure on the "Sense of Agency"

Christoph Kuhn, Cornelius Bück

Klinik für Alterspsychiatrie, PUK Zürich, Lenggstrasse 31, 8032 Zürich

Introduction

In order to describe the brain's process - from the sensory input (position) via a set-point (the "internally planned" value) of the control system to the motor command (force) - producing adaptable and complex movements in an Newtonian external world we propose the implementation of a simple recursive Bayes, whereby the posterior (the conception assigned after the evidence is taken into account) is set to be the prior (the conception before the evidence is taken into account) for the next data point in the sequence represented by its likelihood. Moreover, we include both feedback connections augmenting a small amount of likelihood to the prior and feedforward connections augmenting a small amount of prior to the likelihood. Based on the efferent copy of the motor command, the comparator between the internal world and the external world yields a "sense of agency" depending on "explaining away" prediction errors in contrast to isolated external disturbances.

3B)

Deep Nets and Brain Rhythms: Learning from the Machine

Sebastian Olbrich, Michel van Putten, Martijn Arns

Department for Psychiatry, Psychosomatics and Psychotherapy, University of Zurich, Switzerland

Introduction
Machine Learning and in particular so called Deep Learning have gained much attention within several areas of research due to their overwhelming capability of pattern recognition. In neuroscience, algorithms and methods to analyze differences between groups or for detection of predictors are in great demand, especially in face of a rapidly increasing amount of data and growing size of datasets. However, most methods rely on the a-priori identification of features within the datasets that then can be extracted and compared. As an alternative method, Deep Networks provide the possibility to scan large amount of data obtained from e.g. neuroscience experiments and let the algorithm itself generate features with discriminative or predictive power that are within the data itself. No prior assumptions are needed.

Results
A deep net with six convolutional and four pooling layers and approx. nine million edges is trained throughout 150 epochs with two second segments of raw electroencephalogram (EEG, 24 channels, Sampling Rate 256Hz) data from 1000 healthy subjects (see Figure 1). The data is labeled as “male” or “female”. In this ground truth scenario we show that the trained net can predict sex from functional data (validation set = 310 subjects, 47% female), with an accuracy of 82% ($p \ll 1e-5$). In a second step, by re-activating the network from the output layer toward the input layer, we extract sex-specific features from the deep net filter layers. Frequency analysis of the features that “have been learned from the machine” show that fast EEG-beta activity (20-25 Hz) is a distinctive attribute for male-female classification. Although this feature showed significant differences between groups when used in a conventional regression analysis, the results (accuracy of 70% using the whole dataset) remained far behind the classification accuracy achieved by the deep net.

Discussion
The work shows the great potential of deep nets to detect features in spatiotemporal data, unnoticed by visual assessment, and to assist in knowledge discovery. We anticipate that this approach may also be successfully applied to other specialties where spatiotemporal data is abundant, including cardiology and neuropsychology.

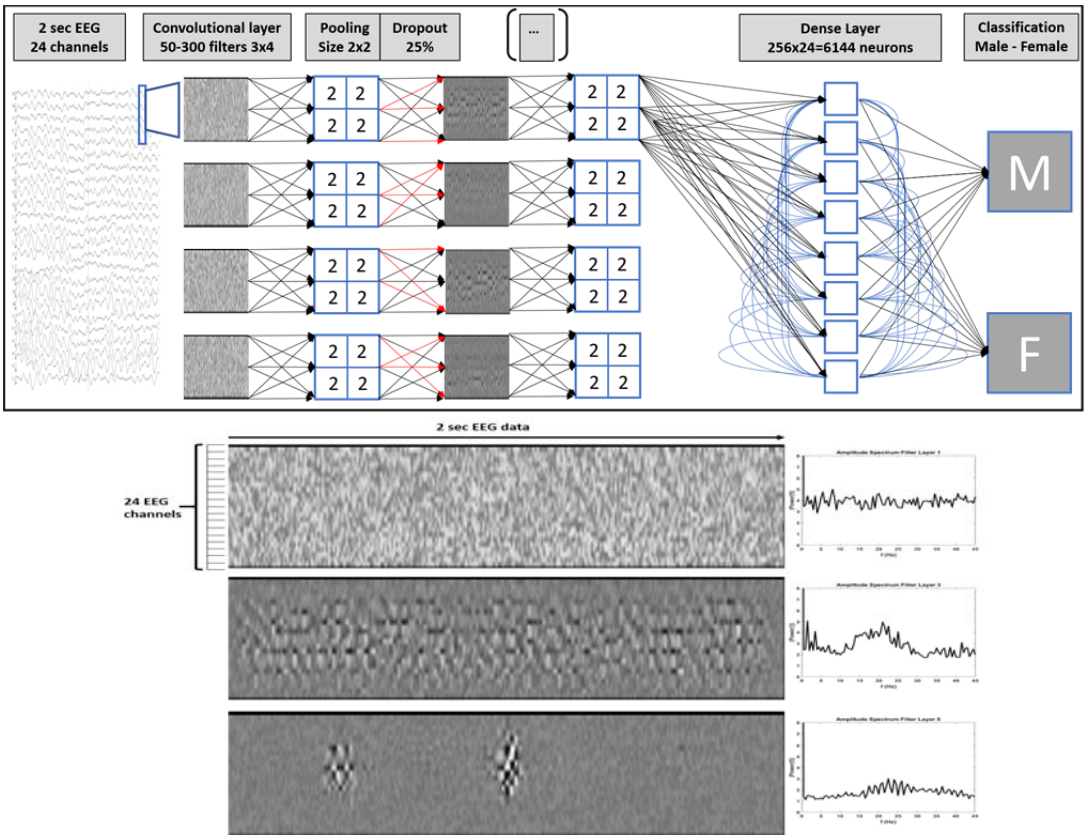

Figure 1: Architecture of the convolutional neural network (left). The input shape (2 second 24-channel EEG) has dimensions 256 (samples) x24 (channels); the output of the net is dichotomous: 1 (male) or 0 (female). Stochastic optimization was realized using Adamax24 with learning rate=0.002, β1 = 0.9, β2=0.999, ε=108 and decay = 0.0. As the loss function, the categorical cross-entropy was used. The total number of parameters was 9,051,902. Example of features used by the deep net for male-female classification (right). Most features in deeper layers showed clear peaks in the EEG-beta frequency range (right middle and bottom panel)

4B)

Effort and reward evaluation in remitted depression: a preliminary report on a possible predictor of relapse

Isabel Berwian, Inga Schnürer, Julia Wenzel, Daniel L Renz, Klaas E Stephan, Henrik Walter, Quentin JM Huys

Translational Neuromodeling Unit, Institute of Biomedical Engineering, University of Zurich and ETH Zurich

Introduction
Loss of interest and pleasure is one of the core symptoms of depression. This is also reflected by the fact that patients are less willing to invest more effort to obtain more rewards. However, if this symptom results from a lack of enjoying rewards, a reduced motivation to obtain rewards or reduced learning about rewards has not been disentangled yet.

Methods
As part of a longitudinal patient study, we conducted a physical effort task in 60 remitted, previously depressed, patients and 18 healthy matched controls. The patient sample discontinued their antidepressant medication after the measurement and was followed up for 6 months to assess relapse. We compared computational models to differentiate between the relative impact of rewards and effort.

Results
Our preliminary results indicate that patients showed a significantly decreased willingness to invest effort for small rewards compared to healthy controls ($p<0.0001$). The behaviour of most participants was best explained by a model that allowed for individual variation both in the sensitivity to effort and rewards, though a higher fraction of controls than patients ($p=0.002$) entirely disregarded the relative rewards. The behavioural differences between patients and healthy controls was captured by a significant difference effort sensitivity ($p=0.01$). A similar pattern of results emerged when comparing patients who relapsed and who did not relapse after antidepressant discontinuation, though this did not reach significance ($p=0.18$).

Discussion
Our results suggest that remitted depressed patients on antidepressants show less interest due to an increased perception of effort, rather than a decreased perception of reward. The increased perception of effort might emerge as a predictor of relapse after antidepressant discontinuation once the dataset reaches its full power. The presented results are preliminary and thus need to be interpreted with caution.

5B)

Predicting relapses after antidepressant discontinuation using emotion-induced relative frontal and occipital EEG power

Marius Tröndle, Isabel Berwian, Julia Wenzel, Inga Schnürer, Tania Villar, Daniel L Renz, Klaas E Stephan, Henrik Walter, Gabor Stefanics, Quentin JM Huys

Translational Neuromodeling Unit, Institute of Biomedical Engineering, University of Zurich and ETH Zurich

Introduction
Relapses are a major determinant of the long-term outcomes of depression and its treatment. The relapse risk should therefore feature prominently in decisions about treatment and treatment discontinuation. So far there are no known biomarkers to guide individual choices about when to discontinue. An fMRI study by Farb et al. (2011) indicates the predictive value of an emotional reactivity score, although not focusing on treatment discontinuation. An aim of the present study is to replicate these results with specific focus on antidepressant discontinuation, using the more economical and widely available EEG.

Methods
A sample of remitted, previously depressed patients on antidepressants is being recruited. Prior to antidepressant discontinuation an emotional reactivity task, adapted from Farb et al. (2011) is performed, in which subjects are confronted with neutral and sad video stimuli. EEG is recorded and source reconstruction using a multiple sparse prior framework performed. Alpha and theta band power is extracted for for each subject in the ROIs reported by Farb et al. (2011), and the same emotional reactivity score is calculated based on the relative power in frontal and occipital ROIs.

Results
Preliminary results with 4 relapsers and 10 stable remitters indicate no significant group differences between relapsers and stable remitters ($p=0.162$). However, thresholding the emotional reactivity scores allows all but one (13/14, 93%) to be classified correctly, and hence relapse/non-relapse status to be predicted.

Discussion
While this preliminary sample is too small for conclusions, the pattern of results observed in EEG is suggestive of the similar effects described in the fMRI literature, suggesting that relapse is associated with a relatively stronger prefrontal than occipital engagement during emotional stimulation. This may prove useful for prediction. However, caution is warranted due to the preliminary nature of the sample.

6B)

*A computational trial-by-trial EEG analysis of hierarchical prediction errors**

Sara Tomiello, Dario Schöbi, Lilian Aline Weber, Helene Haker, Sandra Iglesias, Klaas Enno Stephan

Translational Neuromodeling Unit (TNU), University of Zurich & Swiss Federal Institute of Technology (ETH Zurich), Switzerland

Introduction
Action optimization relies on learning about past decisions and on accumulated knowledge about the environment. In Bayesian models of learning, belief updating is informed by multiple hierarchically related precision-weighted prediction errors (pwPEs). The pwPEs may be reflected by dopaminergic (DA) and cholinergic (ACh) signalling; this is a central pathophysiological theme in schizophrenia. Here, we investigated drug and genetic effects on the timing of PEs and their corresponding precision-weights, using computational trial-by-trial EEG analyses.

Methods
74 healthy male volunteers were tested using EEG while performing a reward associative learning task. We employed pharmacological interventions (amisulpride / biperiden / placebo) and genetic analyses (COMT and ChAT) to probe DA and ACh modulation. Having determined an optimal model for behavioural data, computational trajectories of low-level choice PE (aboutreward outcome), high-level PE (about probability of the outcome) and the respective precision-weights (or inverse uncertainty) were used as covariates in single-subject trial-by-trial GLM analyses at the sensor level. The resulting parameter estimates entered one-sample t-tests (group-level).

Results
A three-level Bayesian model, the Hierarchical Gaussian Filter (HGF), best explained the data and was used to compute the computational regressors for EEG analyses. We found a significant three-way interaction between pharmacology, the COMT gene and the high-level uncertainty. No significant results were detected for the other computational quantities or for the ChAT gene.

Discussion
Given the previous results by Iglesias et al. (2013), it is possible (but presently speculative) that high-level computational quantities are represented in cholinergic regions, which in turn are influenced by dopaminergic projections.

***Accepted as a talk**

7B)

Exploring the validity of pain-related fear questionnaires – a probabilistic fMRI machine learning approach

Meier ML, Schweinhardt P

Interdisciplinary Spinal Research, Department of Chiropractic Medicine, University Hospital Balgrist, Zurich, Switzerland

Introduction
Embedded in the fear-avoidance model of chronic low back pain (CLBP), pain-related fear (PRF) is characterized as a prognostic factor of disability. Currently, there are several questionnaires which assess PRF but their ability to identify who is fearful is controversial. In this respect, neuroimaging might lead to novel insights as individual variability in fear processing is hypothesized to be reflected in differentially and spatially distributed brain responses.

Method
During fMRI recording, 20 CLBP patients (7 females, mean age = 39.35) were asked to observe video clips showing potentially harmful and neutral activities for the back. Subsequently, for each questionnaire (Fear Avoidance Beliefs (FABQ) and Tampa Scale of Kinesiophobia questionnaires, Pain anxiety symptoms scale), we trained a gaussian process regression model by using amygdala activity patterns and leave-one-subject-out cross-validation with the aim to predict the respective questionnaire score on an unseen patient. Statistics were based model performance (R^2, mean squared error MSE) and model selection (Bayes factor).

Results
For the harmful condition, only the FABQ questionnaire demonstrated a significant association with amygdala activity patterns (R^2 = 0.32, MSE = 4.13, $p< 0.05$), driven by a strong contribution of the FABQ-work subscale (R^2 = 0.48, MSE = 1.84, $p< 0.05$). In line with these results, related Bayes factors indicated a preference for the FABQ-work model. Importantly, questionnaire scores were not predictable by activity pattern evoked by neutral activity (all p's>0.5).

Discussion
These results might indicate that the tested questionnaires measure different constructs. Further evaluation in the extended fear network is necessary.

8B)

Hierarchical Prediction Errors during Auditory Mismatch under Pharmacological Manipulations: A Computational Single-Trial EEG Analysis

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Introduction
A central theme of contemporary neuroscience is the notion that the brain embodies a generative model of its sensory inputs to infer on the underlying environmental causes, and that it uses hierarchical prediction errors (PEs) to continuously update this model. In two pharmacological EEG studies, we investigate trial-wise hierarchical PEs during the auditory mismatch negativity (MMN), an electrophysiological response to unexpected events, which depends on NMDA-receptor mediated plasticity and has repeatedly been shown to be reduced in schizophrenia.

Methods
Study1: Reanalysis of 64 channel EEG data from a previously published MMN study (Schmidt et al., 2012) using a placebo-controlled, within-subject design (N=19) to examine the effect of S-ketamine. Study2: 64 channel EEG data recorded during MMN (between subjects, double-blind, placebo-controlled design, N=73), to examine the effects of amisulpride and biperiden. Using the Hierarchical Gaussian Filter, a Bayesian learning model, we extracted trial-by-trial PE estimates on two hierarchical levels. These served as regressors in a GLM of trial-wise EEG signals at the sensor level.

Results
We find strong correlations of EEG with both PEs in both samples: lower-level PEs show effects early on (Study1: 133ms post-stimulus, Study2: 177ms), higher-level PEs later (Study1: 240ms, Study2: 450ms). Ketamine significantly reduced the representation of the higher-level PE in Study1. (Study2 has not been unblinded.)

Discussion
These studies present first evidence for hierarchical PEs during MMN and demonstrate that single-trial analyses guided by a computational model provide better mechanistic interpretability of pharmacological MMN studies, and will hopefully support the development of computational assays for diagnosis and treatment predictions in schizophrenia.

9B)

Machine learning: a new approach to identifying risk factors for the use of coercive measures in involuntarily committed patients

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Introduction
Although knowledge about negative effects of coercive measures in psychiatry exists, its prevalence is still high in clinical routine. This study aimed at defining risk factors and testing their accuracy for prediction of the risk to being subjected to coercive measures.

Method
In a sample of involuntarily committed patients (n = 393) at the University Hospital of Psychiatry Zurich, risk factors for the experience of coercion (n=170 patients) were analyzed using chi-square tests and Mann-Whitney-U tests and trained in machine learning (ML) algorithms (logistic regression, Support Vector Machine (SVM) and decision trees). The obtained models were tested for their accuracy via 5-fold cross validation. Results were compared to binary logistic regression.

Results
In a model with 8 risk-factors, available at admission, the SVM algorithm identified 100 out of 170 patients with and 176 out of 223 patients without coercion (69% accuracy; 59% sensitivity and 79% specificity, receiver operator characteristics (ROC) curve 0.75). In a model with 18 risk-factors, available after discharge, the logistic regression algorithm identified 121 out of 170 with and 173 out of 223 without coercion (74.5% accuracy; 71% sensitivity and 78% specificity, ROC curve 0.82).

Discussion
This study could show that trained ML algorithms can achieve a good or even excellent ROC curve in the prediction of coercion/no coercion. Compared to binary logistic regression, the better generalizability of ML makes it a promising approach for further studies. More detailed knowledge about individual risk factors may help to prevent the occurrence of situations involving coercion.

Topic C)

Neuroimaging: MRI, PET, NIRS, Spectroscopy, EEG, MEG

1C)

Neural activity in response to smoking-related and neutral pictures in three different states in smokers

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Introduction
Tobacco smoking is the leading preventable cause of premature death worldwide. Despite many smokers wanting to quit, relapse rates are high. Cue-induced craving plays a prominent role in relapse of tobacco use disorder (TUD). To elucidate the underlying neural correlates, we investigated the effect of smoking state on cue-induced neural activity.

Methods
Twenty-one male subjects with TUD underwent BOLD fMRI scans in three different smoking states: baseline (2 hours smoking abstinence), withdrawal (24 hours smoking abstinence), and satiation (directly after smoking). Smoking-related and neutral pictures were presented in a block design. Craving, valence and arousal were rated before and after the cue reactivity task (CR). Withdrawal symptoms in every state and TUD severity were assessed.

Results
Smoking pictures elicited higher BOLD responses in the middle occipital gyrus in all smoking states. Greater activation was found in the right cuneus during withdrawal, and in the left superior frontal gyrus and right anterior cingulate during baseline. Negative correlations were found between TUD severity and activity in the right parietal lobe, and between the severity of withdrawal symptoms and activity in the right anterior cingulate during baseline. Craving and arousal ratings were higher after CR. Craving ratings during withdrawal were higher than during baseline and satiation, and correlated negatively with activation in the left middle frontal gyrus.

Discussion
More visuospatial processing, attention and decision making capacity are allocated to smoking images. Interestingly, similar brain circuits show blunted responses with increasing TUD severity and withdrawal symptoms. Similarly, lower working memory and inhibitory control were associated with stronger craving.

2C)

Cerebral blood flow in striatal regions is associated with apathy in patients with schizophrenia

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Introduction
Striatal dysfunction has been proposed as a pathomechanism for negative symptoms in schizophrenia. There is consensus that negative symptoms can be grouped into the two dimensions "apathy" and "diminished expression". Recent studies suggested that different neural mechanisms underlie these dimensions, but so far the relationship of resting-state cerebral blood flow (CBF) and negative symptom dimensions has not been investigated.

Methods
29 patients with schizophrenia and 20 healthy controls were included. CBF in the striatum of patients with schizophrenia and healthy controls was measured with arterial spin labeling (ASL) magnetic resonance imaging. Negative symptoms were assessed using the Brief Negative Symptom Scale.

Results
We observed no group differences in striatal CBF. In patients with schizophrenia an association between the severity of apathy and increased CBF in the ventral and dorsal striatum was found. This effect was not observed between striatal CBF and diminished expression.

Limitations
Since all patients were medicated with atypical antipsychotics, an impact of antipsychotic medication on CBF cannot be excluded, although we did not find a significant association of CBF with chlorpromazine equivalents.

Conclusions
The main finding of the study is a specific association between increased striatal CBF and the negative symptom dimension of apathy. These results further support a separate assessment of the negative symptom dimensions of apathy and diminished expression when investigating the neural basis of negative symptoms. ASL can provide a direct and quantitative technique to investigate the role of CBF changes in the pathophysiology of negative symptoms.

3C)

How our brain changes with age and for other reasons

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Introduction
Volume measurements of cerebral structures in MRI are increasingly used to define in vivo the pathology of neurodegenerative diseases and to quantify at single subject level the related volume loss of the brain and specific substructures. However, it appears crucial to assess any structural changes against the background of a physiologically aging brain.

Methods
Atlas-based volumetry (ABV) is a fully automated method, which classifies T1-weighted 3D MRI images on voxel level into grey and white matter compartments and warps the resulting tissue probability maps into a template space using elastic image registration. Subsequently, probabilistic brain atlases of predefined regions of interest in the same space are used to extract regional brain volumes. The method was applied to MRI data of >8000 healthy controls (2-96 ys) and >2000 patients of diverse disease groups (e.g. Alzheimer disease, fronto-temporal dementia, atypical parkinsonian syndromes, Huntington disease etc.) derived from large-scale internet databases and in-house collections.

Results
In this ABV analysis, the aforementioned neurodegenerative diseases show typical atrophy patterns and can be differentiated to a large extent from healthy controls. However, the present results also make clear that it is important to take into account physiological volume changes and losses due to normal ageing when interpreting patient results.

Discussion
Volumetric MRI analysis appears to be a valuable supportive tool for the diagnosis of neurodegenerative diseases, but should be employed against the background of a sufficiently large database of controls covering a broad age range to allow differentiating disease-related changes from normal ageing.

4C)

Altered functional activation in verbal fluency linked to auditory verbal hallucinations

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Introduction
Auditory verbal hallucinations are a common symptom in schizophrenia. Other symptoms comprise deficits in the domains of cognition, emotion and language. In the language domain, patients with schizophrenia often show deficits in tasks investigating verbal fluency. It is still unclear, however, if this deficit is symptom-specific or a general exacerbation in schizophrenia. The association of verbal fluency deficits and the symptom of auditory verbal hallucinations is interesting in particular as both processes engage brain areas associated with language processing.

Methods
The current study investigated this relationship in 31 participants in three groups of subjects: patients with schizophrenia and hallucinations, patients with schizophrenia without hallucinations, and healthy controls. All subjects performed a verbal fluency task while measuring functional activation by a blood-oxygen-level-dependent (BOLD) magnetic resonance imaging (MRI) procedure. Task-dependent activation was compared between the three groups.

Results
All three groups showed activation in language areas (Broca's in inferior frontal gyrus or Wernicke's in inferior parietal lobule). As expected, patients demonstrated activation in the right hemisphere in addition to left-sided activation. However, activation patterns differed for patient groups when compared to healthy controls. Furthermore, there was unexpectedly more activation for non-hallucinating patients compared to hallucinating patients in bilateral fusiform gyrus. Non-hallucinators but not hallucinators seem to activate fusiform gyri as an additional strategy to compensate for deficits in performance.

Discussion
In contrast to literature, we suggest that there is a link between verbal fluency and auditory verbal hallucinations. The particular relationship between the two processes, however, needs further investigation.

5C)

Closed-loop fMRI Amygdala Neurofeedback using dynamic emotional faces Introduction

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Introduction
Learning to voluntarily control brain regions related to emotion regulation through real-time fMRI neurofeedback training has been shown to improve emotion regulation in psychiatric patients [1]. In these previous neurofeedback studies, feedback about brain activity was provided using symbolic feedback signals such as a thermometer icon. Here, we demonstrate a novel closed-loop approach using feedback stimuli that inherently recruit the brain regions to be trained, i.e., we used emotional face stimuli as a feedback signal [2], the valence of which was determined based on ongoing amygdala activity.

Methods
32 healthy participants performed 1 session composed of 4 closed-loop amygdala neurofeedback runs in a 3T MR-scanner. Participants were told that they will view faces, and that the happiness of the faces increases with increasing bilateral amygdala activity. Their task was to increase the happiness of the depicted face, and thus their amygdala activity in response to the happy face. Neurofeedback was presented using OpenNFT (www.opennft.org) [3]. Offline data pre-processing and analyses were performed in SPM12 and visualized in sweetView (www.sweetneuron.at). We contrasted orthogonalized regressors for Face Blocks, Neurofeedback Signal and Neurofeedback Response.

Results
Our results showed significant activations in the right Amygdala, temporal pole and medial oribitofrontal cortex. We observed increased activation in bilateral amygdalae VOIs.

Discussion
Here we demonstrate the feasibility of the closed-loop amygdala setup. Exposure to the closed-loop stimulus leads to increased amygdala and mOFC activation. Our new approach might facilitate modulation of the amygdala response to emotional stimuli in order to improve emotion regulation in health and disease.

6C)

Temporal activity and large-scale functional connectivity reductions in bipolar euthymia - an sLORETA analysis

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Introduction
Bipolar disorder (BD) is a chronic illness with a relapsing and remitting time course. Relapses are manic or depressive in nature and are intermitted by euthymic states. During euthymic states, patients do not meet the criteria for a manic or depressive diagnosis. However, they still suffer from impaired cognitive functioning as indicated by difficulties in executive and language-related processing. The present study investigated whether these deficits may be reflected by altered intra-cortical activity or functional connectivity in and between brain regions involved in these processes such as the prefrontal and the temporal cortices.

Methods
We obtained 19-channel vigilance-controlled resting EEG from 13 euthymic BD patients and 13 healthy age- and sex-matched controls. Head-surface EEG was recomputed into current density values in 6239 intra-cortical voxels in eight frequency bands using standardized Low Resolution Electromagnetic Tomography. Intra-cortical current densities were averaged for 19 evenly distributed regions of interests (ROIs). Lagged coherences were computed between each ROI pair. Paired t-tests compared measures between patients and controls.

Results
Results revealed temporal activity and large-scale functional connectivity reductions in patients compared to controls. Activity reductions affected all eight EEG frequency bands, primarily in the left hemisphere. Functional connectivity reductions affected the delta, theta, alpha-2, beta-2, and gamma band and involved but were not limited to prefrontal and temporal ROIs.

Discussion
They suggest an underactivation of the temporal cortex and reduced coordination between many brain regions in BD euthymia. These factors may disturb the continuous fronto-temporal information flow required for executive and language-related processing impaired in euthymic BD patients.

7C)

Apathy and diminished expression are not associated with ventral striatum volume in schizophrenia

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Introduction
Negative symptoms are core features of schizophrenia and can be grouped into two domains. These are apathy including anhedonia, avolition and asocialty as well as diminished expression including blunted affect and alogia. A large body of research found that ventral striatal hypoactivation is linked to negative symptomes; In particular, it has been shown that this neural correlate is specific for apathy but not diminished expression. Here, we investigated whether this dissociation can also be found in ventral striatum volume.

Method
We included brain structural data of 60 patients diagnosed with schizophrenia.
Negative symptoms in these groups have been assessed using the Brief Negative Symptom Scale (BNSS). We performed voxel based morphometry (VBM) using the statistical parametric mapping package (SPM 12).

Results
We could show that neither apathy nor diminished expression is associated with ventral striatum volume. There was no significant correlation observed between apathy and left or right ventral striatum volume. Furthermore an exploratory whole-brain analysis revealed no significant association of apathy and ventral striatal volume.

Conclusions
Although a correlation of apathy and ventral striatal volume has been shown in a previous study with fewer subjects, we could not reproduce this finding in a larger group of 60 patients with schizophrenia. However, while these negative findings do not support the association between apathy and ventral striatal volume, there may be more subtle brain structural changes linked to the pathophysiology of apathy, which cannot be detected by voxel based morphometry.

8C)

*Simulating reading acquisition: A multimodal neuroimaging approach for early prediction of reading fluency**

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Introduction
During reading acquisition, neural reorganization of the human brain facilitates the integration of letters and speech sounds, which enables successful reading. Neuroimaging and behavioural studies have demonstrated that impaired audiovisual integration of letters and speech sounds is a core deficit of individuals with developmental dyslexia.

Methods
This longitudinal study aimed to identify neural and behavioural markers of letter-speech sound integration that predict future reading fluency. We simulated the first step of reading acquisition by performing artificial-letter training with prereading children at risk for dyslexia (N=28, age: 6.7±0.3 years). The sample was tested on precursor skills of reading and performed an implicit audiovisual target detection task in a simultaneous EEG-fMRI session, in which the trained artificial correspondences were presented. After half a year of formal reading instruction (age: 7.4±0.3 years), children's initial reading fluency was assessed and they were classified as either normal (N=15) or poor (N=13) readers.

Results
Prediction analysis with multiple logistic regression models revealed that our training provides new precursors of future reading fluency that outperform common behavioural predictors by 7%. In addition to the performance measures, an event-related potential around 400 ms and functional magnetic resonance imaging activation patterns in the left planum temporale to audiovisually presented correspondences substantially improved cross-validated prediction of future poor readers, reaching an overall prediction accuracy of 82%.

Discussion
The multimodal approach demonstrates neural adaptations to audiovisual integration in the developing brain, which not only improve prediction of poor reading skills but may also have promising implications for monitoring early interventions.

***Accepted as a talk**

9C)

How increased craving changes functional brain connectivity during rest

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Introduction
Smoking is the leading cause of preventable premature death worldwide, but successful smoking cessation rates are still low. Studies suggest that reducing cue-related nicotine craving is key to quit smoking. In a recent study, we identified distinct brain areas associated with craving, valence, and arousal ratings of nicotine stimuli. Here, we investigate how connectivity between these and other craving-related brain regions change during rest when comparing resting-state scans before and after craving was induced in nicotine addicts.

Methods
Sixteen smokers passively watched 330 smoking-related stimuli for 30 minutes while undergoing fMRI scanning. To test if craving increased, participants filled the questionnaire on smoking urges (QSU) before and after exposure to the stimuli. They also performed 8 minutes resting-state fMRI scans before and after the craving induction. fMRI data was preprocessed using SPM12 and the CONN toolbox. Resting-state scans were analyzed using a seed-to-voxel functional connectivity approach with the amygdala, nucleus accumbens and VTA as seed regions of interest (ROI). Planned functional connectivity analyses include ICA to investigate standard resting-state components, and ROI-to-ROI approaches to assess specific connectivity changes.

Results
Urge-to-smoke scores increased by 32.4 points on average after exposure to nicotine-related stimuli, thus indicating that the craving induction was successful. fMRI data analysis is currently ongoing.

Discussion
We successfully implemented an experimental protocol to induce craving in nicotine addicts, and acquired resting-state scans before and after craving induction. Comparing connectivity during low- and high-craving conditions will allow for a better characterization of this key component of nicotine addiction.

10C)

*Disentangling craving, valence and arousal in nicotine addiction with parametric functional magnetic resonance imaging (fMRI)**

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Introduction
Craving is the strongest predictor of smoking cessation outcome in nicotine addiction, and a precise delineation of craving-related brain activations is crucial for developing targeted interventions. Unfortunately, most studies that investigate craving present visual craving stimuli without actually controlling for other important aspects of addictions such as valence or arousal changes that these stimuli might induce. The purpose of this study was to generate a set of individually rated nicotine cues (which we will make publicly available) and to define the brain patterns associated with craving, valence and arousal using fMRI.

Methods
Sixteen individuals with nicotine addiction underwent fMRI scanning and were asked to passively view 330 pictures depicting nicotine stimuli of different craving intensities. Spread across 5 runs, the stimuli were presented every 3.3s for 2.3s (i.e. event-related design). After scanning, participants rated all stimuli with respect to “valence”, “arousal” and “urge-to-smoke” on a 100-point Likert-scale. Data were analyzed parametrically using SPM12.

Results
Parametric analysis revealed activation in craving-associated brain regions, including the anterior cingulate cortex (ACC) and nucleus accumbens (NAcc). A regionally specific linear correlation was found between “urge-to-smoke” and NAcc as well as “valence” and subgenual ACC. Activation in the amygdala was positively correlated with the severity of nicotine dependence.

Discussion
This is the first study to successfully identify distinct brain activations for different aspects of craving in nicotine addiction, such as urge-to-smoke, valence, and arousal. A better neural characterization of these dimensions might help to develop more tailored interventions (e.g. as a neurofeedback target).

***Accepted as a talk**

11C)

Neural computations underlying human Pavlovian threat learning

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Introduction
Reinforcement learning (RL) theory describes how expectations and their violations (prediction errors, PE) might drive learning. Appetitive learning and PEs have been studied extensively but as of yet we have little information on where and how aversive prediction errors might be computed. Here, we looked for brain regions encoding aversive PEs and learning signals by using functional magnetic resonance imaging (fMRI) and Pavlovian fear conditioning.

Methods
22 participants underwent fMRI scanning at 3T. Visual conditioned stimuli (CSs) predicted an electric shock (unconditioned stimulus, US) with different probabilities. We searched for brain regions encoding PE signals with an axiomatic approach as well as analysed neural activity relating to trial-by-trial parameters from an optimal Bayesian learning model that best explained previous behavioural data.

Results
In the axiomatic approach, we did not find any brain regions in which BOLD signals unambiguously fulfilled the conditions for representing positive, negative or unsigned aversive PEs. In the model-based analysis, expectation of US probability was associated with activation in the left insular and opercular regions. Moreover, uncertainty about US probability was associated with activation in bilateral superior occipito-parietal and medial frontal, left superior frontal and opecular as well as right precuneal regions. Finally, Bayesian surprise about the US outcome was encoded in middle dorsal prefrontal cortex.

Discussion
In contrast to previous work on appetitive, and aversive operant learning, we did not find brain regions encoding PE signals during Pavlovian threat conditioning. Instead, we highlight neural activity related to trial-by-trial parameters from an ideal Bayesian observer model.

12C

Relapse after antidepressant medication discontinuation is related to dorsal nexus and default mode connectivity. A preliminary report

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Introduction
The relapse rate after antidepressant (ADM) discontinuation exceeds 30% within 6 months (Geddes et. al., 2003). To date, few predictors of relapse after ADM discontinuation have been investigated, none of these are neurobiological markers, and none have been reliably replicated (Berwian et. al., 2017). Thus, discontinuation recommendations are based on trial and error. Resting-state functional connectivity measures are promising due to the ease of data acquisition and the robustness of the signals.

Methods
AIDA is a two-centre, longitudinal, observational study. For this preliminary report, RSFC was acquired before and after discontinuation in 17 healthy controls and in 43 patients followed-up for six-months to ascertain relapses. We performed a seed-to-voxel analysis based on the RSFC literature in depression. All results are FWE at 0.05.

Results
Patients showed increased RSFC between the left dorsal nexus and areas in the posterior left default mode network and right cognitive control network compared to healthy controls. Patients who relapsed after ADM discontinuation, however, showed decreased RSFC between the right dorsal nexus and the posterior left default mode network compared to patients who did not relapse. The ADM discontinuation itself led to an increase in RSFC between the right dorsolateral prefrontal cortex and the hippocampus. However, the latter two results did not survive Bonferroni correction for the number of seeds investigated.

Discussion
Remitted patients on ADM continue to show alterations in RSFC. Particularly connectivity to the left default mode remains both altered and appears to be related to future relapses. Hence, relapse after ADM discontinuation might be predicted by neurobiological signatures. Due to their preliminary status, the presented results must be treated with caution.

13C

Deficits in context-dependent adaptive coding in early psychosis and individuals with schizotypal personality traits

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Introduction
Adaptive coding of reward values is a fundamental principle of our brain to efficiently represent a theoretically infinite range of rewards in the natural environment with a limited firing rate of dopamine neurons. Recent work from our group suggested that adaptive coding of reward is impaired in schizophrenia. However, it is unknown if this deficit extends across the psychosis spectrum. The aim of the current study was to elucidate whether imprecise adaptive coding is a general dysfunction across the psychosis continuum.

Methods
We studied 27 patients with first-episode psychosis, 26 individuals with schizotypal personality traits and 25 healthy controls using functional magnetic resonance imaging in combination with a variant of the monetary incentive delay task. In our paradigm, adaptive coding corresponds to a steeper response slope in the low reward condition than in the high reward condition.

Results
Compared to healthy controls, patients with first-episode psychosis and individuals with schizotypal traits showed less efficient neural adaptation to the current reward context in the right DS, which leads to imprecise neural representation of reward. In addition, impaired adaptive coding of reward in the right DS and right VS was associated with total symptom severity across the psychosis continuum.

Discussion
Deficits in adaptive coding were prominent across all subgroups of the psychosis continuum and even detectable in unmedicated individuals at risk for psychosis. Our findings suggest that impaired adaptive coding may be a general deficit in the psychosis continuum with early onset in the course of the disease.

14C

*Human noradrenergic conflict adaptation response predicts real-world stress resilience**

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Introduction
Stress and traumatic events are common features of life in modern societies. While some individuals succumbs to stress and develop psychiatric symptoms others remain unaffected. The neural mechanisms underlying individual stress resilience predispositions are currently unknown.

Methods
To determine possible mechanisms for stress resilience we obtained non-invasive measures (fMRI) of human locus coeruleus (LC) arousal system function in medical students, which are at-risk to develop depression and anxiety due to their stressful profession. Individual anxiety and depression symptom changes after 3 and 6 months internship were quantified relative to symptom baseline level prior internship using standardized questionaires (STAI, PHQ). Stress related symptom changes were correlated with LC-responsivity measures obtained prior internship during performance of a classic conflict adaptation task. Individual stress resilience was predicted using out-of sample procedures.

Results
Across 48 medical students (mean-age=24, female=28), individual LC conflict adaptation responsivity predicted anxiety- and depression scores three and six months into the internship (all Rho > 0.34, all p at least < 0.05, Spearmans Rho). Out-of-sample predictions showed that observed and predicted anxiety and depression symptom severity were significantly related, both for the measures after 3 months and after 6 months (all Rho > 0.30, p at least < 0.05, Spearmans Rho).

Discussion
Neural responsivity of the human LC predicted changes of anxiety and depression symptoms in response to real-life stress. These results are important for prevention and intervention purposes and help the development of diagnostic and therapeutic measures promoting resilience and mental health in medical students and potentially other professions.

***Accepted as a talk**

15C

Enhancing mindfulness based emotion regulation via connectivity based real time functional magnetic imaging (rt-fMRI) neurofeedback – a study outline

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Introduction
Emotion regulation deficits are core symptoms in a variety of mental disorders. Rt-fmri neurofeedback is successful in training the regulation of brain activation and the coupling of brain regions. It can be used for training emotion regulation on a neurofunctional level. Mindfulness-based strategies are widely applied for improving emotion regulation. These strategies need extensive training. We want to improve and accelerate this training using rt-fmri neurofeedback. Pre-study data suggest that mindfulness interventions enhance the coupling between dorsomedial prefrontal cortex (dmpfc) and amygdala during rest and during perception of emotionally negative stimuli.

Methods
12 healthy subjects are included. Assessment comprises fmri- eligibility, clinical interview, and questionnaires. Training is performed in four sessions. Scanning procedures include functional localizers of dmpfc and amygdala and three training runs with dcm-feedback of the influence of dmpfc on the amygdala in each session. Subjects are instructed to apply mindfulness introspection according to our previous studies. Feedback is given at the end of each block. Training comprises “neutral” blocks without and “negative” blocks with emotionally negative stimuli to vary the difficulty of the task. A transfer task with negative and neutral stimuli without feedback before the first and after the last training session is used to test transferability.

Results
Training success is rated in terms of reduction in amygdala activity and increase in dmpfc-to-amygdala coupling between the pre-training run and the post-training transfer task. Additionally the training success is analyzed regarding pre-training variables.
We want to investigate whether it is possible to improve and accelerate learning of mindfulness based emotion regulation via rt-fmri training.

Discussion
Training success is rated in terms of reduction in amygdala activity and increase in dmpfc-to-amygdala coupling between the pre-training run and the post-training transfer task. Additionally the training success is analyzed regarding pre-training variables.
We want to investigate whether it is possible to improve and accelerate learning of mindfulness based emotion regulation via rt-fmri training.

Topic D)

Clinical Research: Etiology, Epidemiology, Neuropsychology, Diagnostics

1D)

Conduct disorder symptom profiles in juvenile offenders: Associations with comorbid disorders, limited prosocial emotions and the prediction of criminal re-offenses

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Introduction
Although conduct disorder (CD) is highly prevalent in juvenile offenders (JO), it remains unclear if specific aggressive/covert and/or moderate/severe symptom profiles can be identified in this group. We assessed CD-subtypes in JO using Latent Class Analyses (LCA) and tested their relation to comorbid psychiatric disorders, suicidality, limited prosocial emotions (LPE) and criminal/violent re-offenses.

Method
Interview-based psychiatric disorders/CD symptoms, a self-reported LPE proxy, and officially-recorded offenses were assessed in a sample of 281 male juvenile offenders (age 11.2-21.3 years) from a detention and a forensic outpatient center in Zurich, Switzerland.

Results
LCA revealed five CD-subtypes: A low/mild CD-subtype (reference group in the following analyses), an aggressive CD-subtype, a rule-breaking CD-subtype, a moderate CD-subtype and a severe CD-subtype. The severe and to a lesser degree also the moderate CD-subtype were related to comorbid attention-deficit-hyperactivity disorder, substance use disorder, affective disorder, suicidality, and the LPE proxy. Time to criminal violent re-offenses were predicted by the severe CD-subtype (OR=5.98, CI=2.5-13.80) and moderate CD-subtype (OR=4.18, CI=1.89-9.21), but not by other CD-subtypes or by the LPE proxy in multivariate Cox-regressions (controlling for age, low socioeconomic status and foreign nationality).

Conclusions
In agreement with findings from community samples, the present results confirm the existence of different CD-symptom profiles in JO. Subtyping JO according to CD symptoms is of high clinical importance and may inform on risk of further violent offenses. The current findings need confirmation from further investigations in JO samples using multi-informant measures and are limited to male JO only.

2D)

Electrophysiological parameters as biomarkers for psychiatry: intra-individual variability and influencing factors

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Introduction
The aim of this study was to compare the intra-individual variability of different electrophysiological parameters, in order to assess the autonomous nervous system (ANS).

Methods
A five-minute baseline of resting heart rate (RHR), heart rate variability (HRV), respiration rate (RR), skin conductance (SC) and skin temperature (ST) was recorded in 63 healthy subjects (mean age 35.9; 36 females) at two separate times. The participants were divided into three groups to assess the test-retest variability: (1) retest after 30 minutes, (2) retest at separate times on the same day, (3) retest at the same time on a different day. Age, gender, education, marital state, nicotine and alcohol consumption, physical activity, body mass index, Brief Symptom Inventory, subjective well-being, pain and fear scales were also evaluated.

Results
There were significant test-retest differences in SC, ST and low frequency/high frequency ratio of HRV. Immediate retest showed the highest test-retest correlation, followed by measures on two different days but at the same time. The lowest test-retest correlation was found between measurements in the morning and afternoon. Smoking, age and gender showed significant correlations with certain electrophysiological parameters (HRV, ST, RR), whereas other parameters measured in this study did not exert any significant influence on the ANS.

Conclusions
RHR and RR appear to be robust, stable and easy to obtain biomarkers for evaluating ANS function. Circadian rhythm and other influencing factors factors should be considered when comparing two or more measures of ANS.

3D)

Interindividual concordance of human heart rate responses to a highly emotional movie.

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Introduction
Emotions guide behaviour and serve as social signals, yet measuring emotions is a challenge in social sciences. The coupling of autonomic and central nervous processes offers a promising approach to objectively depict bodily changes as part of emotional experiences. Results of previous studies on the psychophysiological response to emotive stimuli are very heterogeneous. This diversity reflects interindividual differences in processing of emotions that is essential to the phenomenon of emotions itself and has to be taken into account in study design and statistical analyses.

Methods
We investigate heart rate (HR) responses to an emotional movie. Forty healthy participants watched the entire movie “The Impossible” while HR was recorded. Raw HR time series were detrended and a temporal smoothing with a moving Gaussian filter was applied. Six scenes were selected to examine HR responses to different emotions. To distinguish HR response patterns, agglomerative hierarchical clustering analysis was conducted. Cases were aggregated to clusters until mean intracluster correlation dropped below r = .5.

Results
Multiple heart rate response patterns were observable during all of the six emotive scenes. Thus, heart rate responses to complex emotive stimuli were not uniform. Nevertheless, for two of the six selected emotive scenes, dominant patterns that comprised more than half of the study sample emerged.

Discussion
Our results strongly suggest that interindividual variability in heart rate responses to emotive scenes is the rule rather than the exception. To capture this diversity, this study proposes an approach that allows an elaborate measurement of interindividual differences in emotional autonomic responses.

4D)

*Construct Validity of the German Version of the Psychopathy Checklist-Revised (PCL-R)**

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Introduction
The Psychopathy Checklist-Revised (PCL-R) is among the most well-established instruments for the assessment of psychopathic traits with respect to diagnostic, prognostic, and research purposes. Within the scope of the German adaptation of the PCL-R, its factor structure and construct validity were assessed.

Methods
The normative sample comprised 118 male offenders from four prisons and a forensic hospital in Germany. Confirmatory factor analysis (CFA) was used to test the factor structure of the PCL-R. Convergent validity was assessed based on a Multitrait-Multimethod (MTMM) matrix including self-report and third-party assessment of psychopathy. A canonical correlation analysis was conducted in order to distinguish between psychopathic traits on the one hand and the *Big Five*, alexithymia, and impulsivity on the other hand. A socially desirable responding style in terms of self-deception and impression management was correlated to psychopathic traits.

Results
The CFA showed good fit between the four-factor model and the empirical data structure. The evaluation of the MTMM matrix corroborated a relation between the two instruments, indicating convergent validity. With regard to divergent validity, psychopathic core personality traits were linked to lower neuroticism, whereas social deviance was negatively associated with agreeableness, conscientiousness, and impulsivity. The PCL-R total score was negatively correlated to impression management.

Discussion
The results confirm previous analyses of the factor structure of the PCL-R, and indicate convergent and discriminant validity. On condition that the PCL-R is assessed by a trained rater it has proven to be a valid instrument for the assessment of psychopathic traits in German-speaking countries.

***Accepted as a talk**

5D)

Individuals with subclinical persecutory delusional tendencies exhibit aberrant social inference

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Introduction
It has long been suspected that abnormalities in social inference (e.g., about the intentions of others) play a key role in the occurrence of persecutory delusions. In this study, we examined the impact of subclinical persecutory delusions (PD) on social inference, testing the prediction that proneness to PD is related to maladaptive integration of social information.

Methods
We included 148 participants who scored on opposite ends of Freeman's Paranoia Checklist (PCL) and performed a probabilistic advice-taking task with a dynamically changing social context (volatility) under one of two experimental frames. These frames were implemented by instructions that differentially emphasised possible reasons behind unhelpful advice. The frame either highlighted (i) the adviser's intentions (dispositional frame) or (ii) the rules of the game (situational frame). Task structure was identical across frames. Our design was thus 2x2 factorial (high vs. low delusional tendencies, dispositional vs. situational frame).

Results
We found group by frame interactions indicating that in the situational frame high scorers on the PCL took advice less into account than low scorers ($F=5.7381$, $p<0.05$). This reduced adaptation to the frame was enhanced after experiencing volatility: While high scorers integrated social information similarly to low scorers at the beginning of the task, after experiencing volatile advice, they disregarded advice more than low scorers in the situational frame ($F=5.5296$, $p<0.05$).

Discussion
Individuals with subclinical PD are thus relatively insensitive to differences in social context and show maladaptive social inference. These findings may help identifying at risk mental state individuals and understanding maladaptive behavior in schizophrenia.

6D)

*Reduced cocaine use is associated with improved psychiatric symptoms and normalized glucocorticoid receptor expression within an one-year interval**

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Introduction
Substance use is frequently accompanied by severe psychiatric symptoms contributing to worse clinical outcomes. However, it is still unknown whether these symptoms are reversible simply by the discontinuation or attenuation of drug consumption.

Method
We therefore examined the longitudinal association between cocaine use, psychiatry symptoms, and the peripheral expression of the glucocorticoid receptor gene (NR3C1) in 48 drug-naïve controls and 38 cocaine users. At baseline and after a one-year follow-up, psychiatric symptoms were measured by the revised Symptom Checklist-90 (SCL-90-R) and Beck Depression Inventory (BDI). Intensity of cocaine use was determined by six-month hair testing at both test sessions. Mixed-effects statistical models were performed to investigate how changes in drug consumption affect the severity of psychiatric symptoms and NR3C1 over time.

Results
Time-group interaction effects were found for the Global Severity Index, Compulsiveness subscale from the SCL-90-R, and the NR3C1 expression. Pairwise comparisons showed that cocaine users who decrease their consumptions significantly improved in their BDI scores and SCL-90R subscales. Moreover, NR3C1 expression seem to normalize with decreasing cocaine use.

Conclusions
Our longitudinal findings suggest that psychiatric symptoms might be partially cocaine-induced and spontaneously reversible upon sustained reduction or abstinence of drug intake.

***Accepted as a talk**

7D)

Empathy and social decision-making in abstinent long-term 3,4-methylenedioxymethamphetamine users

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Introduction
3,4-Methylenedioxymethamphetamine (MDMA) is the prototypical prosocial drug inducing enhanced empathy, increased prosocial feelings, and a general sense of well-being. While recent research on the acute effects on social cognition and interaction suggests that MDMA enhances emotional empathy and prosociality, the chronic effects of MDMA use on these functions have not been investigated yet. The purpose of this study was to examine empathy together with social decision-making in long-term but recently abstinent MDMA users.

Method
We tested 38 main MDMA users and 56 drug-naïve controls with the Movie for the Assessment of Social Cognition (MASC), the Multifaceted Empathy Test (MET), the Distribution and the Dictator Game. Recent drug use was objectively quantified by 6-months hair analyses.

Results
Long-term MDMA users showed superior cognitive empathy than controls in the MET as well as in the MASC, whereas they did not differ from controls in emotional empathy. Additionally, MDMA users acted less self-serving in the Dictator Game. To investigate if these group differences are a consequence of MDMA use or a predisposing trait, we regressed the cognitive empathy performance on the objectively quantified drug use using MDMA hair concentrations. It turned out that stronger MDMA consumption was associated with lower cognitive empathy indicating that MDMA might have a toxic effect on social cognition when used chronically and in high doses.

Discussion
We conclude that individuals with high cognitive empathy abilities and pronounced social motivations might be more prone to MDMA consumption, possibly because of its well-known prosocial effects.

8D)

Sensorimotor representations underlying the apparent motion perception of human body parts. Evidence from a participant with Xenomelia.

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Introduction
Previous studies suggest that the integrity of an observer's sensorimotor functions crucially impact the apparent motion perception (AMP) of human body parts.
This seems to be true only when top-down processes (TDs), relying on fronto-parietal motor networks, are targeted (i.e. when two pictures depicting two different limb postures are slowly flashed and thus produce AMP of biologically feasible movement trajectories (BFT).
The present study seeks to specify whether these TDs depend upon visual or sensorimotor representations of plausible body motions. Moreover, we investigate the eventual abnormalities at the level of the body representation of an individual affected by Xenomelia, an unusual condition characterized by the non-acceptance and the desire of amputation of a healthy limb.

Method
20 healthy participants (Mean age: 25.5±7 y) observed pairs of stimuli varying only in the position of one of the actor's upper limbs flashed at either a fast or slow flash rate. AMP could consist of upper limbs moving around (BFT) or through (not BFT) other body parts or fixed objects.
In a second experiment we also included AMP of lower limbs considering a separate sample of 10 healthy participants (Mean age: 39.6±6 y) in order to compare their performances with those of P1 (Male, 42 y) affected by a longstanding desire of amputation of the left leg.
Actor's movements were observed from a 1st and 3rd person perspective which are thought to be associated, with motor simulation of the observed movements and with encoding processes at the level of the observer's visual system, respectively.

Results
Replicating the results of previous studies1,2 , we found that in healthy participants the speed of the flash-rates significantly predicted AMP patterns. In particular, flashed at a slow flash-rate, bodily stimuli were more likely to produce the illusion of BFT. However AMP of P1 compared to those of healthy subjects was found to be biased toward a not BFT irrespective of the speed of the flash-rates. Interestingly, a similar AMP pattern was observed in an aplasic individual born without upper limbs and not experiencing phantom limb sensations1. Moreover, in healthy participants, we found a significant difference between 1st and 3rd perspective in terms of the speed of the flash-rates at which TDs affect AMP of both upper and lower limbs.

Discussion

This perspective-dependent effects on AMP speak against the notion that TDs would rely on visual motion information alone. Apparently, a crossmodal activation of limb sensorimotor and visual representations is more triggered by 1pp, which speaks for a crucial role of sensorimotor representations in AMP.

Furthermore, our results suggest that the crossmodal interaction of limb representations and the visual analysis of body motion is altered in P1. Specifically these representations seem to be altered within the motor system underlying the matching between the observation and the execution of actions and bringing about the experience of biologically impossible motion.

9D)

Quality of life following traumatic brain injury (CROCFLAME) - is there a need for psychiatric treatment?

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Introduction
Traumatic Brain Injury (TBI) is the leading cause of disability and mortality in children and young adults and becomes increasingly important in the elderly. Psychiatric long-term sequels are often underdiagnosed in post-TBI patients, thereby restricting their quality of life. This catamnesis survey was carried out to elucidate influencing factors on quality of life.

Method
439 out of 1266 patients, who suffered from mild, moderate or severe TBI between 2005 to 2015 were contacted. Health-related quality of life was assessed (QOLIBRI: 0-100). A score below 60 indicates an affective or anxiety, a score below 40 both disorders. Quality of life was quantified (%; mean ± SD) and correlated to TBI severity, etiology, age at TBI/survey, time since TBI and sex distribution.

Results
43% was the overall and 72% the net survey response rate. Demographic data did not differ between groups (main unit (n=439), non-responders (n=255), QOLIBRI responders (n=135)). 64% indicated sufficient quality of life with a QOLIBRI total score equal or greater than 60 (65.50 ± 22.57). 36% suffered at least from one, 16% from affective and anxiety disorder. There was a slight correlation between initial TBI severity and health-related quality of life ($p = 0.042$).

Discussion
Most patients had a good quality of life up to 10 years after TBI, but 36% suffered from anxiety and/or depressive disorder. TBI severity has a minor influence on quality of life and adaption is most relevant. In conclusion, there is a need for better psychiatric diagnosis and treatment in post-TBI patients.

10D)

Poor sleep quality reduces resilience - may social networks act as a buffer? A prospective daily diary study in at risk- individuals

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Introduction
Sleep problems are not only key symptoms of many mental and physical health conditions, but can also predict the onset of psychopathology, such as depression and posttraumatic stress disorder (PTSD). Healthy sleep, on the other hand, may promote resilience in the face of stress and adversity. Moreover, social support and social networking has been highlighted as key factor influencing reactions to stress including the development of PTSD.

Method
Here we examined a sample of 50 medical students during their first internship representing a well described real-world stressor. Data on sleep and heartrate were continuously collected over a time frame of 12 weeks non-invasively by a wrist-worn activity monitor. Prior to starting the internship, i.e., at baseline, and mid- internship, participants filled in a weeklong sleep and stress diary, including information on social interactions, arousal and anxiety as well as other questionnaires, such as a social network index. Mixed models were calculated to examine complex relationships between sleep, stress and social resources.

Results
Results show that social safeness may buffer the detrimental impact of daily sleep and stress. Additional prospective relationships between sleep quality, social relations and resilience will also be presented.

Discussion
This longitudinal prospective approach allows for identification of static, as well as modifiable risk and protective factors that may contribute to resilience in stress-exposed populations like medical students. Together, our data suggest sleep quality and social resources as potentials targets for stress-prevention programs that could help reduce the negative influence of stress in at risk- populations and promote resilience.

11D)

Attention Dependent Emotion Processing in Psychopathy (Study Outline)

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Introduction

The psychopathic personality disorder is associated with a range of emotional and cognitive deficits, including attention abnormalities. The most recent studies on etiological mechanisms leading to these impairments in psychopathy support the response modulation hypothesis by J. P. Newman and colleagues. According to the response modulation hypothesis, an early attention bottleneck prevents psychopaths from considering peripheral stimuli that are not directly pertinent to individual goals. Thus, psychopaths are likely not having a deficit in emotion processing per se, but difficulties in focusing on emotion-related cues when their cognitive load is high. So far, this assumption has not been investigated in the context of the basic emotions and decision-making.

Method

This study examines the role of attention on emotional cues in decision-making processes dependent on psychopathy in an experimental way. For that purpose, participants from a German forensic sample of 28 psychopathic (PCL-R score ≥ 25) and 28 non-psychopathic (PCL-R score ≤ 16) criminal offenders will solve moral and social dilemmas (i.a. Prisoner's Dilemma Game, Ultimatum Game) under different focus conditions concerning emotional feedback on their decisions. The research question will be whether psychopathic individuals show distinctive consideration of emotional cues in decision-making processes depending on their attention focus.

12D)

Positive Autobiographical Memory Characteristics and their Effect on Mood in Daily Life

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Introduction
Positive autobiographical memory retrieval is an effective emotion regulation strategy associated with increased well-being. Psychopathology, such as depression, has been linked to retrieval of autobiographical memories that are less vivid and contain fewer details. Such memories may, in turn, be associated with negative affect and increase or maintain negative mood states. Using ecological momentary assessment, the present study aimed to investigate positive autobiographical memory characteristics and their impact on affect in nondysphoric and dysphoric individuals who were never-depressed or who reported previous episodes of depression.

Method
In a daily diary study, we investigated time-dependent associations between autobiographical memory characteristics, such as memory vividness and detailedness and positive and negative affect. So far, 27 participants completed the positive autobiographical memory diary with a mean duration of 10 days (participants are asked to record a total of 10 positive autobiographical memories).

Results
Preliminary results indicate that positive memory characteristics are predictive for daily affect and that this relationship is stronger in subjects with previous depression.

Discussion
These findings have implications for clinical interventions and suggest positive autobiographical memory elaboration as a promising target to augment clinical interventions for depression.

13D)

Subtyping Aggression in Children and Adolescents with Conduct Disorder and Oppositional Defiant Disorder: A Psychophysiological Approach.

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Introduction
Oppositional defiant disorder (ODD) and the more severe type conduct disorder (CD) characterized by aggression and antisocial behavior are among the most common psychiatric disorders in childhood and adolescence with a prevalence of 2% - 4%. Treatments show small effects and can potentially be improved through subtyping and better understanding of the underlying psychophysiological correlates.

Method
By recording heart rate (HR) and electrodermal activity (EDA; skin conductance) of 35 youths with ODD and/or CD and 14 healthy controls at rest before and after presentation of a paradigm with affective stimuli, it was attempted to gain further insights into the subtypes of aggression-related disorders. Reactive and proactive aggression, callous-unemotional (CU) traits and scores of the Child Behavior Checklist (CBCL) were taken into account as behavioral measures.

Results
Results indicated a higher HR and a tendency for higher EDA respectively for subjects with a diagnosis than for controls. Reactive and proactive aggression or CU traits showed no associations with HR or EDA. However, oppositional defiant problems according to the CBCL correlated positively with HR. Moreover, comorbidity with Attention deficit hyperactivity disorder (ADHD) was positively associated with EDA at rest after emotional stimuli. No physiological distinction between ODD and ODD plus CD was found.

Discussion
The present findings add to the inconsistent results on psychophysiological subtypes of aggression, but underline the importance of physiological factors and further research into their role for personalized interventions (“precision medicine”) in aggression.

14D)

Non-medical prescription opioid use and its impact on social cognition

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Introduction
In the last two decades, non-medical prescription opioid use (NMPOU) has become an increased public health concern globally. Although misuse of opioid analgesics (e.g., morphine, oxycodone, or fentanyl) has reached epidemic dimensions in the United States, little is known about its sequelae on social cognition. Studies with heroin users and opioid-substituted patients have shown deficits in emotion perception. However, in this population, it is difficult to attribute postulated findings only to neuropharmacological effects because of confounding factors such as comorbid physical and psychiatric diseases.

Methods
We compared 23 individuals with NMPOU with 29 matched healthy and drug-naïve controls. Participants conducted the Comprehensive Affect Test System, investigating emotional perception, and the Multifaceted Empathy Test, measuring cognitive (CE) and emotional empathy (EE). Trait empathy was assessed using the interpersonal reactivity index (IRI).

Results
Emotion perception and CE were significantly reduced in opioid users compared to controls. Pearson's correlations revealed dose-dependent deficits in CE and emotional perception. In contrast, the IRI showed no significant differences in trait empathy between both groups.

Discussion
This is the first study investigating social cognition in individuals with NMPOU. Contrary to cocaine and alcohol users displaying deficits mainly in EE, individuals with NMPOU show selective impairments in CE, indicating that the opioid system might be involved in CE processing. Similar CE deficits were also found in autistic patients supporting Panksepp's neurochemical theory of autism. Therefore, future interventions of opioid dependence should target deficits in social cognition to improve social interaction and consequently enhance therapy outcome and prevent relapse.

15D)

Dissociative amnesia – a survey of 28 cases

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Introduction
Dissociative or functional amnesia is a severe disease condition, affecting memory and identity (Staniloiu and Markowitsch, 2014; Markowitsch and Staniloiu, 2016). A collection of patients (27) with dissociative – or psychogenically caused – autobiographical amnesia will be described and documented.

Purpose
Variables which are central for the occurrence of dissociative amnesia will be established.

Methods
Patients' behaviour – especially with respect to memory – was assessed with a number of neuropsychological tests and questionnaires. Furthermore, both static and functional brain imaging techniques (magnetic resonance imaging, positron emission tomography [PET], diffusion tensor imaging [DTI]) were used.

Results
The described cases demonstrate that autobiographical amnesia without direct brain damage can have very mixed appearances, causes and consequences. Manifestations of these psychogenic forms include a reduced effort to perform cognitively at a normal level, a forensic background, anterograde (instead of retrograde) autobiographical amnesia, the fugue condition, its mixture with somatic diseases, and its appearance in childhood and youth were found. Furthermore, especially PET provided evidence for hypometabolic brain regions, especially in memory processing regions; but also DTI showed changes in connectivity.

Conclusions
Autobiographical amnesia of a psychogenic origin may occur within a variety of symptom pictures. For all patients, it probably serves a function by protecting them from continuing to deal with their life situation which appears to them unmanageable or adverse. The objective to establish variables leading to dissociative amnesia has been reached with new knowledge being that there also forms of anterograde amnesia and that traumatic as well as other forms of brain damage can lead to dissociative amnesia. Implications are that dissociative amnesia can be severe and chronic disease, even leading to changes on the brain level.

16D)

The rehabilitation of functional neurological disorders (symptom) disorders and dissociative disorders after mild traumatic brain injury

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Introduction
Patients with mild traumatic brain injury (TBI) constitute the majority of patients with TBI (the silent epidemic). Psychiatric disorders accompanying mild TBI contribute to mild TBI prognosis. Little research was devoted to the potential linkage between mild TBI and dissociative disorders and functional neurological symptom (conversion disorders) (Markowitsch and Staniloiu, 2016). This may be due to the fact that for a long time, dissociative and conversion disorders were "dissociated" from the research arena. Similarly to the mild TBI, these disorders have been evolving diagnostic constructs, at times submitted to controversy.

Purpose
The current presentation aims to increase the awareness and understanding of the relationship between mild TBI and dissociative disorders and functional neurological symptom (conversion) disorders by summarizing diagnostic, epidemiological, pathophysiological, neuropsychological and neuroimaging information on these disorders, reviewing explanatory paradigms of the relationship between mild TBI and dissociative disorders and summarizing the status of art of treatment and rehabilitation of these disorders.

Methods
Literature review and own clinical data, obtained with diverse psychiatric, neuropsychological and brain imaging data.

Results
Functional neurological (symptom) disorders and dissociative disorders often have their onset after a mild TBI; their development contributes to the delayed recovery from TBI related symptoms. Furthermore patients with mild TBI who score high on the Dissociative Experiences Scale (DES) have worse outcomes than patients who score low on the DES.

Conclusions
At least 10-15 % of patients with mild TBI follow a chronic course. Preliminary data suggest that dissociative disorders and functional neurological symptom (conversion disorders) may be a risk factor for delayed recovery from mild TBI. This underlines a stringent need for timely (early) multidisciplinary treatment and rehabilitation to provide cure, prevent chronicity and reduce the substantial disability associated with both mild TBI and functional neurological (conversion) and dissociative disorders.

Topic E)

Therapy Research: Drug Therapy, Psychotherapy, Healthcare Research

1E)

Telephone-administered cognitive-behavioral relapse prevention for patients with chronic and recurrent depression: Study protocol for a multi-center randomized trial (NaTel-Study)

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Introduction
Depressive disorders often take a recurrent or chronic course which causes enduring individual suffering and immense health costs. Even after effective treatment there remains a substantial risk for relapse. The effects of psychological continuation interventions for preventing relapses and recurrences are promising but research suggests that there are obstacles concerning the dissemination of these interventions in a face-to-face setting. In the NaTel-project we have developed a novel telephone-administered cognitive-behavioral continuation therapy (T-CT) as an aftercare intervention for patients at risk for depressive relapses.

Method
Following index acute-phase CBT participants will receive eight sessions within approximately six months delivered via telephone by their index therapists. Primary focus of the intervention is to support transfer of skills learned during index CBT to daily life and to train relapse prevention strategies. Primary research question of the study is whether participating in T-CT reduces relapses.

Results
We present the protocol of the NaTel-study that tests the effectiveness of the intervention in a two-parallel group, multi-center, evaluator-blind RCT involving 218 patients with chronic or recurrent major depression who have responded to index CBT. Relapse as determined with semi-structured clinical interviews at 6-, 12- and 18-month follow-up, will be the primary endpoint of this study.

Discussion
The NaTel-project addresses an urgent problem of mental healthcare by focusing on the long-term outcome of patients with depression. Use of distance technology offers advantages over traditional aftercare interventions. Positive results would pave the way for an accessible, effective low-threshold continuation treatment which could improve treatment pathways of patients suffering from depression.

2E)

Developing a new functional neuroimaging paradigm to investigate change in psychotherapy: "The Zurich Depression Study"

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Introduction
The recall of formative experiences in relationships is a key element of the psychotherapeutic process and of particular importance in the treatment of depression. Reflecting upon repetitive thinking patterns and recurrent emotional states contributes to altering patients' way of experiencing themselves and others in their social environment. Despite a growing number of neuroimaging studies in psychotherapy research, the neural mechanisms mediating such types of changes during psychotherapy remain poorly understood. We developed a new fMRI paradigm to investigate these changes in depressed patients during psychotherapy.

Method
Our fMRI paradigm uses stimuli of the Interpersonal Relations Picture Set (IRPS) in a mixed-block design. Participants rate arousal and valence after each experience recall in the scanner. The aim of our study is to follow depressed patients who pursue psychodynamic psychotherapy, cognitive behavioral therapy, and body-centered psychotherapy (25 patients per group) throughout six month of psychotherapy.

Results
Preliminary results of 30 depressed patients suggest that the recall of formative experiences in relationships modulates brain activity in the posterior cingulate cortex and the insula. Subjective ratings show higher scores on arousal and more negative scores on valence for the recall of formative experiences compared to the control condition.

Discussion
These preliminary results indicate that our paradigm is apt to inform us about the neural mechanisms mediating the recall of emotionally arousing autobiographic memories. The longitudinal data promises to shed light on some of the neurobiological underpinnings of the psychotherapeutic process in depression.

3E)

Pre-training neuropsychological impairment of children and adolescents with ADHD is unrelated to treatment response after computerized cognitive training

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Introduction
Current meta-analyses find no convincing evidence for the efficacy of cognitive training in ADHD. Considering that only a fraction of ADHD children show cognitive impairment in neuropsychological measures, treatment response may be dependent on pre-training neuropsychological performance.

Method
Children with ADHD participated in a computerized cognitive training over 10 to 14 weeks. A neuropsychological test battery and parent and teacher behavioral ratings served as outcome measures. The training group was divided into subgroups with more and less neuropsychological impairment based on the participants' pre-training neuropsychological performance. Linear mixed models were conducted to analyze if treatment response was more pronounced in the subgroup with more pre-training neuropsychological impairment.

Results
Few significant interactions between time and pre-training neuropsychological impairment were found in the neuropsychological test battery, which did not withstand correction for multiple testing. Changes in parent and teacher ratings of ADHD symptoms and of executive functions did not interact with pre-training neuropsychological impairment. Children who showed a clinical reliable improvement (Reliable Change Index) in three or more behavioral rating outcomes were classified as global clinical responders; the others were classified as global clinical non-responders. Responders showed significantly less neuropsychological impairment before training.

Discussion
Against our hypothesis, children who showed more pronounced clinical improvement in aggregated parent and teacher ratings showed less neuropsychological impairment before training. Overall, the results did not support the assumption that ADHD children with more neuropsychological impairment benefit to a greater extent from specific, individualized cognitive training than less impaired children.

4E)

*Ketamine Treatment in Major Depression: Predictive Power of Heart Rate**

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Introduction
Ketamine has been shown to be effective in the treatment of therapy resistant episodes of major depressive disorder. Although some studies have evaluated possible clinical and anamnestic predictors of outcome following ketamine infusion there is a lack of objective biological markers. Therefore, this study aimed to analyze the predictive power of heart rate (HR) and heart rate variability (HRV) for ketamine treatment in major depressive disorder.

Method
In 47 patients suffering from major depression, electrocardiogram (ECG) was recorded and HR and HRV measures were assessed at baseline before and during a 10 minute ketamine infusion (0.5mg/kg) as well as 10 minutes and 24 hours post infusion (randomized, double-blinded-design). Changes of depressive symptoms were assessed using the Hamilton Depression Rating scale, response was defined as a 33% reduction after 24 hours. A linear mixed model was used to analyze the discriminative and predictive power of HR and HRV measures concerning the change of mood symptoms.

Results
Ketamine infusion increased HR and HRV power during and after infusion with a return to baseline after 24 hours. Responders to ketamine showed a significantly higher heart rate ($F=10.86$, $df=147.65$, $p=.001$) and significant effects for covariates sex ($F=5.83$, $df=162.67$, $p=0.017$) and age ($F=4.24$, $df=161.93$, $p=0.041$) during the whole course of investigation, including the baseline condition in post-hoc testing with medium effect sizes (Cohen`s $d=0.47$-0.67). Also, HRV power discriminated between responders and non-responders ($F=6.65$, $df=133.30$, $p=0.011$), while normalized low/high frequency power did not.

Discussion
This study showed that HR and HRV power measures differ for responders and non-responders to ketamine infusion treatment in major depressive disorder. Notably the baseline parameters obtained before the infusion also yielded significant predictive value, suggesting HR and HRV as possible clinical useful biomarkers for treatment outcome.

***Accepted as a talk**