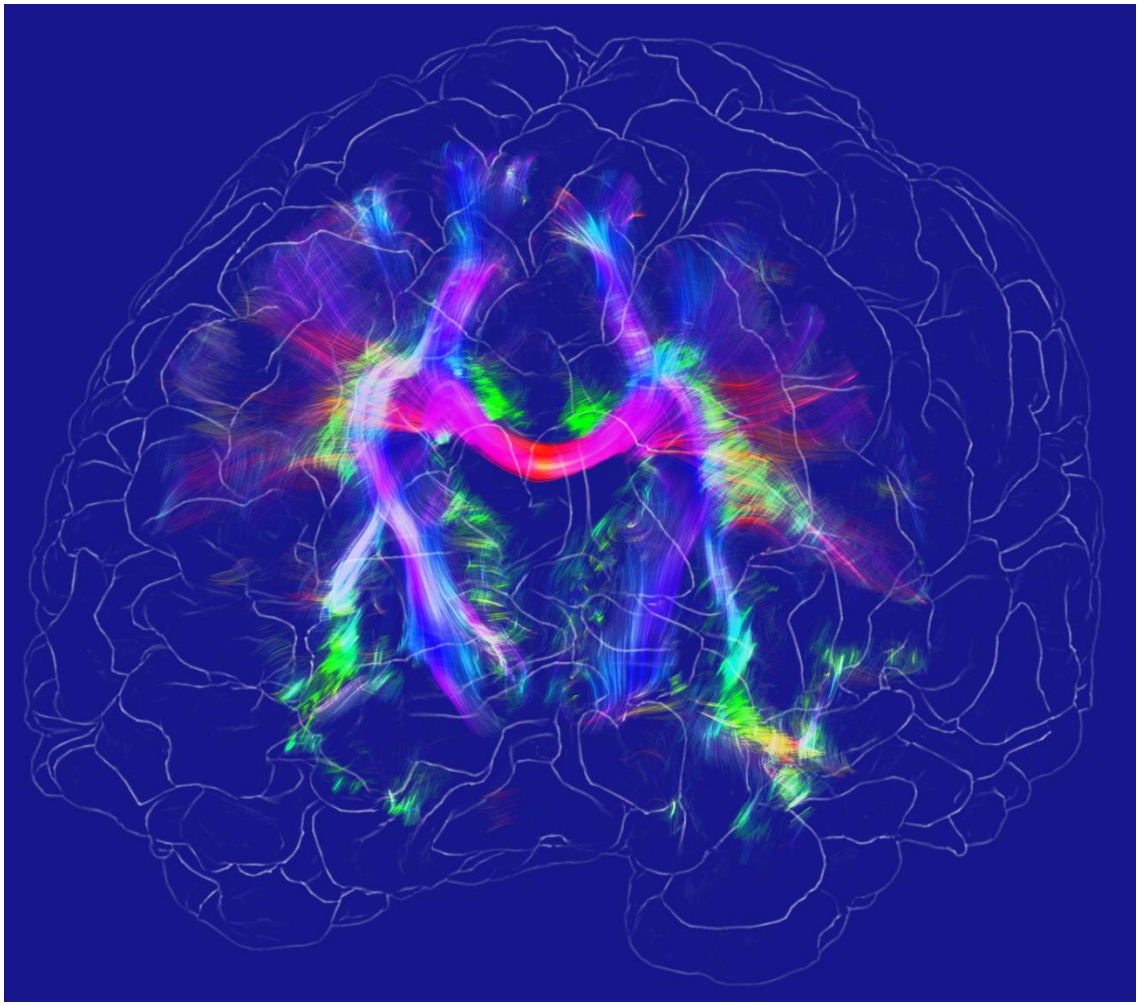

8th MindBrainBody Symposium

in the framework of the International Brain Awareness Week

March 15-18, 2021 Virtual

Abstract Booklet

Mind
Brain
Body
Institute

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MBBS 2021 Booklet

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8th MindBrainBody Symposium 2021

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MindBrainBody Institute

The MindBrainBody Institute is situated at the Berlin School of Mind and Brain (a graduate school of the Humboldt-Universität zu Berlin established by the German Excellence Initiative in 2006) and closely linked to the Department of Neurology at the Max Planck Institute for Human Cognitive and Brain Sciences (MPI CBS Leipzig). Research at the MindBrainBody Institute focuses on three research areas related to mind-brain-body interactions using neurophysiological, neuroimaging and behavioral methods - also in combination with virtual reality setups:

- Mind-body-emotion interactions, stress, and their relation to vascular risk factors like hypertension
- Conscious and unconscious perception in somatosensory system
- Stroke with focus on somatosensory symptoms, as well as pain and emotional disturbance

Research projects are performed in close partnership with other groups at the Berlin School of Mind and Brain, at the Department of Neurology at MPI CBS Leipzig, the Competence Network Stroke, the excellence Cluster NeuroCure at Charité Universitätsmedizin Berlin (Humboldt-Universität zu Berlin, Freie Universität Berlin), the Center for Stroke Research Berlin (CSB), and the Bernstein Center for Computational Neuroscience. For example, in a recent project (VReha), we - in collaboration with technical - clinical, and industry partners, investigate the use of virtual reality for the diagnosis and rehabilitation of cognitive deficits in neurological disorders.

For more details and updates, please visit our website:
www.mindbrainbody.de

8th MindBrainBody Symposium

On behalf of the MindBrainBody Institute, we are pleased to welcome all young researchers to participate at the 8th MindBrainBody Symposium (MBBS 2021) which takes place on March 15-18, 2021 virtually. We are happy to welcome postdoctoral, doctoral researchers and students in the domains of cognitive, social neurosciences, cognitive neurology, and psychology or behavioral sciences. The symposium program includes keynote lectures, workshops, presentations by applicants, poster sessions (with a Poster Prize). In the previous years, the Poster Prizes of MBBS were awarded to Katie Groves (University of Essex) in 2016; Lise Hobeika (Sorbonne Universités), Toni Muffel (MPI CBS Leipzig) in 2017; Friederike Irmen (Berlin School of Mind and Brain), Monika Graumann (Freie Universität) in 2018; & Lina Skora (University of Sussex) in 2019.

MBB Young Scientist Award

Also this year we will grant the MBB Young Scientist Award, which will provide the winner with the opportunity of a 3-month funded research stay at the MindBrainBody Institute in Berlin or at the Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences. Applicants could submit a project idea in the research domains of the MindBrainBody Institute. The previous winners were Paweł Motyka (University of Warsaw) and Pietro Sarasso (University of Turin) in 2016; Birgit Nierula (Institut d'investigacions Biomèdiques August Pi i Sunyer) in 2017; Dorottya Lantos (Goldsmiths, University of London) & Marina Kliuchko (Aarhus University) in 2018; Alejandro Galvez-Pol (University College London) in 2019; & Mohammad Rostami (Tarbiat Modares University), Emma Louise Michalski (Umeå University), & Lina Skora (University of Sussex) in 2020.

8th MindBrainBody Symposium
March 15-18, 2021
Venue: *Virtual*

Mind
Brain
Body
Symposium

Program

Monday, March 15, 2021

Time Zone (GMT+1)

17:00-18:00 **Keynote Public Lecture**

Moderator: Arno Villringer (MindBrainBody Institute; Berlin School of Mind & Brain, Berlin; MPI CBS Leipzig)

Soyoung Q Park (Charité – Universitätsmedizin Berlin, Berlin;
German Institute for Human Nutrition, Potsdam)

Motives and modulators of human decision making
Discussion Part 2 | Public Keynote Lecture | Tuesday, March 16, 2021 at 8:00-8:30 (GMT+1)

18:30-19:15 **Poster Session A**
Posters Nr. A1-A20
Zoom Breakout Rooms
Discussion Part 2 | Poster Session A & B | Tuesday, March 16, 2021 at 09:30-10:00 (GMT+1)

19:15-20:00 **Poster Session B**
Posters Nr. B1-B20
Zoom Breakout Rooms
Discussion Part 2 | Poster Session A & B | Tuesday, March 16, 2021 at 09:30-10:00 (GMT+1)

Tuesday, March 16, 2021

Time Zone (GMT+1)

10:30-11:30 **Keynote Lecture 1**

Moderator: Arno Villringer (Berlin/Leipzig)

Beatrice de Gelder (Maastricht University, Maastricht)
From feelings to features. A different approach to body processing and the neural basis of emotions
Discussion Part 2 | Keynote Lecture 1 | Tuesday, March 16, 2021 at 19:00-19:30 (GMT+1)

11:30-11:45 **Break**

11:45-13:00 **Panel 1: Oral Presentations by Participants**

Moderator: Carina Forster (Berlin)

1. Buciuman Madalina-Octavia (Ludwig-Maximilians-University of Munich, Munich)
Heart-evoked potentials and emotional processing of faces with varying levels of threat ambiguity

2. Rafiee Yasaman (University of Goettingen, Goettingen)
The influence of ovarian hormones on multisensory emotion recognition

3. Langus Alan (University of Potsdam, Potsdam)
Pupillary entrainment to speech rhythm

4. Lisa Edelkraut (University of Málaga, Málaga)
Structural and functional neural correlates of apathetic and depressive symptoms improvement in persons with aphasia receiving donepezil alone and combined with intensive aphasia therapy

5. Tahnée Engelen (Ecole Normale Supérieure, Paris)
Do neural responses to heartbeats distinguish between experienced and observed emotions?
Discussion part 2 | Panel 1 Presentations | Tuesday, March 16, 2021 at 20:45 - 21:15 (GMT+1)

13:00-15:30 **Break**

15:30-16:15 **Methodological Focus 1**

Moderator: Martin Grund (Leipzig)

Hellmuth Obrig (MPI CBS Leipzig; Clinic for Cognitive Neurology, University Hospital Leizpig, Leipzig)
fNIRS: methodological aspects and application in developmental studies
Discussion Part 2 | Methodological Focus 1 | Wednesday, March 17, 2021 at 08:00-08:30 (GMT+1)

16:15-17:00 **Methodological Focus 2**

Moderator: Tilman Stephani (Leipzig)

Michael Gaebler (MPI CBS Leipzig, MindBrainBody Institute, Berlin) and
Esra Al (MPI CBS Leipzig, Berlin School of Mind and Brain, Berlin; MindBrainBody Institute)
How to analyse heart-brain interactions and their link to behavior: heart rate variability, cardiac phase, and heartbeat-evoked potentials
Discussion Part 2 | Methodological Focus 2 | Wednesday, March 17, 2021 at 09:15-09:45 (GMT+1)

17:00-18:00 **Keynote Lecture 2**

Moderator: Lina Skora (Brighton/Leipzig)

Gaetano Valenza (University of Pisa, Pisa)
Functional Brain-Heart Interplay: Signal Processing Methodology and Future Perspectives
Discussion Part 2 | Keynote Lecture 2 | Thursday, March 18, 2021 at 10:00-10:30 (GMT+1)

Wednesday, March 17, 2021

Time Zone (GMT+1)

10:00-11:00 **Keynote Lecture 3**

Moderator: Martin Grund (Leipzig)

Tobias Heed (Bielefeld University, Bielefeld)
Mechanisms of tactile-motor integration
Discussion Part 2 | Keynote Lecture 3 | Wednesday, March 17, 2021 at 19:45-20:15 (GMT+1)

11:00-11:45 **Poster Session**

Posters Nr. C1-C20

Zoom Breakout Rooms
Discussion Part 2 | Poster Session C & D | March 17, 2021 at 21:15-21:45 (GMT+1)

11:45-12:30 **Poster Session D**

Posters Nr. D1-D20

Zoom Breakout Rooms
Discussion Part 2 | Poster Session C & D | March 17, 2021 at 21:15-21:45 (GMT+1)

12:30-14:30 **Break**

14:30-15:00 **Sponsor Workshops 1: Brain Products/MES**

Moderator: Fivos Iliopoulos (Berlin)

Mahipal Choudhary and Eduardo Bellomo (Brain Products/MES)
Mobile Mind-Brain-Body Monitoring: Mobile & Wireless EEG / fNIRS

15:00-15:30 **Sponsor Workshops 2: Biopac Systems, Inc.**

Moderator: Mina Jamshidi Idaji (Leipzig)

Alice Phung (BIOPAC Austria/Germany Sales Representative)
fNIRS for Mental Workload Assessment

15:30-16:45 **Panel 2: Oral Presentations by Participants**

Moderator: Eleni Panagoulas (Berlin)

6. Tillman Stephani (MPI CBS Leipzig)
Temporally and spatially structured dynamics of neural excitability shape somatosensory perception from first cortical responses onwards

7. David Haslacher (Charité – Universitätsmedizin Berlin, Berlin)
Attention mediates interoception via top-down control of oscillatory synchronization

8. Trinh Nguyen (University of Vienna, Vienna)
Neural and physiological synchrony in mother-infant dyads

9. Ignacio Rebollo (German Institute of Human Nutrition Potsdam-Rehbruecke)
Sensory and motor cortices are coupled to the rhythm of the stomach during rest

10. Xaver Fuchs (Bielefeld University, Bielefeld)
Increasing the size of perceptual hand representation via visuotactile recalibration
Discussion part 2 | Panel 2 Presentations | Thursday, March 18, 2021 at 08:00 – 08:45 (GMT+1)

16:45-17:00 **Break**

17:00-18:00 **Keynote Lecture 4**

Moderator: Tilman Stephani (Leipzig)

Satu Palva (University of Helsinki; University of Glasgow)
Large-scale brain networks in cognition
Discussion Part 2 | Keynote Lecture 4 | Thursday, March 18, 2021 at 11:30-12:00 (GMT+1)

18:00-18:15 **Closing Remarks and Certificate Distribution**

Arno Villringer (Director: MindBrainBody Institute; Berlin School of Mind & Brain, Berlin; MPI CBS Leipzig)

Public Keynote Lecture

Soyoung Q Park

Monday, March 15, 2021 at 17:00-18:00 (GMT+1)
Discussion Part 2 | Public Keynote Lecture | Tuesday, March 16, 2021 at 8:00-8:30 (GMT+1)

Public Keynote Speaker: **Soyoung Q Park**

Charité – Universitätsmedizin Berlin (Neuroscience Research Center), Berlin, Germany
German Institute for Human Nutrition (DIfE – Leibniz Alliances), Potsdam, Germany

Motives and modulators of human decision making

What drives us to trust someone we just met? Did we eat spaghetti for lunch because we saw our colleague eat spaghetti? Do we become happier when we are nicer to our neighbors? How is our breakfast linked to our social interactions throughout the day? Research from different disciplines such as economics, psychology and neuroscience have attempted to investigate the motives and modulators of human decision making. Our decisions can be flexibly modulated by the different experiences we have in our daily lives. These modulations can occur through our social networks, through the impact of our own behavior on the social environment, but also simply by the food we have eaten. Here, I will present a series of recent studies from my lab in which we shed light on the psychological, neural and metabolic motives and modulators of human decision making.

Keynote Lecture 1

Beatrice de Gelder

Tuesday, March 16, 2021 at 10:30-11:30 (GMT+1)
Discussion Part 2 | Keynote Lecture 1 | Tuesday, March 16, 2021 at 19:00-19:30 (GMT+1)

Keynote Speaker 1: **Beatrice de Gelder**

Department of Cognitive Neuroscience, Faculty of Psychology and Neuroscience, Maastricht University, Maastricht, Niederlands

From feelings to features. A different approach to body processing and the neural basis of emotions

Given that emotion is a notion that covers an excessively broad range of phenomena, it is no surprise that the debate on basic motions and their neural basis has been going on for decades. Noteworthy, basic concepts in human studies still largely build on research on rodent behavior, yet still almost exclusively used facial expressions. In this talk we will develop arguments for a novel approach to body communication. Following experiments and presentations ,we will illustrate the relevance of this research for outstanding questions on emotional consciousness.

Keynote Lecture 2

Gaetano Valenza

Tuesday, March 16, 2021 at 17:00-18:00 (GMT+1)
Discussion Part 2 | Keynote Lecture 2 | Thursday, March 18, 2021 at 10:00-10:30 (GMT+1)

Keynote Speaker 2: **Gaetano Valenza**

Bioengineering and Robotics Research Centre "E. Piaggio", University of Pisa, Pisa, Italy
Dept. of Information Engineering, University of Pisa, Pisa, Italy

Functional Brain-Heart Interplay: Signal Processing Methodology and Future Perspectives

Advances in neuroimaging and electrophysiology are fostering great achievements in many heterogeneous research and clinical domains, including cardiology, neurology, psychiatry and neuroscience. While standard biomedical signal and image processing techniques have primarily focused on ad-hoc physiological systems and domain-specific conclusions, there is the need to devise new methods to quantify cross-system exchange in the frame of brain-heart interplay. This talk provides an overview on signal processing methodologies for the quantification of directional, functional brain-heart interplay by targeting their complex, time-varying dynamics. Model-based and model-free methods targeting EEG/fMRI and HRV series will be presented, aiming to uncover the brain regions involved in the functional modulation of autonomic control, which has been referred to as the central autonomic network.

Keynote Lecture 3

Tobias Heed

Wednesday, March 17, 2021 at 10:00-11:00 (GMT+1)
Discussion Part 2 | Keynote Lecture 3 | Wednesday, March 17, 2021 at 19:45-20:15 (GMT+1)

Keynote Speaker 3: **Tobias Heed**

Biopsychology & Cognitive Neuroscience (AE14), Reach & Touch Lab, Faculty of Psychology & Sports Science, Bielefeld University, Bielefeld, Germany

Mechanisms of tactile-motor integration

Tactile localization is often regarded as a prime example of multisensory processing. Touch is sensed on the skin; but because our body parts constantly move around, a touch at a given skin location will be at different points in external space depending on body posture. It is a widely accepted idea that touch is automatically recoded from skin to external space, independent of whether or not this is currently required. This idea has usually been presumed to entail that a precise location in external space is derived by combining skin location and posture information. I will present experiments that cast doubt on this framework of tactile localization and suggest, instead, that information concerning touch is coded purely skin-based and that the modulatory role of external space in touch may depend on motor planning rather than on tactile-(multi)-sensory processing. These experiments call into question a rather long-standing set of experimental methods to investigate tactile localization. I will offer some ideas on how old and new findings can be reconciled in an extended framework of tactile-spatial processing that differentiates goal-directed actions and categorical decisions based on tactile input.

Keynote Lecture 4

Satu Palva

Wednesday, March 17, 2021 at 17:00-18:00 (GMT+1)
Discussion Part 2 | Keynote Lecture 4 | Thursday, March 18, 2021 at 11:30-12:00 (GMT+1)

Keynote Speaker 4: **Satu Palva**

Neuroscience Center, Helsinki Institute of Life Sciences, University of Helsinki, Finland
Centre for Cognitive Neuroscience (CCNi), Institute of Neuroscience and psychology (INP), University of Glasgow, UK

Large-scale brain networks in cognition

Latest advances in using non-invasive electrophysiology in humans, electro and magnetoencephalography (EEG/MEG), and invasive intracranial EEG (iEEG) recordings from epileptic patients have highlighted the presence and significance of large-scale brain-wide networks in rest and cognitive functions. In electrophysiological recordings, functional connectivity between areas can be estimated as phase-coupling (synchronization) or amplitude coupling of neuronal oscillations between brain areas. The source and signal leakage, specifically prominent in MEG and EEG data, however, lead to several confounds in the analysis of inter-areal oscillatory networks by producing artefactual and spurious connections. Hence, the identification of genuine oscillatory networks and their role in cognition is challenging. I will discuss these confounds and how they can be avoided in the analyses on functional connectivity and in the identification of inter-areal oscillatory networks. The large-scale oscillatory networks are thought to be central for cognitive functions and be dependent on the brain critical state. I will further discuss these hypothesis and evidence from MEG, EEG and iEEG that support the functional significance of oscillatory networks in cognitive functions.

Methodological Focus 1

Hellmuth Obrig

Tuesday, March 16, 2021 at 15:30-16:15 (GMT+1)
Discussion Part 2 | Methodological Focus 1 | Wednesday, March 17, 2021 at 08:00-08:30 (GMT+1)

Method. Focus 1 Speaker: **Hellmuth Obrig**

Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig
Day Clinic for Cognitive Neurology, University Hospital Leizpig, Leipzig

fNIRS: methodological aspects and application in developmental studies

fNIRS can detect functionally evoked changes in brain activation. The principle rests on the fact that increased neuronal activity elicits changes in optical properties of the respective cortical area. This largely applies to a focal hyperoxygenation which is measured as changes in the concentrations of oxygenated and deoxygenated hemoglobin. The seminar will give an introduction into the physical and physiological underpinnings of the methodology and will discuss limitations. As an example of its application I will present some studies on language development. Other application may be discussed upon request.

Methodological Focus 2

Michael Gaebler and Esra Al

Tuesday, March 16, 2021 at 16:15-17:00 (GMT+1)
Discussion Part 2 | Methodological Focus 2 | Wednesday, March 17, 2021 at 09:15-09:45 (GMT+1)

Method. Focus 2 Speakers: **Michael Gaebler and Esra Al**

Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig
Humboldt-Universität zu Berlin, Faculty of Philosophy, Berlin School of Mind and Brain, Berlin

How to analyse heart-brain interactions and their link to behavior: heart rate variability, cardiac phase, and heartbeat-evoked potentials

Brain-heart coupling is associated with mental processes. While cardiac activity is relatively easy to acquire, its preprocessing and analysis come with challenges. We introduce three methods to investigate the link betwen heart-brain interactions and behavior: heart rate variability, cardiac phase analysis, and heartbeat-evoked potentials. After a short overview over the physiology and psychology of heart-brain coupling, we give a overview over the three methods, focusing on practical aspects, highlighting pitfalls, and suggesting solutions.

Sponsor Workshop 1

Brain Broducts/ MES

Wednesday, March 17, 2021 at 14:30-15:00 (GMT+1)

Workshop Brain Products Presenters: **Mahipal Choudhary and Eduardo Bellomo**

Brain Products/MES

Mobile Mind-Brain-Body Monitoring: Mobile & Wireless EEG / fNIRS

Traditionally, also due to the size and the susceptibility (sensitivity) of the utilized systems, brain imaging studies have been done under well-controlled labor conditions and mostly in shielded cabins. This has significantly restricted the application fields of brain imaging devices, such as EEG and fNIRS. Since more and more (neuro)scientists wish to explore brain functions under naturalistic / real-life conditions, in which subjects can even freely move around and interact with the environment, there is an increasing demand for mobile mind-brain-body monitoring systems. In fact, thanks to the recent technological progress, it is possible now to design very compact, less sensitive and wireless brain imaging tools: During the MindBrainBody Symposium we are more than happy to present our state-of-the art wireless EEG and fNIRS solutions for your mobile as well as lab studies.

Sponsor Workshop 2

Biopac Systems, Inc.

Wednesday, March 17, 2021 at 15:00-15:30 (GMT+1)

Workshop Biopac Presenter: **Alice Phung**

BIOPAC Austria/Germany Sales Representative

fNIRS for Mental Workload Assessment

Are you interested in getting started with fNIRS? Growing in popularity, fNIRS is a tool for studying human cognition including workload, memory, learning, attention and more. It is simpler than ever to incorporate into your experiments. Join BIOPAC for a compelling exploration of using fNIRS in your research. Alice will present a lightweight, ergonomic, and easy-to-use ecosystem of recording hardware and software. Plus, she will demonstrate each step of the process—from setting up the participant to running an experiment and analyzing the results. You will learn how to:

- Operate a multimodal experiment using: fNIRS, ECG/HRV, eye tracking, and stimulus presentation
- Record high quality data
- Optimize the setup
- Synchronize devices
- Analyze data

Panel 1
Oral Presentation by Participants

Tuesday, March 16, 2021 at 11:45-13:00 (GMT+1)
Discussion part 2 | Panel 1 Presentations | Tuesday, March 16, 2021 at 20:45 - 21:15 (GMT+1)

Talk presenter 1: Madalina-Octavia Buciuman

Heart-evoked potentials and emotional processing of faces with varying levels of threat ambiguity

Buciuman, M. O. [1] & Schütz-Bosbach, S. [1]

[1] Department of Psychology, General and Experimental Psychology, Ludwig-Maximilians-University of Munich, Munich

Introduction: Several previous experimental and theoretical accounts suggest a relationship between interoception and affective processing and preliminary evidence exists that interoceptive cues might be used in order to aid affective decision-making. However, no previous studies have directly investigated whether interoceptive focus is flexibly modulated according to the ambiguity level of the stimuli that have to be affectively judged. A useful way of tracking interoceptive processing in a temporally efficient online manner is by means of the heart-evoked potentials (HEPs). **Methods**: The current study attempted to investigate interoceptive focus as measured by HEPs in relationship with emotional processing while making affective judgements of neutral-angry morphed faces with different levels of threat ambiguity (low, medium and high ambiguity). Subjective evaluations of the emotionality of the faces and emotion-specific ERP data (N170, EPN, LPP) to the face stimuli were simultaneously collected. **Results:** We found a significant difference in terms of HEPs amplitudes between the high ambiguity and medium ambiguity conditions, such that HEPs were more positive while making judgements about highly ambiguous stimuli. HEP amplitudes were also marginally more positive in the high ambiguity relative to the low ambiguity condition. Also, HEP amplitudes were negatively correlated with the amplitudes of the late-stage emotion-specific ERPs (LPP) only in the high and medium ambiguity conditions and positively correlated with the self-report affective judgements only in the medium ambiguity condition. **Discussion:** Our results provide evidence for the dynamic involvement of interoceptive cues in the affective decision-making process, such that interoceptive focus at cortical level is increased under high threat ambiguity. This is in line with the constructive, inference-based accounts of emotion and could have relevant therapeutical implications for psychopathologies in which threat attribution is abnormal, as interoceptive focus can be modulated through different methods, such as behavioral training.

Talk presenter 2: Yasaman Rafiee

The influence of ovarian hormones on multisensory emotion recognition

Rafiee, Y. [1,2], & Schacht, A. [1,2]

[1] Department of Affective Neuroscience and Psychophysiology, Institute of Psychology, University of Goettingen, Goettingen
[2] Leibniz ScienceCampus "Primate Cognition", Goettingen, Germany

Introduction: The influence of ovarian hormones on socio-cognitive functions has gained interest in the past few decades. In this line, some studies attempted to investigate the impact of ovarian hormones on facial emotion recognition but obtained heterogeneous results. This mixed evidence might be due to differences between experimental paradigms, low statistical power, between-subject comparisons, or inaccurate measure of hormone levels. In this preregistered study, we aimed to overcome such shortcomings by incorporating hormonal measurements in a large-scale within-subject study. We hypothesized that increased levels of estradiol are related to improved emotion recognition in faces. Furthermore, we investigated the effect of ovarian hormones on recognizing emotions from visual, auditory and audiovisual modalities, which was understudied in most research. **Methods**: One hundred thirty-four naturally cycling women were included in the analysis. The level of estradiol and progesterone was measured via saliva in two phases of the menstrual cycle i.e. late follicular and mid-luteal for each participant. Participants completed computer-based emotion recognition task, in which visual, auditory, and audio-visual stimuli showed five emotional (happiness, sadness, anger, disgust, and fear) or neutral expressions. The dependent variable was accuracy. **Results:** Our results showed no significant relationship between levels of estradiol and emotion recognition. In addition, the exploratory analysis concerning the effect of ovarian hormones on emotion recognition from visual, auditory and audiovisual expressions revealed non- significant results. However, recognition of audiovisual stimuli were significantly higher than visual or auditory stimuli. **Discussion:** Our findings did not support the supposed relationship between ovarian hormones and emotion recognition abilities in women. They are in accordance to a recent large-scale study but contradicts with some previous studies. This discrepancy might be due to the methodological strengths of our study (e.g., large sample size, proper experimental design, and precise hormonal measurement) and applying statistical analysis that prevents from false positive and pseudo-replication in results.

Talk presenter 3: Alan Langus

Pupillary entrainment to speech rhythm

Langus, A. [1], Boll-Avetisyan, N. [1], & Höhle, B. [1]

[1] University of Potsdam, Cognitive Sciences, Department of Linguistics, Potsdam, Germany

Introduction: Spoken languages are often thought to belong to distinct rhythmic classes: stress-timed or syllable-timed. However, acoustic measures have shown that syllables in syllable-timed languages and lexical stress in stress-timed languages are not perfectly periodic. Here we therefore investigate whether listeners can perceive rhythm in spoken language despite naturally occurring variability in the duration of syllables and stress-intervals. To test rhythm perception we measured pupillary entrainment to natural recordings of sentences from syllable-timed languages (Italian and French) and stress-timed languages (Dutch and Polish). **Methods**: German-speaking adult listened to 80 natural recordings of Dutch, Polish, French and Italian sentences. Each of these sentences was only presented once. We recorded participants pupil size with an eye-tracker at 120Hz. To measure entrainment, we calculated the Phase Locking Value (PLV) between the pupillary response and the envelope of the auditory stimuli in the syllabic (4-7Hz) and in the prosodic (1-4Hz) frequency bands. **Results:** The results showed that the PLV values were significantly higher for sentences from syllable-timed languages (Italian and French) than from stress-timed languages (Polish and Dutch) when considering the syllable frequency band (ß = 0.97, SE = 0.035, T = 2.522, P = .0117). In contrast, the PLV values were significantly higher for sentences from stress-timed languages than for syllable-timed languages when considering the prosodic frequency band (ß = 0.16, SE = 0.067, T = 2.399, P = .0165). **Discussion:** Our results show that the pupillary response can synchronize to the acoustic envelope of naturally spoken language, providing a spontaneous measure of sensorimotor synchronization between the speech signal and listeners' pupil size. Importantly, pupils synchronize better with prosodic rhythm in stress-timed languages (Dutch and Polish) and with syllable rhythm in syllable-timed languages (Italian and French). Pupillary entrainment can therefore provide a measure of speech rhythmicity even under conditions of naturally occurring variability.

Talk presenter 4: Lisa Edelkraut

Structural and functional neural correlates of apathetic and depressive symptoms improvement in persons with aphasia receiving donepezil alone and combined with intensive aphasia therapy

Edelkraut, L. [1,2], López-González, F.J. [3,4], Berthier, M.L [1,2], Roé-Vellvé, N. [3], López-Barroso, D. [1,2], Mohr, B. [5], Pulvermüller, F. [6,7], Starkstein, S.E. [8], Jorge, R.E., Dávila, G., Torres-Prioris M.J. [2]

[1] Unit of Cognitive Neurology and Aphasia, Medical-Sanitary Research Center (CIMES), University of Malaga, Málaga
[2] Institute of Biomedical Research in Malaga (IBIMA)
[3] Molecular Imaging Unit, Medical-Sanitary Research Center (CIMES), Univerisity of Málaga, Málaga
[4] Molecular Imaging Group, Radiology Department, Faculty of Medicine, University of Santiago de Compostela, Galicia
[5] Department of Psychiatry, Charité Universitätsmedizin, Berlin
[6] Brain Language Laboratory, Department of Philosophy and Humanities, WE4, Freie Universität Berlin
[7] Berlin School of Mind and Brain, Humboldt Universität zu Berlin, Berlin
[8] Division of Psychiatry, School of Medicine, The University of Western Australia, Perth;
(9) Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston

Introduction: We report the structural and functional brain changes correlating with improvements in language, apathy and depression in persons with aphasia (PWA) receiving donepezil (DP) alone and combined with intensive language-action therapy (ILAT). **Methods**: A 10-week open-label pilot study was performed in 10 persons with chronic aphasia due to left perisylvian strokes. Behavioral and neuroimaging (voxel-based morphometry [VBM] and [18] fluorodeoxyglucose positron emission tomography [[18] FDG-PET]) evaluations were performed at baseline (T1), after receiving DP alone (T2, week 0-8), and thereafter combined with ILAT (T3, week 8-10). Outcome measures included the Western Aphasia Battery and the Stroke Aphasic Depression Questionnaire examining subdomains of apathy and depression. **Results:** Treatment with DP alone and combined with ILAT significantly improved aphasia, depression and apathy. VBM analysis revealed increases in gray matter density (GMD) correlating with apathy improvement when comparing T2-T1 in left supramarginal gyrus, right angular gyrus, right precuneus, right middle occipital cortex, right superior parietal lobe, and right cerebellum. No significant results were found associated to depression changes at this time point. For the comparison T2-T3, significant increases in GMD correlated with improvement in depression scores, but not for apathy, in the bilateral orbitofrontal and bilateral anterior cingulate cortices, right inferior temporal gyrus, and left cuneus. 18FDG-PET analysis revealed changes in the metabolic activity that correlated with improvement in apathy in the ventral tegmental area and the left head of the caudate nucleus ($r = 0.69$) when comparing T2-T1. Comparisons of T3-T2 showed metabolic increments correlating with apathy improvement in the left medial dorsal nucleus of the thalamus ($r = -0.68$) and the left subgenual cingulate gyrus ($r = -0.66$). No significant changes in metabolic activity related to changes in depression scores were found. **Discussion:** Treatment with DP alone and combined with ILAT improved aphasia, depression and apathy by modulating regions innervated by cholinergic pathways.

Talk presenter 5: Tahnée Engelen

Do neural responses to heartbeats distinguish between experienced and observed emotions?

Engelen, T. [1], Buot, A. [1], Grèzes, J. [1], & Tallon-Baudry, C. [1]

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Introduction: On a daily basis, we share in each other's joy and frustrations, yet despite the contagious nature of emotions, we are perfectly capable of dissociating the emotion we are experiencing from the emotions displayed by someone else. Such a differentiation between experienced and observed emotions might seem trivial, but becomes more puzzling considering that many physiological responses and neural activations are shared between experiencing and observation of emotions. One proposed mechanism in which our sense of self might be anchored is heartbeat evoked responses (HER). Here, we propose a new avenue of research; does the neural monitoring of heartbeats help differentiate experienced from observed emotions? **Methods**: Participants engaged in a task in which they were instructed to rate naturalistic images based on how they themselves felt when viewing the image (experienced emotion), or how they thought the person depicted in the image felt (observed emotion) while brain activity (EEG) and physiological reactivity (cardiac activity, facial EMG, and Skin Conductance Responses (SCR)) were recorded. **Results:** HERs differentiated between the experienced and observed conditions during the instruction period, in frontal and occipital cortices. Additionally, during image exploration, an experienced-observed difference in SCR was found, as well as an interaction for the valence of the image and experienced-observed condition in the facial zygomatic muscle. **Discussion:** Our results show that the HER can perform a role in experienced-observed emotion distinction, and that certain physiological measures are sensitive to the perspective in which an affective image is evaluated.

Panel 2

Oral Presentation by Participants

Wednesday, March 17, 2021 at 15:30-16:45 (GMT+1)
Discussion part 2 | Panel 2 Presentations | Thursday, March 18, 2021 at 08:00 – 08:45 (GMT+1)

Talk presenter 6: Tilman Stephani

Temporally and spatially structured dynamics of neural excitability shape somatosensory perception from first cortical responses onwards

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[7] Institute for Cognitive Neuroscience, National Research University Higher School of Economics, Moscow
[8] Now at Department of Psychology, University of Potsdam, Potsdam

Introduction: Brain responses vary considerably from moment to moment, even to identical sensory stimuli. This has been attributed to changes of instantaneous neuronal states reflecting the system's excitability. Yet the spatiotemporal organization of these dynamics and their influence on the perception of external stimuli remain poorly understood. **Methods**: In a series of somatosensory stimulation paradigms in humans, we examined the interplay of two markers of cortical excitability, pre-stimulus oscillatory activity in the alpha band (8-13 Hz) and thalamo-cortical excitatory post-synaptic potentials (EPSP) inferred from short-latency somatosensory evoked potentials (SEP) in the EEG, as well as their association with the perceived stimulus intensity. Furthermore, we characterized the temporal structure and the spatial specificity of these dynamics using scaling analysis and source reconstruction of hand- and foot-related SEPs, while controlling for peripheral nerve variability. **Results:** Pre-stimulus alpha oscillations influenced initial cortical SEPs, which were in turn associated with changes of the perceived stimulus intensity (yet unrelated to variability of subcortical or peripheral nerve activity). Furthermore, these fluctuations of cortical excitability consistently followed a temporal power law, indicating the existence of long-range temporal dependencies. Moreover, comparing these dynamics between spatially distinct somatosensory regions (i.e., foot and hand areas), we observed a somatotopic organization of the relation between ongoing neuronal states and stimulus-evoked responses. **Discussion:** Our findings indicate that fluctuations of instantaneous neural excitability modulate already at initial cortical processing how intense a stimulus is perceived. Despite these cortical dynamics representing topologically confined effects, they seem to be embedded in global system activity as indicated by the observed long-range temporal dependencies. This may reflect an overarching organizing principle of scale-free neuronal dynamics, allowing the brain to adaptively balance robustness and flexibility of neural responses during processing of external stimuli.

Talk presenter 7: David Haslacher

Attention mediates interoception via top-down control of oscillatory synchronization

Haslacher, D. [1], & Soekadar, S. [1,2]

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Introduction: Interoception, the perception of the physiological state of the body, is increasingly recognized to mediate the interaction between brain and body in health and disease. However, the neural mechanisms underlying interoception are poorly understood. Brain oscillations are known to mediate sensory perception, but their role in interoception remains unknown. Here, we provide novel evidence of top-down control of delta oscillatory synchronization in the somatosensory cortex by the anterior cingulate cortex when attention is paid to the heartbeat. **Methods**: Participants (N=19) were asked to pay attention to their heartbeats or a simultaneously presented tone sequence while electroencephalography and electrocardiography was recorded. Using a beamforming algorithm, source activity in the anterior cingulate and somatosensory cortices was reconstructed. Phase in the delta band was obtained via a bandpass filter and the Hilbert transform. Phase-locking between the heartbeat and delta oscillations in the somatosensory cortex was computed. Furthermore, phase transfer entropy in the delta band from the anterior cingulate cortex to the somatosensory cortex was computed. **Results:** It was found that when participants paid attention to their heartbeat, phase-locking of somatosensory delta oscillations to the heartbeat increased. Furthermore, delta phase transfer entropy from the anterior cingulate to the somatosensory cortex increased. **Discussion:** These results implicate delta synchronization to somatic signals in primary sensory areas and its top-down control in interoception. Delta synchronization between the heartbeat and cortical oscillations may represent a useful target to augment interoception, e.g. to investigate the link between interoception and various psychiatric disorders.

Talk presenter 8: Trinh Nguyen

Neural and physiological synchrony in mother-infant dyads

Nguyen, T. [1], Abney, D. [2], Salamander, D. [1], Bertenthal, B. [3] & Hoehl, S. [1]

[1] University of Vienna, Vienna
[2] University of Georgia, Athens
[3] Indiana University Bloomington, Bloomington

Introduction: Bio-behavioral synchrony is suggested to shape the children's socio-cognitive and affective development. Interpersonal neural, behavioral and physiological synchronization were separately documented this far. However, it remains unclear how the three levels of synchrony relate to one another. Here, we examine mother-infant dyads in both interactive and non-interactive contexts to study under which circumstances neural and physiological synchrony occur. We hypothesize that neural and physiological synchrony should be enhanced in interactive contexts as compared to non-interactive contexts. **Methods**: We tested 69 4- to 6-month-old infants and their mothers in three conditions. Mother and infant were either seated next to one another or the infant sat on the mother's lap as both watched a calm aquarium video. Next, mother and infant engaged in a 5-minute long free play. We assessed neural synchrony through dual-functional near-infrared spectroscopy measurements in frontal regions. Physiological synchrony was assessed through respiratory sinus arrythmia estimates **Results:** Findings revealed a significant increase in neural and physiological synchrony during free play in comparison to the non-interactive watching conditions, $t>4.12$, $p<.001$. However, neural synchrony during the proximate watching condition was significantly increased as compared to the distal watching condition, $t>2.38$, $p<.045$. **Discussion:** The results indicate that both neural and physiological synchrony were enhanced in the interactive free play in which mother and infant were able to respond to each other. However, as only neural synchrony was increased in the proximate non-interactive condition, the findings thus indicate that neural and physiological synchrony might share commonalities but also diverge in their functionality.

Talk presenter 9: Ignacio Rebollo

Sensory and motor cortices are coupled to the rhythm of the stomach during rest

Rebollo, I [1,2], & Tallon-Baudry, C. [2]

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[2] Cognitive Neuroscience Lab, Ecole Normale Superieure de Paris

Introduction: Signals from the gastro-intestinal tract are constantly relayed to subcortical, cortical and neuromodulatory structures, interacting with spontaneous brain activity and its underlying spatio-temporal structure. We present here a refined anatomo-functional characterization of our initial observation of a resting-state network composed of brain regions phase-synchronized to the slow (0.05 Hz) electrical rhythm generated in the stomach **Methods**: Using a larger sample size (n=63 healthy human participants), we were able to reveal an extended gastric network and characterize its anatomy, effect sizes and inter-individual variability across a seven resting state networks parcellation, a fine-graded multimodal parcellation of the cortical surface and the main gradients of cortical organization. **Results:** The gastric network is bilateral but more prominent in the right hemisphere. Most (67%) of the gastric network is included in the somato-motor-auditory (38%) and visual (29%) resting state networks. Gastric brain coupling occurred also in the granular insula and, to a lesser extent, in the piriform cortex, indicating that all sensory-motor cortices corresponding to both exteroceptive and interoceptive modalities are coupled to the gastric rhythm during rest. Only a few specific transmodal areas of the other resting-state networks were strongly coupled to the gastric rhythm, the retrosplenial cortex and superior temporal sulcus of the default network, left prefrontal regions of the control network, right supplementary motor and area 55b of the saliency network, as well as the eye fields of the saliency and attention networks. Only an index of cardiac autonomic activity co-varied with the strength of gastric coupling across participants. **Discussion:** These results suggest that gastric monitoring and sensory-motor processes are likely to interact and that gastric-brain coupling is not limited to the granular insula but is rather distributed across sensory-motor regions.

Talk presenter 10: Xaver Fuchs

Increasing the size of perceptual hand representation via visuotactile recalibration

Fuchs, X. [1, 2] & Heed, T. [1,2]

[1] Biopsychology and Cognitive Neuroscience, Faculty of Psychology and Sports Science, Bielefeld University, Bielefeld, Germany
[2] Center for Cognitive Interaction Technology (Citec), Bielefeld University, Bielefeld, Germany

Introduction: Simultaneous, spatially discrepant visual and tactile stimuli perceptually attract each other, known as visuotactile ventriloquism. Following prolonged exposure to ventriloquism, even unisensory tactile stimuli are mislocalized towards the offset visual location. This so-called ventriloquism aftereffect reflects tactile recalibration. Visuotactile integration and recalibration can alter body representation. For instance, in the rubber hand illusion touch is transferred to an embodied artificial hand. Here, we asked whether the ventriloquism aftereffect can affect body shape perception, for instance, perceived hand size. **Methods**: Twenty-seven healthy participants placed their left hand under a horizontally positioned touchscreen used for visual stimulus presentation and tactile localization. Eight vibrotactile stimulators were attached to participants' fingertips and palms. We presented visuo-tactile stimuli with spatial offsets increasing over 15 blocks such that visual stimuli implied increasing hand size. There were two sessions: In the test session, there was a consistent mapping between vision and touch; in a control session this mapping was disrupted. Following each block, participants localized unimodal tactile stimuli by tapping on the monitor with the other hand's index finger. Additionally, we assessed changes in tactile distance judgments and reported hand size. **Results:** We observed an outwards progression of tactile localization in the test compared to the control session. However, we did not observe any consistent pre-post effects on tactile distance judgments, and no consistent effects on reported perceived hand size. **Discussion:** Gradual increase of visuo-tactile discrepancy induced a visuotactile ventriloquism aftereffect and recalibrated perceived positions of tactile locations of the hand, corresponding to a progressively growing perceptual hand representation. However, the aftereffects were not mirrored in either tactile distance judgments or reported perceived hand size. This suggests that the induced changes did not transfer to other levels of spatial body representation. These results fit with previous findings that hand representations based on localization versus tactile distances are independent.

Poster Title Overview

Poster Session A: Title Overview

Poster	Poster Title	Presenter	Co-presenters
A01	Evolutionary vs. Modern Threats: A Systematic Review	Shapouri	
A02	The Neurophenomenology of Freediving: An Investigation of Brain, Body, and Behavior through Breath	Luecke	
A03	Predictive attenuation of touch and tactile gating are distinct perceptual phenomena	Kilteni	
A04	Consciously perceived timing of "the first urge to move" does not relate to Bereitschaftspotential onset: further evidence	Bredikhin	Germanova
A05	Do you just see the Mug Handle? Let's take a look at Affective Affordances too!	Caravà	Scorolli
A06	The robustness of repetition-based rule learning in infants: a meta-analysis of fNIRS language studies	Gemignani	
A07	Don't expect a fish to climb a tree, join it in the sea! Embodied Approaches to Teaching English as a Foreign Language to Students with Dyslexia	Camillini	Scorolli
A08	Realist Social Cognition	Araneda	
A09	My brain code 2.0	Mondria	
A10	Congenitally Blind Do Not Recruit the Extrastriate Body Area in Motor Actions	Yizhar	
A11	Body Image During Quarantine; Generational Effects of Social Media Pressure on Body Appearance Perception	Speranza	Abrevaya
A12	Scheduling 'Eureka' Moments	Oschinsky	
A13	Functional connectivity alterations between default mode netwo rk and occipital cortex in patients with Obsessive-Compulsive Disorder (OCD)	Geffen	
A14	Human-machine communication in self-driving cars: verbal feedforward and feedback increase trust, but not the intention to use it.	Nosrat Nezami	
A15	Do we rely on the outcome of our movements to know how we just moved?	Charalampaki	
A16	Heart-evoked potentials and emotional processing of faces with varying levels of threat ambiguity	Buciuman	
A17	Heart-evoked potentials reflect interoceptive-exteroceptive predictions, during a paradigm with individual adjustment of cardio-audio delays	Banellis	
A18	Broadband Spectral Slope of EEG in Patients with Parkinson's Disease	Zhang	
A19	HARMOnic miNImization (Harmoni): a novel method for discrimination of genuine vs. spurious neuronal interactions in M/EEG recordings	Jamshidi Idaji	Nikulin
A20	Somatotopy of facilitatory and inhibitory paired-pulse TMS phenomenaSomatotopy of facilitatory and inhibitory paired-pulse TMS phenomena	Asmolova	Nazarova

Poster Session B: Title Overview

Poster	Poster Title	Presente	Co-presenters
B01	Unraveling multi-site oscillatory dynamics in a rat model of response inhibition	ter Horst	
B02	Active sampling during tactile discrimination is modulated by the cardiac cycle	Galvez-Pol	
B03	A virtual Reality program to enhance performance and emotional control in professional athletes	Neyret	
B04	Cognitive Mapping of Social Relationships in Younger and Older Adults	Oltmer	
B05	Neuroethics: A Guide for Bridging Cross-sectoral Neuroscience	Moss	
B06	Resting-state theta oscillations and reward sensitivity in risk taking	Azanova	
B07	Multi-echo BOLD Index: Figuring out false positive and providing detailed activation patterns in task fMRI	Yang	
B08	Cardiovascular Reactivity as a Learning Indicator in the Amphibian Rhinella Arenarum	Calleja	
B09	Prosocial Transfer Effects of Collaborative Playlisting	Harris	
B10	Coloring Negation – Selection of Alternatives is Situated in the Context	Mende	
B11	Measuring the Accuracy and Precision of Interoceptive Beliefs: A Novel Psychometric Bayesian Approach	Legrand	
B12	Effects of acute stress on probabilistic reversal learning in healthy participants	Wieland	
B13	Neuronal activity in an amphibian brain during a spatial navigation task	Daneri	
B14	ERP and MEG Correlates of Visual Consciousness: The Second Decade	Förster	
B15	Effects of memory load on the contralateral delay activity and induced alpha power in the EEG: studied with a virtual reality setup	Klotzsche	Gaebler; Nikulin
B16	Age-related alterations in rhythmic and non-rhythmic resting state EEG activity and their link to cognition in older age	Cesnaite	
B17	Introspective delusions	Caporuscio	
B18	Memory as world-brain relation: how we find and lose our way	Hiott	
B19	Categorization alters perception: Assessing potential predictors of pain categorization biases	Vencatachellum	
B20	Predicting Music-Induced Visual Imagery Using Occipital Alpha	Hashim	

Poster Session C: Title Overview

Poster	Poster Title	Presenter	Co-presenters
C01	Influence of Vestibular Signals on Bodily Self-Consciousness: Different Sensory Weighting Strategies Based on Visual Dependency	Tekgün	Erdeniz
C02	Writing Units or Decades First in Two Digit Numbers Dictation Task: The Case of Arabic an Inverted Language	Ganayim	
C03	Hyperscanning: A Valid Method to Study Neural Inter-brain Underpinnings of Social Interaction	Czeszumski	Lang
C04	Language Evolved From Displaying Natural Signs Referring to Past Actions	von Heiseler	
C05	Transformative Experiences, Cognitive Modelling and Affective Forecasting	Mathony	
C06	Mind and Brain in the Psychedelics Renaissance: The case study of microdosing	Liokaftos	
C07	Respiratory and cardiac activity associated with conscious tactile perception	Grund	
C08	The search for a human homologue of the macaque ventral intraparietal area	Foster	Tobias Heed
C09	A Comprehensive Review of Asymmetry in Meditation	Gupta	
C10	Proprioception Has Limited Influence on Tactile Reference Frame Selection	Yizhar	
C11	Cognitive rehabilitation of visual field deficit due to hypoxic-Ischemia following an interventricular neurocytoma removal: A case report	Vartanian	
C12	Non-Linear Analysis of Expert and Non-Expert Meditators using Machine Learning	Pandey	
C13	Does a Strong Sense of Agency Make You Take More Risks?	Yalciner	
C14	Respiration modulates rhythmic resting-state activity	Kluger	
C15	Magnetoencephalography responses to unpredictable and predictable rare somatosensory stimuli in healthy adult humans	Xu	
C16	Neuroscientific knowledge mediates perceived “realness” of felt experience	Samodai	
C17	Assessing the chance of successful tactile localization for stroke patients; thermal vs physical stimulation	Rostami	
C18	Altered Event Processing in Persons with Parkinson’s Disease	Wyrobnik	
C19	Investigating the role of individual differences in the hypoalgesic response to a virtual reality game: An exploratory analysis	Rischer	
C20	Respiratory and cardiac interoceptive sensitivity in 9-month old infants	Tünte	

Poster Session D: Title Overview

Poster	Poster Title	Presenter	Co-presenters
D01	Influences on the visual categorization of naturalistic structures in infancy and early childhood	Schlegelmich	
D02	Personification of wine in the advertising	Hristova	
D03	Mixed nerve and purely sensory somatosensory evoked potentials along the neural axis	Nierula	
D04	Probing auditory sensory attenuation in an online experiment using Lab.Js and Jatos	Kiepe	
D05	The Concept of Subjectivity In Favor of Dennett's Illusionism	Aliari	
D06	Relationships between metacognition of motor, visual and memory processes	Arbuzova	
D07	Body Ownership of Switched Hands in Virtual Reality	Yizhar	
D08	Trait Anxiety as a Marker of Aberrant Precision Weighing in Perceptual Decision Making	Kraus	
D09	Cardiac concomitants of feedback processing during a competence-based social status manipulation.	Boukarras	
D10	Are agency judgments metacognitive?	Constant	
D11	Use of heuristics and hand gestures in time conceptualization among different age groups	Stojić	
D12	Full-Body Motor Markers of Schizophrenia - Using MoCap to quantify Disembodiment	Martin	
D13	Motor Imagery of Linked Movements Might Enhance Motor Learning	Gippert	
D14	Design and Validation of Virtual Social Stress Induction Protocol for Individuals with Borderline Personality Disorder	Francová	
D15	Implicit power-space associations without instructional biases	Li	
D16	The effect of dorsal pulvinar inactivation on heart rate, heart rate variability and breathing	Kaduk	
D17	Is your pain my pain? Effects of localized placebo analgesia on empathy for everyday painful situations	Hartmann	
D18	The Respiratory Resistance Sensitivity Task: a novel method for measuring respiratory interoception and metacognition	Nikolova	
D19	User Experiences of Prescription and Over-The-Counter Drug Abuse in Aden City, Yemen.	Saleh	Wazaify
D20	Social brain dynamics: Social domain-specific neural network re-configuration enables understanding of others' thoughts and feelings	Maliske	

Poster Abstracts

Poster Session A

Posters Nr. A1-A20 (Zoom Breakout Rooms)

Monday, March 15, 2021 at 18:30-19:15 (GMT+1)
Discussion Part 2 | Poster Session A & B | Tuesday, March 16, 2021 at 09:30-10:00 (GMT+1)

A01 **Poster Presenter:** Soheil Shapouri

Evolutionary vs. Modern Threats: A Systematic Review

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[1] Brain and Behavioral Sciences, Department of Psychology, University of Georgia, Athens, GA, United States

Introduction: The potential differences between evolutionary (e.g., snakes and spiders) and modern threats (e.g., guns and bombs) can have a wide-ranging impact on a variety of theoretical and practical issues, from our understanding of specific phobia to stimulus selection in psychophysiological studies. Two evolutionary explanations about the role of amygdala in human fears make different predictions about fear-relevant stimuli. While fear module theory predicts stronger fear, avoidance and reactions to evolutionary threats, relevance detection theory proposes that cues of special relevance for the survival and reproduction of organisms are more likely to provoke fear, capture attention and activate the survival circuits. **Methods**: A systematic search was conducted in PubMed as well as hand-searching of reference lists to identify studies that have compared evolutionary and modern threats. **Results:** About 30 studies have been conducted using fear conditioning, illusory correlation paradigm, attention bias, and physiological measures in the past four decades mostly using visual stimuli in adult populations. Stronger skin conductance response is sometimes observed for evolutionary threats and sometimes for modern threats. Illusory correlation between threats and negative outcomes are evident for both kinds of threats and the majority of attention bias studies have found faster reaction times to modern threats. Scarcity of physiological studies does not allow to make a firm conclusion about possible brain mechanisms. **Discussion:** Current empirical evidence supports relevance detection hypothesis better than fear module theory. But before making any firm conclusion the field needs behavioral experiments in children and using auditory stimuli and brain imaging studies need to be replicated.

A02 **Poster Presenter:** Suraiya Luecke

The Neurophenomenology of Freediving: An Investigation of Brain, Body, and Behavior through Breath

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[1] School of Philosophy, Psychology, and Language Sciences, University of Edinburgh, Edinburgh

Introduction: Freediving is the sport of diving underwater on one single breath. These prolonged breath-holds, which can last for over 20 minutes, bring freedivers into exceptional psycho-physiological states. Freedivers experience a) exceptional physiological conditions, at the limits of gas-exchange viability, b) exceptional psychological conditions, in inherently life-threatening situations, and c) exceptional environmental conditions, through prolonged exposure to foreign underwater environments. Freedivers must maintain an extremely fine balance between physiological, psychological, and environmental conditions to dive successfully. Freediving is therefore an exceptional yet non-pathological case of cognition, and is thus very well suited to investigating interactions between mind, brain, body, and behavior. **Methods**: The current study uses a neurophenomenological approach, combining quantitative neurophysiological data with qualitative phenomenological reports. Semi-structured phenomenological interviews were conducted with a diverse cohort of nine freedivers. Simultaneously, neurophysiological data on respiration was examined to understand the neural and bodily mechanisms that correlate with freediving phenomenology. **Results:** Freediving induces a unique neurophysiological state. This unique state is brought about by the interaction of two necessary conditions: the freediving breathe-up, a volitional breath control technique, and underwater conditions. The phenomenology of this state is marked by five key characteristics: 1) intense focus, 2) heightened perception, 3) absence of reflective awareness, 4) absence of conscious deliberation in decision-making, 5) restricted emotional range. **Discussion:** The present discussion focuses on how freedivers' altered respiration affects their perception, action, and phenomenological experience. Various neurophysiological mechanisms, involving respiration-entrained neuronal oscillations, neural Piezo2 mechanoreceptors, and intracranial pressure, are discussed. The neurophenomenological data provides evidence that respiration directly, intrinsically, and non-trivially modulates perception, action, and phenomenological experience in a behaviorally relevant manner, suggesting that respiration is a constant and crucial dynamical oscillator of mind, brain, body, and behavior. These findings have important consequences for both the treatment of empirical data in the neurosciences, and for theoretical frameworks of cognition.

A03 **Poster Presenter:** Konstantina Kilteni

Predictive attenuation of touch and tactile gating are distinct perceptual phenomena

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[1] Department of Neuroscience, Karolinska Institute, Sweden

Introduction: In recent decades, research on somatosensory perception has led to two important observations. First, self-generated touches that are predicted by voluntary movements become attenuated compared to externally generated touches of the same intensity (attenuation). Second, externally generated touches feel weaker and are more difficult to detect during movement compared to rest (gating). Researchers today often consider gating and attenuation to be the same suppression process; however, this assumption is unwarranted because, despite more than forty years of research, no study has combined them in a single paradigm. **Methods**: We quantified how people perceive self-generated and externally generated touches during movement and rest. **Results:** We demonstrate that whereas voluntary movement gates the precision of both self-generated and externally generated touch, the amplitude of self-generated touch is selectively attenuated compared to externally generated touch. We further show that attenuation and gating neither interact nor correlate. **Discussion:** We conclude that they represent distinct perceptual phenomena.

A04 **Poster Presenters:** Dmitrii Bredikhin and Ksenia Germanova

Consciously perceived timing of "the first urge to move" does not relate to Bereitschaftspotential onset: further evidence

Bredikhin D. [1], Germanova K. [1], Klucharev V. [1], & Nikulin V. [1,2]

[1] Center for Cognition and Decision Making, Institute for Cognitive Neuroscience, National Research University Higher School of Economics, Moscow, Russia.
[2] Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig

Introduction: The studies based on a paradigm proposed by Libet et al. (1983) compare the electrophysiological measurement of Bereitschaftspotential (BP) with the introspective measurements of movement execution time (M-time) and with the time of the "first urge to move" (W-time). Dominik et al. (2017) challenged the reliability of W-time reports. Specifically, they showed that estimated W-time precedes M-time only if the experiment starts with M-time estimation (M-task) followed by W-time estimation (W-task). We assume that only subjects who start the experiment with M-task can clearly distinguish W-time from M-time, because they implicitly receive training to differentiate them. Therefore, if a connection between BP and W-time exists, it would manifest itself primarily in this condition. To test this hypothesis, we conducted an EEG study using the behavioural paradigm of Dominik and colleagues (2017). **Methods**: EEG was recorded from 37 subjects (22 females, mean age 25.0) using 32 electrodes. Subjects were randomly assigned to two groups, which differed only in the order of tasks. Movement onsets were calculated using electromyographic recordings. BP onsets were calculated from the Cz electrode using automatic and manual detections. **Results:** First, we replicated behavioural results of Dominik et al. (2017) demonstrating a task-dependence of W-time on the experimental procedure. Second, a correlation analysis between estimated W-times and BP onset did not reveal a significant correlation in any group. **Discussion:** Previous studies showing that BP and W-time are uncorrelated (Harrard, Eimer, 1999; Schlegel et al., 2012) did not control the task order. Despite the fact that we accounted for this factor, the lack of a correlation between BP onsets and W-time persisted. Overall, our results suggest that a link between BP and W-time should be made with caution, especially when providing inferences in the Free Will debate.

A05 **Poster Presenter:** Marta Caravà and Claudia Scorolli

Do you just see the Mug Handle? Let's take a look at Affective Affordances too!

Caravà, M. [1], & Scorolli, C. [2]

[1] Independent Researcher
[2] Department of Philosophy and Communication Studies, University of Bologna, Bologna

Introduction: Empirical research is paying growing attention to the affective dimension of human experience. Still, while when it addresses the relationship between human agents, the affective variable –even when uninvestigated– is intrinsically evoked, with agent-object relationships the recognition of such engagement has not received proper attention yet. Our analysis aims to fill this gap thorough the investigation of human-object relationships in action-perception loops in terms of "affective affordances". Our objective is twofold: clearly defining this novel theoretical construct by addressing its explanatory power and proposing a feasible operationalization for empirical testing. **Methods**: We critically examined interdisciplinary studies from cognitive science and philosophy, classifying them on three main domains: affordance perception, material objects in action-perception loops, and the effects of emotions on perception. Through this structured analysis we developed a clear-cut definition of "affective affordances" based on two parameters: the level of integration of an object in the agent's everyday practice and its modality of integration. **Results:** These parameters allowed us to identify two core aspects that influence the likelihood of affective activation in the relationship between a human agent and everyday material objects, to therefore explain this affective relationship considering different timescales, i.e., in a synchronic and diachronic perspective. Far from overlooking the needs for empirical validation, we detailed how the predicted effects of affectively loaded objects can be isolated from the kinematics of reach-to-grasp actions. This analysis of the temporal course nicely suits the integration of well-established paradigms, thus allowing for the incorporation of physical-spatial and socio-linguistic variables. **Discussion:** Through the concept of "affective affordance" we start bridging the gap between research on objects and emotions in philosophy and cognitive science, providing a new understanding of the affective dimension of object perception across different times scales, and opening up an outstanding exploratory research line in the study of affordances.

A06 **Poster Presenter:** Jessica Gemignani

The robustness of repetition-based rule learning in infants: a meta-analysis of fNIRS language studies

Gemignani, J. [1,2], & Gervain, J, [1,2]

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Introduction: Infants' ability to perceive repetition-based regularities is thought to play a central role in the process of language acquisition and has been long investigated, both with behavioral and with neuroimaging studies, particularly with functional near-infrared spectroscopy (fNIRS). The variability of effects measured with fNIRS stems potentially from the interplay of a number of factors, related both to the experimental settings and to physiology. In this study, our first goal is to evaluate the effect size of repetition-based rule learning yielded by fNIRS; then, to quantify its variability across studies, brain regions and age groups. Lastly, to explore whether part of the variation can be explained by individual differences such as sex. **Methods**: Eight fNIRS studies conducted in three different labs were examined; the sample comprised data acquired from 149 infants (75 M, 74 F; 103 newborns, 46 six month-olds). Stimuli included trisyllabic auditory sequences in the form of AAB or ABB as well as random sequences. fNIRS was measured with 24 channels distributed bilaterally. Data analysis included pre-processing and block-averaging; then, Cohen's d effect size was computed as the difference between the hemodynamic responses elicited by repetition sequences and those elicited by random sequences. Variability of the effect sizes was evaluated across studies with a meta-analytic approach, as well as across subjects with mixed-effects models. **Results:** In the left temporal ROI, the estimated d was 0.26 (C.I [-0.01, – 0.53]). At individual level, no significant effect of sex was found; in turn, a significant Age x Hemisphere interaction showed that, in the left hemisphere, newborns have a stronger repetition effect than six month-olds. **Discussion:** Despite the variability normally displayed by data acquired in developmental populations, the effect of repetition-based regularities on the infant brain as measured with fNIRS is robust and reproducible.

A07 **Poster Presenter:** Giorgia Camillini and Claudia Scorolli

Don’t expect a fish to climb a tree, join it in the sea! Embodied Approaches to Teaching English as a Foreign Language to Students with Dyslexia

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Introduction: Italian students with dyslexia face remarkable difficulties in learning English as a foreign language. Conventional school programs typically bring to scarce outcomes. Nowadays scientists and teachers agree on the idea that the specificity of students -with and without learning difficulties- should be exploited as basic resource for the integration. Nonetheless, there is still confusion when it comes to translating theoretical knowledge into practical directions. The attempt of this preliminary study is integrating well-established theories on Language Teaching Accessibility with Embodied theories, to implement inclusive practices. **Methods**: The case study refers to a 13-year-old student diagnosed with dyslexia. The focus of the analysis was shifted from his specific deficits and challenges to his interests and learning context. The experimental work has been thus concentrated on the elaboration and development of a methodological tool effective in stimulating his internal motivation to use a "new" language to explore a core theme of his bodily, affective, and social Self. Through this approach the novel language, i.e., English, should gradually emerge in its potential to extend bodily and contextual boundaries. The learning tool was identified in a Blog, that is in a “multimedia container”. **Results:** Although language proficiency was not at the core of the intervention, the multisensory access to the contents, along with the simultaneous use of non-linguistic and linguistic materials, led to a more spontaneous and confident use of English -indirectly improving reading and writing skills. This individual work -permanently available, updatable- was shared with the class group, to experience the reaching of “in-some-ways” distant classmates, thus enhancing his sense-of-agency and self-efficacy. **Discussion:** Similarly to social networks, a blog is appealing to adolescents, and allows to organize audio-visual and linguistic materials. A blog not only leaves space to creativity, but simultaneously asks for a structured organization of linguistic-conceptual contents, naturally equipping students to overcome language needs.

A08 **Poster Presenter:** Nicolás Araneda

Realist Social Cognition

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Introduction: Low-level descriptions of interaction dynamics have been canonically approached by cognitive neuroscience through a representation-oriented and inference-based perspective, leading to a stable paradigmatic plateau, that no longer allows further construction of a completely coherent semiotic framework capable of accounting for currently unobserved characteristics of social cognition, which is forcibly situated and mostly occurs in interaction. Social contexts are saturated with information that remains invisibilized because of the use of mutually incommensurable conceptual metaphors throughout contemporary scientific discursive practices, despite the embodied turn led by 4E Cognition **Methods**: A new turn toward realist ontology and epistemology is thus rendered as necessary to inform the gaps within cognitive neuroscience and ground its currently unfulfilled interdisciplinarity. Examples are drawn from research on language to make the case for each argument. Trending cognitive neuroscience performs low-level descriptions of individual or group interactions by the use of state of the art techniques and methodologies. These observations can be defined as being close to the material niveau of the structure and functioning of our organism as a biological entity. Conscious processes like states of emotion, perception or belief formation –all of which motivate human behavior– transcend the reach of this scope, nonetheless. Thus, the general claims about these epistemic constructs, as a whole, should be more qualified. For instance, psycholinguistics used to be quite English based and postulated general principles of which later turned to be proven that they were not replicable with other languages. Psychophysical cues in language processing need to be redefined epistemologically from a new materialistic perspective, in order to account for group learning and social transmission of knowledge. Theory of embodiment has provided the starting point for such a cultural approach of cognition, as "The social environment affects the embodied mind". **Results:** Nowadays, it is possible to account for several of the biases that undergo social learning and knowledge transmission, and thus attempt to quantify the chance over time of aspects of cognition within a mechanistic framework. This allows us to focus, for instance, on usage frequencies or regularizations of the "more richly structured" aspects of language and to inquire if models of neutral selection can account for these behaviors. This could inform theories of cognition across all levels of information-processing systems, a prevailing need for which there is a consensus among several disciplines (i.e., neuroscience, artificial intelligence, linguistics, philosophy, psychology and anthropology). Even if one were to continue tackling dimensions that involve representational content, there is an emerging claim within cognitive science of language that semantic composition is the primary structural selection factor over syntactic processing (Blank et al., 2016) and that there is a need for realistic models of what may have selected for their representations. **Discussion:** The epistemic question of how knowledge is being generated and how this is influencing the research results thus arises. I propose a holistic approach to improve onto this practice: by further strengthening the way we examine the relationship between recollection of objective data on changes in brain activity and the engagement of culture. Placing the brain at the center of discussions about human nature, following that "the nervous system is our most cultural organ", emphasizes the interaction between the sociocultural milieu and its contingent sensory environment at the material level (i.e., in terms of brain percepts). Likewise, topics such as the representational requirements of cognition in their relation to the dynamic, circular and distributed causal structure of the brain have not been studied through second-person perspective or ethnographic methods yet, but have been limited to be described by the use of questionnaires at the most. Within a world of causality, affordances have been commented on their potentiality: "The chair invites us to sit down." Thus, they contribute to the emergence of meaning, since the response to the aforementioned invitation does not depend

on cognitive representations alone but they come into play "through particular actions and projects of the subjective selves of the sentient entities". These are central concepts of current robotics, artificial intelligence and information architecture upon which the ethnographic method has to shed some light; this possibility needs to be acknowledged for scientific advancement. The conveyance of New Realism entails this legitimization. As we have learned specifically from linguistics and more broadly from 4E-Cognition that all structure is social in two ways: it exists through construction and acquires meaning through interpretation. There is an "ultimate source domain" –the physical– that needs to be cross-ontically mapped before any further higher cognitive metaphorization occurs, as "(…) before any entity can be assigned structure or orientation, it must be objectified first." It follows that we should learn that explorations on social cognition stemming from discursive practices are not entirely materially unobservable and are actually filled with relevant information –social cognitive affordances– which current working metaphors are not able to represent.

A09 **Poster Presenter:** Erika Mondria

My brain code 2.0

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Introduction: Brain Computer Interfaces used on art recipients, enable the online evaluation and processing of neurophysiological interaction data of affective mental states. The art-installation “my brain code 2.0” creates the possibility for people to make their invisible physiological state tangible while performing tasks in different settings and observing their brain oscillations online. The installation not only encourages people to engage with their inner body processes, but also provides a sustained occupation with oscillations via the resulting printout-codes. The three parts of the art-installation address topics such as mental manipulation, unconscious processes, the correlation of everyday tasks with changes in the state of mind, new technological AI developments, as well as an exploration of how artistic staging can play a role. The three parts BRAIN ACTIVATOR, BRAIN READER and BRAIN DECODER, lead to a journey to oneself, to the internal realities, reciprocally related to the external environment and circumstances. **Methods**: One participant solves mathematical and imagination problems. Simultaneously, recordings of the EEG and a facial expression recognition analysis are running. A "materialization" of brain waves is part of the method. An audience observes the participant's brain waves and mimic analysis in real time. The "BRAIN DECODER" decodes the captured brain-code during the participant's imagination task. **Results:** 40 art recipients participated. Concerning the brain-code, the BRAIN DECODER generated the correct imaginary image in 76% of the cases. Supplementary evaluation took place through questionnaires and AI analysis. **Discussion:** The focus in art scenarios is on the experience (in one's own perception) not the outcome. Invisible echoes of the human mind are questioned through data visualization. The visualization of bioelectric signals especially in art and the comparison of specific sources influencing physical processes in human organs, serve as a key, for locating potential influences “manipulations” on humans-autonomy and for the general self-awareness.

A10 **Poster Presenter:** Or Yizhar

Congenitally Blind Do Not Recruit the Extrastriate Body Area in Motor Actions

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Introduction: There is now abundant evidence that the visual dorsal and ventral streams develop their functional and structural architecture independent of the visual modality, and respond to the content of stimuli in a supramodal fashion. However, these studies were limited to the stability of visual perceptual processing in the occipital cortex, its predominant and canonical function. There are consistent results that show that the Extrastriate Body Area (EBA) is recruited in motor actions, typically of the hand. Given the now known task-specific sensory-independent nature of visual areas in perception, does EBA develop its action-related capabilities regardless of visual experience? **Methods**: We studied this question by investigating the properties of cortical responses recorded in fMRI (3-T Siemens Skyra). 8 congenitally blind and 9 participants executed bi-lateral body part movements. Resting-state data from another 9 congenitally blind and 20 sighted participants was used for further analysis. **Results:** In the active motor tasks, activity in both EBA was significantly stronger in the sighted group for left-hand, right-hand, and left-foot conditions. No significant differences between the groups were found in sensorimotor cortices. We also found statistically significant connectivity between the EBA and sensorimotor areas in the sighted group, while the strength of interactions were insignificant for the blind group. In a direct group comparison, the sighted group showed stronger connectivity strength between the EBA and sensorimotor areas. **Discussion:** Replicating previous studies, we found in the sighted group that EBA is recruited for unseen unilateral body part movements and that EBA is functionally connected to a large network of visual and sensorimotor areas. In the congenitally blind we found that body movements recruit typical sensorimotor areas such as S1 and M1 but not the EBA. One possibility is that EBA is actively involved in visually guided movement, and is therefore of no use for congenitally blind individuals.

A11 **Poster Presenter:** Trinidad Belén Speranza and Sofía Abrevaya

Body Image During Quarantine; Generational Effects of Social Media Pressure on Body Appearance Perception

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Introduction: Virtual interactions have replaced face-to-face interactions in daily life. Research on the implications of socializing through a virtual self-body image have grown over the past decade. A review of the literature suggests that impaired body image satisfaction is influenced by media pressure and might have a distinct effect on men and women. There is, however, a lack of comprehensive studies of how social media impacts body image perception across genders and generations. In general, external pressures on body image satisfaction have been almost exclusively studied in young women and have not tried to differentiate between the effects of traditional and social media. In the current studied, we carried out an online survey that examined whether social media pressure and type of body-ideal (General Attractiveness, Muscularity, Low body Fat) exerts distinct pressures on men and women of the X, Y, and Z generations. **Methods**: A modified version of the SATAQ-4R that added direct questions about social media pressure was developed to compare media pressure with other types of social pressure (family, peers, media, and significant other). **Results:** Increased levels of perceived traditional and social media pressure affected body image satisfaction for all age groups and genders significantly more than other kinds of social pressure. Overall, media pressure had a similar effect on men and women but had a distinct effect depending on generation with a higher impact felt by younger compared to older males. Genders did differ on their type of body-ideal with females experiencing more pressure to be thin and males to be muscular, especially for younger generations. **Discussion:** Social pressure on perceived appearance is stronger from media--both traditional and social--and tends to diminish with age. Future research and public policy design should focus on traditional and social media as a potential intervention tools for the prevention of body image disorders.

A12 **Poster Presenter:** Frederike Oschinsky

Scheduling 'Eureka' Moments

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Introduction: Can we design technology that allows users to let their mind wander in order to increase the likelihood of 'Eureka' moments? Mind wandering is described as a shift of attention away from a primary task toward spontaneous thought and as the mind's capacity to move away aimlessly from external happenings. Although it occurs very often (up to 50% of the waking phase), it has not yet been sufficiently investigated when and how it occurs and which positive effects it induces (e.g., insight). **Methods**: Through the triangulation of self-reports and synchronized neurophysiological measures (electroencephalography (EEG) and eye tracking), we seek to answer this question. **Results:** Our results can have significant novel implications for the design of digital workplaces and contribute to the appreciation of the irreplaceable 'human' capability to find innovative solutions. **Discussion:** We pursuit this goal, because divergent thinking is one of humans' most valuable assets that cannot easily be replaced, if at all, by machines.

A13 **Poster Presenter:** Tal Geffen

Functional connectivity alterations between default mode network and occipital cortex in patients with Obsessive-Compulsive Disorder (OCD)

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Introduction: Alterations in functional connectivity as assessed using resting-state fMRI have been described in patients with OCD compared to controls with heterogeneous findings. A recent meta-analysis by Gürsel et al. (2018) found altered connectivity within and between default mode (DMN), salience (SN), and frontoparietal networks (FPN), as well as evidence for aberrant fronto-striatal circuitry. Here, we probed functional connectivity alterations in a sample of OCD and controls based on this meta-analysis findings. **Methods**: We measured functional connectivity during resting-state fMRI in a sample of OCD patients (n=24) and matched for age and sex controls (n=33). The CONN toolbox implemented in SPM was used to perform seed-to-voxel analysis using 30 seed regions based on the meta-analytic findings of Gürsel et al. **Results:** Patients with OCD showed reduced functional connectivity between SN and DMN compared to controls, replicating previous findings. We did not observe significant group differences of functional connectivity within the DMN, SN, or FPN. The strongest finding consisted of general dysconnectivity between DMN and SN to the visual network. OCD patients showed reduced functional connectivity between the left lateral parietal seed (LPl) and the inferior lateral occipital pole left (iLOCl) compared to controls. Furthermore, LPl and the right superior lateral occipital cortex (sLOCr), as well as the right precuneus, were found to be hyperconnected. This finding was positively correlated to OCD symptom severity, especially compulsions. **Discussion:** Our findings replicated partly the meta-analysis findings, specifically SN and DMN hypoconnectivity. By using seeds based on the meta-analysis, we identified aberration between the SN and in particular, the DMN to the visual network. This raises the question about the involvement of the visual system in OCD symptoms and the abnormal connectivity of a unimodal region to the multimodal DMN.

A14 **Poster Presenter:** Farbod Nosrat Nezami

Human-machine communication in self-driving cars: verbal feedforward and feedback increase trust, but not the intention to use it

Farbod N. Nezami [1], Maximilian A. Wächter [1], Ashima Keshava [1], Hristofor Lukanov [1], Marc Vidal De Palol [1] , Gordon Pipa [1], & Peter König [1,2]

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Introduction: Fully autonomous vehicles as cognitive agents in traffic will be one of the decisive use cases of artificial intelligence acting in the middle of modern societies. However, the potential positive effects of this technology will only apply if autonomous cars are accepted by a majority of the society the cars will operate in. To increase acceptance and trust, we aim for a self-explaining car which informs the passengers prior to actions. **Methods**: n this study, we investigate the current attitude of the German and Austrian population (N = 8599) in a virtual reality experience and a post-experimental questionnaire. Participants experienced a ninety seconds virtual drive through a virtual city in one of three randomly chosen conditions of auditive feedforward and feedback in the human-machine interaction, while head tracking data, and a simplified gaze vector were recorded **Results:** Our main finding is that a self-explaining car does have a positive impact on trust, but does not influence the intention of using such a car. Additionally we can show a gender and age effect with female participants being generally less trusting in all conditions compared to male participants and a general decrease of all acceptance factors with increasing age **Discussion:** The results are in line with previous human-machine research stating that more communication leads to increased driving safety, but also to a more negative emotional response. These findings reveal a need for a well balanced self-explanatory artificial intelligence to enable human-machine interactions that foster safe traffic behaviour and increase trust as well as the willingness to use such technology.

A15 **Poster Presenter:** Angeliki Charalampaki

Do we rely on the outcome of our movements to know how we just moved?

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Introduction: We can monitor our intentional movements, in order to know and describe how we have moved our bodies. Here, we asked which information we use to monitor our movements.: For example, when throwing a ball to hit a target, we might use the information about how the ball flew to metacognitively assess our performance. Alternatively, we might disregard the way in which the fall flew — given that it is not directly relevant to our goal — and metacognitively assess our performance based solely on whether we reached the goal: hitting the target . We ran a self-replication of a previous study from our lab, addressing several confounds and extending the analysis. **Methods**: Participants played a virtual version of a ball-throwing game, with the goal of hitting a target on each trial. After each ball throw, they discriminated which of two trajectories displayed on the screen corresponded to the one followed by the virtual ball. Participants completed trials in two conditions, that differed on whether the two trajectories shown matched (Same-Outcome) or differed (Different-Outcome) in terms of hitting the target or not. **Results:** Participants had better discrimination perfromance in the Different-Outcome condition (BF10>4000) and, accordingly, were significantly more confident in these trials (BF10>4000). However, there was no significant difference at the metacognitive level (measured as metad'/d') between the two conditions. **Discussion:** Participants successfully incorporated information about the outcome of the movement for their discrimination and confidence responses. However, we found no specific advantage of the Different-Outcome condition at the metacognitive level: Information about the outcome did not affect the precision of confidence ratings. We argue that these findings underline the separation between the different levels of information that may contribute to body monitoring, which are often treated indiscriminately in the literature.

A16 **Poster Presenter:** Madalina-Octavia Buciuman

Heart-evoked potentials and emotional processing of faces with varying levels of threat ambiguity

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Introduction: Several previous experimental and theoretical accounts suggest a relationship between interoception and affective processing and preliminary evidence exists that interoceptive cues might be used in order to aid affective decision-making. However, no previous studies have directly investigated whether interoceptive focus is flexibly modulated according to the ambiguity level of the stimuli that have to be affectively judged. A useful way of tracking interoceptive processing in a temporally efficient online manner is by means of the heart-evoked potentials (HEPs). **Methods**: The current study attempted to investigate interoceptive focus as measured by HEPs in relationship with emotional processing while making affective judgements of neutral-angry morphed faces with different levels of threat ambiguity (low, medium and high ambiguity). Subjective evaluations of the emotionality of the faces and emotion-specific ERP data (N170, EPN, LPP) to the face stimuli were simultaneously collected. **Results:** We found a significant difference in terms of HEPs amplitudes between the high ambiguity and medium ambiguity conditions, such that HEPs were more positive while making judgements about highly ambiguous stimuli. HEP amplitudes were also marginally more positive in the high ambiguity relative to the low ambiguity condition. Also, HEP amplitudes were negatively correlated with the amplitudes of the late-stage emotion-specific ERPs (LPP) only in the high and medium ambiguity conditions and positively correlated with the self-report affective judgements only in the medium ambiguity condition. **Discussion:** Our results provide evidence for the dynamic involvement of interoceptive cues in the affective decision-making process, such that interoceptive focus at cortical level is increased under high threat ambiguity. This is in line with the constructive, inference-based accounts of emotion and could have relevant therapeutical implications for psychopathologies in which threat attribution is abnormal, as interoceptive focus can be modulated through different methods, such as behavioral training.

A17 **Poster Presenter:** Leah Banellis

Heart-evoked potentials reflect interoceptive-exteroceptive predictions, during a paradigm with individual adjustment of cardio-audio delays

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Introduction: Interoceptive-exteroceptive integration is fundamental for an integrated experience of perceiving the world via the body. Embodied predictive coding models describe these integrated mechanisms as predictive and precision-weighted, contributing towards emotion and embodied selfhood. **Methods**: In a previous study (Banellis & Cruse., 2020), we presented sounds at short (perceived synchronous) or long (perceived asynchronous) delay from the heartbeat, with half the trials including an omission. We analysed HEPs during omissions to measure pure predictive signals without contaminating auditory potentials. Previously, we observed a HEP difference across cardio-audio delay trials during the period between the heartbeat and the expected sound, providing evidence of cardio-audio integrated expectations. Attentional precision modulated predictive responses, but we found no evidence of trait-precision modulation by interoceptive performance. In this study, we sought to more sensitively test for trait precision influences on HEPs by using individually-adjusted cardio-audio delays. **Results:** We replicated the pre-omission HEP difference across delay trials, further supporting cross-modal expectations. Despite this, we did not replicate evidence of attentional modulation of predictive responses and found only weak evidence of trait-precision modulation by interoceptive performance. **Discussion:** This doesn't support a predictive coding account of interoceptive-exteroceptive integration and therefore is in conflict with the interpretation of HEP's reflecting precision-weighted predictive signals. However, using tailored delays may have enhanced the cardio-audio expectations, resulting in less of a reliance on attentional-precision to boost predictions. In addition, assessing interoceptive perception is very challenging and therefore variations in interoceptive performance may not accurately reflect trait-precision variations. Thus, a clearer definition of the manipulation and measurement of precision on HEP responses is crucial to determine compatibility with the predictive coding framework. Nonetheless, the robust delay effects observed in both studies support cross-modal integrated predictive processes and this paradigm provides a tool for investigating these mechanisms in clinical populations, as well as assessing its role with cognition.

A18 **Poster Presenter:** Juanli Zhang

Broadband Spectral Slope of EEG in Patients with Parkinson's Disease

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Introduction: Parkinson's Disease (PD) is associated with an imbalance in excitatory and inhibitory interactions in basal ganglia-thalamocortical system. However, the direction of this imbalance alterations remains elusive. **Methods**: Recently, spectral slope in electrophysiological signals (also known as 1/f slope) has been proposed to index the excitation/inhibition ratio. Here, we explored the changes of this aperiodic property in resting state EEG using data from 15 patients with PD. **Results:** We showed that the spectral slope in PD in OFF-medication state was flattened compared to the age-matched healthy controls, and the abnormality could be alleviated by the dopaminergic medication. These effects were most pronounced in the centro-parietal cortical regions. Using independent analysis, we replicated previous findings showing elevation of PAC (phase amplitude coupling) between beta and broadband gamma in medication OFF- compared to ON-state. Interestingly we also showed that the differences in spectral slope and PAC values between ON and OFF-states in PD exhibited distinct spatial distributions. Moreover, spectral slope and PAC values were correlated only in healthy subjects. Thus these results indicated that they might pick up different pathophysiological aspects of PD. Furthermore, spectral slope over the centro-parietal regions had larger effect size for distinguishing PD patients from healthy controls, and also for distinguishing medication ON and OFF states. In addition, we also showed that oscillatory beta band power estimation using the raw power spectrum could be strongly confounded with aperiodic spectral contribution. **Discussion:** Taken together, our findings suggest that non-oscillatory component of power spectra could serve as a novel non-invasive biomarker of PD. It may provide additional insights about the pathology of PD which suggests that at the cortical level, PD is accompanied by a shift from E/I balance towards more excitation over inhibition, and dopaminergic medication could effectively normalize this imbalance.

A19 **Poster Presenter:** Mina Jamshidi Idaji and Vadim V. Nikulin

HARMOnic miNImization (Harmoni): a novel method for discrimination of genuine vs. spurious neuronal interactions in M/EEG recordings

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Introduction: Within- and cross-frequency phase-phase synchronizations (PPS) are proposed as mechanisms for integrating spatially and spectrally distributed information in the brain. However, investigating PPS in M/EEG is limited by methodological difficulties, e.g. by the presence of spurious interactions due to the non-sinusoidal waveshape of brain oscillations. By Fourier analysis, a non-sinusoidal signal can be decomposed into its fundamental component and higher harmonics, which are phase-coupled to each other. Therefore, studying a non-sinusoidally shaped signal by narrow-band filtering can result in the observation of spurious cross-frequency and within-frequency interactions, which cannot be detected by surrogate data permutation tests. Until recently, there has been no methodology for removing harmonics from M/EEG data. **Methods**: In this research work, we introduce a novel method (called HARMOnic miNImization - Harmoni) that removes the components which can be potentially the harmonics of a non-sinusoidal signal. Harmoni's working principle is based on the presence of PPS between harmonic components and the fundamental component of a non-sinusoidal signal. **Results:** We tested Harmoni in different realistic EEG simulations. The simulated EEG data consisted of sinusoidal and non-sinusoidal sources in alpha and beta frequency ranges with an addition of a pink noise. The simulated coupling between these source signals represented genuine and spurious CF and within-frequency PPS. Using ROC analysis, we showed that the spurious interactions are suppressed significantly, while the genuine activities are not affected. We also applied our method to real data from an SSVEP BCI. We showed that Harmoni successfully removed the harmonics in occipital regions. **Discussion:** Using extensive realistic simulations and analysis of real data, we show that Harmoni is able to alleviate significantly spurious effects of harmonics on connectivity estimation in M/EEG data. In addition, Harmoni can serve as a first steppingstone towards the development of other methods aiming at refining within-frequency and CF PPS analysis of M/EEG.

A20 **Poster Presenter:** Anastasia Asmolova and Maria Nazarova

Somatotopy of facilitatory and inhibitory paired-pulse TMS phenomenaSomatotopy of facilitatory and inhibitory paired-pulse TMS phenomena

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Introduction: Transcranial magnetic stimulation (TMS) is used in different neurological and psychiatric diseases, as both a therapeutic and a diagnostic tool. Paired pulse TMS (ppTMS) is utilized to non-invasively probe excitatory and inhibitory circuits, especially in the motor system. ppTMS phenomena can be differentiated by the length of the interstimulus interval (ISI) and, consequently, related to the local or more widespread transsynaptic neurocircuits. However, it is still unknown whether ppTMS phenomena have similar strength for different motor representations, and how such functional focality depends on the ISI. **Methods**: 24 healthy young volunteers were enrolled. Four ppTMS phenomena: SICI – short interval intracortical inhibition, LICI – long interval intracortical inhibition, SICF – short interval intracortical facilitation and ICF – intracortical facilitation, were investigated (ISIs were equal to 2, 100, 3 and 12 ms, correspondingly). We registered MEPs from the APB, extensor digitorum communis (EDC) and abductor digiti minimi (ADM). We used PCA to quantify the size of the common variability among muscles for each ppTMS paradigm and Bootstrap, Mann-Whitney U-test and FWER to test the difference of this common variability among the ppTMS phenomena. **Results:** A common variability PCA factor was significantly different among all the ppTMS phenomena, showing the largest explained variability among muscles for LICI (88.0 %) and the smallest - for SICF (54.8 %). **Discussion:** We demonstrate that the strength of ppTMS phenomena correlates across muscles but the size of such shared variance is different for every ppTMS phenomenon. The length of the ISIs was not the main discriminative factor. Having ISI very similar to SICI`s, SICF has much smaller first PCA component, indicating that it is a more topographically specific phenomenon. It may be due to the fact that SICF is possibly mediated by I-wave facilitation on a pyramidal neuron. SICF phenomena should be further investigated for the development of more functionally focal TMS approaches.

Poster Session B

Posters Nr. B1-B20 (Zoom Breakout Rooms)

Monday, March 15, 2021 at 19:15-20:30 (GMT+1)
Discussion Part 2 | Poster Session A & B | Tuesday, March 16, 2021 at 09:30-10:00 (GMT+1)

B01 **Poster Presenter:** Jordi ter Horst

Unraveling multi-site oscillatory dynamics in a rat model of response inhibition

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Introduction: Consider this situation: you are about to cross the street, while suddenly the traffic light turns red. Since preparation for movement is already initiated, the brain needs to inhibit this response and initiate a different action. This is what we call 'response inhibition'. There is a substantial lack in understanding how response inhibition is orchestrated in the brain, although it is known that the orbitofrontal cortex (OFC) and subthalamic nucleus (STN) are involved. But how do they communicate during response inhibition? And how does that communication relate to behaviour? **Methods**: For this I use an improved rat model of response inhibition, enabling me to record multi-site intracranial electrophysiology with the opportunity to interfere with optogenetics, while simultaneously recording their movements and behavioural outcomes during a response inhibition task. I hypothesize that 1) the OFC and STN communicate through coupling in the beta frequency and 2) that coupling plays a key role in succesful response inhibition behaviour. **Results:** In my poster presentation I will elaborate on these hypotheses, explain the improved rat model of response inhibition, show behavioural data and the custom-designed probes I use for recording multi-site intracranial electrophysiology. **Discussion:** It will be discussed how this rat model has the potential to unravel the multi-site oscillatory dynamics that underly response inhibition.

B02 **Poster Presenter:** Alejandro Galvez-Pol

Active sampling during tactile discrimination is modulated by the cardiac cycle

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Introduction: Past studies showed that cognition varies with phasic bodily signals such as heartbeat. This has been shown by locking the presentation of sensory events to distinct cardiac phases. However, task-relevant information is not usually encountered in such a phase-locked manner nor passively accessed, but actively sampled at one's own pace. Following this argument, we have recently shown that the cardiac cycle does modulate the way in which we actively/freely sample the visual world. Here we expand this finding by examining haptic sampling in a free tactile discrimination task. **Methods**: Forty-eight participants performed a free tactile discrimination of grating orientation with variable difficulty (narrow to wider gratings) while their ECG was recorded. Then, we computed the phase of the cardiac cycle in which they touched the gratings. Specifically, we computed the mean phase of the cardiac cycle in which they performed the initial touch, the mean phase of the tactile fixation, and the mean phase of the departing touch (i.e., cardiac phases concomitant to touching 'in, on, and out' the gratings). **Results:** Across the subsequent analyses, we found a significant coupling of tactile sampling with the cardiac cycle. Overall, less touches were generated just before and during the systolic phase of the cardiac cycle, which has been reported as the period of maximal effect of the baroreceptors upon cognition. Conversely, more tactile fixations whereby participants felt the gratings were found during the quiescent diastole phase (mid phase of the cardiac cycle). Remarkably, this latter effect increased with the difficulty of the gratings. **Discussion:** These results provide novel evidence and are congruent with a signal-to-noise ratio account between ongoing inner signals from the body and the external world to-be-processed. Humans might optimize the processing of sensory inputs by sampling the environment during quiescent periods of the organism.

B03 **Poster Presenter:** Solène Neyret

A virtual Reality program to enhance performance and emotional control in professional athletes

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Introduction: In sports performance, emotional states can have a direct impact on physical performance, it seems that the individual emotions of an athlete in team sports are highly influenced by the social emotions related to their ingroup (team) and to their outgroup (opponent). Identity processes seem to have a direct impact on athletes' performance but are not well understood yet. **Methods**: Social situations including ingroup and outgroup dynamics can be recreated in Virtual Reality. And, it has been shown that people tend to have realistic emotional and behavioural reactions to social situations experienced in Virtual Reality. In our study, we present a Virtual Reality program which recreates a situation of high-performance expectation for professional rugby players. We show different visual and auditory parameters aimed at inducing different levels of stress in the participant immersed in the Virtual Reality scenario. **Results:** We show how different combinations of the parameters can create different levels of social and environmental stress. **Discussion:** We believe that an exposure of athletes to highly realistic stressful situations in Virtual Reality could help them to be better prepared for facing similar emotions when being with their team on the rugby field.

B04 **Poster Presenter:** Jan Oltmer

Impaired remapping of social relationships in older adults

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Introduction: Social relationships are a central aspect of our life, yet our ability to change established social relationships is an under-investigated topic. Cognitive maps, processed by the hippocampus, are known to store spatial information and relational distances. Here, we transfer the concept of cognitive mapping to social cognition by defining 'social space' as cognitive dimensions in social interactions, more precisely as hierarchy (power), and sympathy (affiliation). These dimensions explain social behavior in the human and animal kingdom. **Methods**: We developed a novel virtual environment in which 32 healthy adults (16 < 27 years, 16 > 60 years) interacted with avatars. In session 1, 4 avatars were positioned in social space by virtual interactions changing their power and affiliation. Power was defined as competence, hierarchical behaviour and general power, Affiliation as warmth of communication, sharing of private information and body contact. In session 2, 2 avatars were updated (i.e., didn't change behavior), whereas 2 avatars were remapped (i.e., they changed behavior). A combination of ANOVAs were used to analyze polar coordinates and radial distances in social space. Nonparametric binomial tests as well as Watson & Williams F-tests were used to analyze polar vector angles. **Results:** We show that participants 'remap' social space when avatars show conflicting behavior in the dimensions of power and affiliation compared to previous interactions ($p<0.001$). We also show that whereas older adults show similar remapping behavior in power and affiliation coordinates, they show a distinct reduction in 'updating' the interaction between power and affiliation that defines the position of people in social space ($p<0.001$). **Discussion:** The interaction of 'power' and 'affiliation' has previously been associated with social cognitive maps in the hippocampus, our data provide first evidence that reduced hippocampal cognitive mapping that is associated with increased age also influences social relationships.

B05 **Poster Presenter:** Ankita Moss

Neuroethics: A Guide for Bridging Cross-sectoral Neuroscience

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Introduction: Neuroscience and its findings have deep personal and cultural meaning, so the implications of brain science raise new flavors of ethical issues not covered by traditional bioethics. Neuroethical concerns have registered at the highest levels of government. In 2018, an interdisciplinary global neuroethics group working with leading scientists from the International Brain Initiative published "Neuroethics Questions to Guide Ethical Research in the International Brain Initiatives". The document provides guiding questions to consider throughout the lifecycle of neuroscience research. These questions tackle issues such as identity, morality, cross-cultural differences, privacy, and potential stakeholder involvement in ethical decision-making. In our work with the International Brain Initiative, a consortium of 7 large-scale national-level brain research projects around the globe, we noted the important role that the private sector will play in scaling neuroscience for society. We also noticed a gap in communication and collaboration between government, academia and the private sector. These guiding questions were largely co-created with policy makers and academics, so it was unclear how these issues might be received by neuro-entrepreneurs and neuro-industry. We hoped to identify a common language for discussing neuroethical issues with stakeholders outside of government and academia. **Methods**: We used empirical ethics methods to assess the perceived value and attitudes of neuro-innovators toward neuroethical issues and whether or not these issues align with the process of neuro-innovation. We conducted one-on-one structured interviews with 21 neuro-innovators in the private sector and used two independent reviewers to analyze for themes. Themes were derived through an iterative process and mapped onto our theoretical framework. **Results:** From this preliminary research, we identified key neuroethical themes and processural pain points of neurotech entrepreneurs throughout the innovation process. **Discussion:** We will provide a preliminary neuroethics needs assessment for neuro-industry and suggest avenues to advance societally impactful neuroscience.

B06 **Poster Presenter:** Maria Azanova

Resting-state theta oscillations and reward sensitivity in risk taking

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Introduction: Females demonstrate greater risk aversion than males on a variety of tasks, but the underlying neurobiological basis is still unclear. **Methods**: We studied how theta (4-7 Hz) oscillations at rest related to three different measures of risk taking in a female, male and mixed sample. Thirty-five participants (15 females) completed the Bomb Risk Elicitation Task (BRET), which allowed us to measure risk taking during an economic game. The Domain-Specific Risk-Taking Scale (DOSPERT) was used to measure self-assessed risk attitudes as well as reward and punishment sensitivities. In addition, the Barratt Impulsiveness Scale (BIS11) was included to quantify impulsiveness. To obtain measures of frontal theta asymmetry and frontal theta power, we used magnetoencephalography (MEG) acquired prior to task completion, while participants were at rest. **Results:** Frontal theta asymmetry correlated with average risk taking during the game but only in the female sample. By contrast, frontal theta power correlated with risk taking as well as with measures of reward and punishment sensitivity in the mixed sample. Importantly, we showed that reward sensitivity mediated a correlation between risk taking and the power of theta oscillations localized to the anterior cingulate cortex. In addition, we observed significant sex differences in source- and sensor-space theta power, risk taking during the game, and reward sensitivity. **Discussion:** Our findings suggest that sensitivity to rewards, associated with resting-state theta oscillations in the anterior cingulate cortex, is a trait that potentially contributes to sex differences in risk taking.

B07 **Poster Presenter:** Wenchao Yang

Multi-echo BOLD Index: Figuring out false positive and providing detailed activation patterns in task fMRI

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Introduction: It is clear that fMRI is quite successful in detecting brain activation and brain function related disease during the last past nearly 30 years. However, the false-positive and activation boundary puzzled the scientists in our field quite a lot. In 2009, Bennett showed in his famous dead fish experiment that the dead salmon's brain even became active during photostimulation with standard fMRI analysis. **Methods**: Since the standard fMRI uses only one echo data and there is no way to prove whether the response is truth response or false. Here, we acquired 3-echo data to test the response's authenticity. 16 healthy volunteers were scanned under visual and motor task. Our multi-echo scan was done on 3.0T Siemens scanner with voxel size=3*3*4mm^3), further done with with 2*2*3mm^3 on 2 extral volunteers. We designed a BOLD Index to check the BOLD property. First, the standard t-test under p=0.01 and p=0.05 was done respectively, and then the BOLD Index is used to check the false positive. **Results:** The false positive regions detected by BOLD Index are usually at the periphery of activation region. The strict threshold (p=0.01) has less false positive 14.7% than loose threshold (p=0.05) holding 27.6% false positive. Motor cortex has higher false positive (32.17%, p=0.05; 19.0%, p=0.01) than visual cortex (21.9%, p=0.05; 11.6%, p=0.01). The extra experiment shows that the BOLD Index can distinguish the precentral gyrus, postcentral gyrus, while the standard t-test analysis couldn't. **Discussion:** Motor cortex has more false positive than visual cortex, it is because the motor cortex has more sulci and fissures, which contain more CSF, and was considered as active using standard t-test. The reason why BOLD Index can help to distinguish the gyrus around sulci rather than a mass result like t-test, since the sulci contains more non-BOLD signal and which is quantified BOLD index.

B08 **Poster Presenter:** Nicolas Gustavo Calleja

Cardiovascular Reactivity as a Learning Indicator in the Amphibian Rhinella Arenarum

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Introduction: In vertebrates the adaptation to a new environment, specially an aversive one, involves cardiorespiratory adjustments. In order to understand the mechanisms that control this phenomenon, we have developed a procedure for aversive stimulation and chronic recording of cardiac activity in the terrestrial toad Rhinella arenarum. **Methods**: The subjects were chronically implanted with electrodes and exposed to the presentation of NaCl solutions in an inescapable compartment, while the heart rate was recorded. Training sessions were performed once a day for 12 days: 6 sessions for Acquisition and 6 for Extinction. During the Acquisition a 300 mM NaCl saline solution (neutral) was presented followed by an 800 mM NaCl solution (aversive). In the Extinction trials the aversive solution was replaced by the neutral one. **Results:** By the end of the Acquisition period the cardiac reactivity was registered during the neutral solution presentation, showing an anticipatory tachycardia to the aversive event. During Extinction the anticipatory cardiovascular response was gradually disappeared and the initial reactive response to the aversive solution was again observed. **Discussion:** These results suggest a physiological adjustment of the cardiovascular system mediated by a learned response, probably part of an adaptive system to cope with threatening situations.

B09 **Poster Presenter:** Ilana Harris

Prosocial Transfer Effects of Collaborative Playlisting

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Introduction: Musical group interaction (MGI) has been found to promote prosocial tendencies across various populations. However, experimental study is lacking in respect of effects of everyday forms of musical engagement on prosocial tendencies, as well as whether key aspects—such as physical co-presence of MGI participants—are necessary to enhance prosocial tendencies. We conducted an online experiment to investigate whether mere perceived presence of a partner during playlist-making could elicit observable correlates of social processing implicated in both MGI and prosocial behaviors more generally. **Methods**: Participants completed a questionnaire assessing demographic and musical backgrounds and were assigned to one of two conditions (C0, C1). Participants were then told to create 3 fixed-length playlists with song clips provided by the experimenter, and that either another participant (C0) or a song recommendation algorithm (C1) would add additional clips to each playlist; in reality, clip additions were random. Participants were played back each resultant playlist (shuffled). A recognition task subsequently assessed participants' memory of who selected each clip provided in the previous sessions. Finally, participants answered self-report items assessing inclusion of other in self (IOS) and trait empathy (IRI). **Results:** For self-report data: a main effect of age on composite IOS_IRI ($p=.048$) as well as interaction effects of (age)*(experimental_condition) and (musical_background)*(prioritizing_social_functions_of_music) were found ($p=.043$; $p=.014$). For behavioral data: a 3-way interaction effect of (musical_background)*(hours_of_music_listening_per_day)*(prioritizing_social_functions_of_music) and a 2-way interaction effect of (experimental_condition)*(hours_of_music_listening_per_day) on hit rate during recognition task were found ($p=.016$; $p=.108$). **Discussion:** For younger individuals and for musicians who privilege social motivations for engagement with music, some of the social processes involved in MGI and implicated in empathy are likely to be elicited even by an assumption of virtual co-presence. In addition, individual differences in styles of listening behavior may mediate the effects of mere perceived partner presence on recognition memory.

B10 **Poster Presenter:** Melinda A. Mende

Coloring Negation – Selection of Alternatives is Situated in the Context

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Introduction: Recent studies have pointed that processing of linguistic negation could be similar to finding alternatives: When reading a negated sentence pragmatical inferences are made, i.e. fast inference towards the antonym (ITA). In the present study, negative-sentence-processing was investigated in two different contexts – binary context (black-and-white stimuli) / continuous context (colored stimuli) in a sentence-judgement task with reaction-time-measure (RT). Sentences describing the color of a number were used and verified by evaluating negated and affirmative sentences with button-press. **Methods**: 37 undergraduate-students participated in the study. Affirmative and negated sentences in German were displayed describing the color of a number followed by the number, for example “Die Zahl ist weiß” (affirmative sentence in binary context), “Die Zahl ist nicht rot” (negated sentence in continuous context). The task consisted of judging whether the descriptive sentence matched the following number with centered button-press-response. Black-and-white / colored stimuli were presented in separated blocks. It was hypothesized that a. processing of sentences is slower in negated sentences (main effect of sentence type) and b. processing of negated sentences is slower in context of color (main effect of context). **Results:** Both hypotheses were confirmed with a 2x2-repeated-measures ANOVA: Main effects of both sentence-type and context were detected indicating that there is a processing advantage for a. affirmative sentences, and b. that negated sentences ate processed faster when there is only one alternative (similar to an antonym). **Discussion:** The study shows that processing of negated sentences is slower in a continuous context than in a binary context, indicating that fast processing via ITA is used in simple, binary contexts. This research indicates that negation is not processed only be reversing the truth value but rather pragmatically situated in the context.

B11 **Poster Presenter:** Nicolas Legrand

Measuring the Accuracy and Precision of Interoceptive Beliefs: A Novel Psychometric Bayesian Approach

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Introduction: There is considerable interest in measuring cardiac interoception, i.e., the ability to accurately detect heartbeats. Unfortunately, most extant tasks are confounded by well-known issues that impair both their criterion and internal reliability, limiting their application in psychological and psychiatric research. At the core of this controversy is the role of subjective beliefs about the heart-rate in measures of cardiac interoception. **Methods**: Here, we recast these beliefs as an important part of the causal machinery of interoception, and offer a novel psychometric Bayesian "heart rate discrimination" (HRD) approach to the accuracy and precision of interoceptive beliefs. To validate our approach, we measured HRD performance in 215 healthy participants, and again 3 months later in a subset of 186 to establish reliability. **Results:** Cardiac interoceptive beliefs are more biased, less precise, and are associated with poorer metacognitive insight relative to a matched exteroceptive control. These parameters are stable across sessions and can be used to measure individual differences. Critically, a consistent bias is observed on the psychometric threshold, suggesting that among the general population, people tend to underestimate their resting heart rate frequency: -6.9 bpm (95% CI [-8.6 -5.3]) in the first test and -8.6 bpm (95% CI [-10.2 -7.0]) bpm in the second test. **Discussion:** Our task, provided as an open-source Python package, offers users an intuitive and robust approach to quantifying cardiac beliefs. A tendency to underestimate the heart rate frequency is discussed in light of previous studies using the heartbeat tracking task.

B12 **Poster Presenter:** Lara Wieland

Effects of acute stress on probabilistic reversal learning in healthy participants

Wieland, L. [1], Ebrahimi, C. [1], Katthagen, T. [1], Panitz, M. [2], Heinz, A. [1], Sjoerds, Z. [3], & Schlagenhauf, F. [1]

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Introduction: Stressful situations can alter reward-based learning. In some studies stress leads to increased learning from rewards, in others it does not show an effect. A task addressing reward-based learning is the reversal learning task, which uses probabilistic rewards as feedback and incorporates sudden changes in reward contingencies. Deficits in reversal learning have been described in various psychiatric patient populations such as psychosis or addiction, known to be susceptible to stress. The effects of acute stress on reversal learning have been rarely investigated. Here, we investigated the effect of acute social stress in a within-subject design in healthy control participants. **Methods**: A sample of n = 28 male non-clinical participants performed the task in a control condition versus the Trier Social Stress Test (TSST), a validated method to induce psychosocial stress. In our version of the reversal learning task, participants choose between two anti-correlated stimuli in order to obtain rewards in three blocks. Reward contingencies remain stable for the first 55 trials and the last 35 trials. During the second block, in between the stable blocks, reward contingencies change four times, which requires participants to flexibly adapt their behavior. Performance was measured in correct responses, frequency of switches after losses and wins. **Results:** Cortisol responses and subjective stress responses showed that the stress induction was successful. Preliminary analyses showed no significant effect of stress induction on the number of correct responses or the frequency of switches after losses and wins. **Discussion:** These results demonstrate that reversal learning, at least regarding the overall performance measures in our task, is robust to stress-related changes. Behavioral modeling of the task could yield further insights into more subtle behavioral changes after stress induction. Further research should test more diverse samples and patient populations as well.

B13 **Poster Presenter:** Maria Florencia Daneri

Neuronal activity in an amphibian brain during a spatial navigation task

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Introduction: Spatial navigation is a skill conserved between vertebrates, suggesting that it is important for survival. We are interested in the evolution of neural mechanisms that rule this ability, looking for learning patterns potentially present in a common ancestor. We use the terrestrial toad, Rhinella arenarum, as a model of ancient vertebrate. Amphibians have a homologous area to the hippocampal formation (brain structure involved in spatial learning) called medial pallium, which functions are not yet fully described. **Methods**: We trained toads in a water finding orientation task using a transparent open field (with access to visual extra maze cues). After acquisition, brains were analyzed using c-Fos immunohistochemistry technique. Expression of c-fos is an indirect marker of neuronal activity because it is often expressed when neurons fire action potentials. c-Fos is an immediate early gene (IEG) that codes for a transcription factor that is thought to mediate long-term changes in neural functioning. Thus, c-Fos staining in a neuron indicates recent activity and it is believed that increased c-Fos expression is induced by a novel experience, such as learning spatial task in a maze. **Results:** Our results revealed increased c-Fos + neurons in the medial pallium region. **Discussion:** The results obtained suggest that the medial pallium region is involved in spatial navigation strategies in amphibians. Hippocampus and medial pallium seems to be partially functional equivalents, telling us that this ability is evolutionary conserved.

B14 **Poster Presenter:** Jona Förster

ERP and MEG Correlates of Visual Consciousness: The Second Decade

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Introduction: This poster introduces a review paper surveying and discussing the ERP and MEG research of the past decade on the neural correlates of visual consciousness. The two most consistent correlates of the onset of visual consciousness are the early visual awareness negativity (VAN), a posterior negative component in the N2 time range, and the late positivity (LP), an anterior positive component in the P3 time range. Two earlier extensive reviews ten years ago had concluded that VAN is the earliest and most reliable correlate of visual phenomenal consciousness, whereas LP probably reflects later processes associated with reflective/access consciousness. **Methods**: The article this poster is based on provides an update to those earlier reviews. ERP and MEG studies that have appeared since 2010 and directly compared ERPs between aware and unaware conditions are reviewed, and important new developments in the field are discussed. **Results:** The results corroborate the VAN as the earliest and most consistent signature of visual phenomenal consciousness, and cast further doubt on LP as an ERP correlate of phenomenal consciousness. **Discussion:** Moreover, important new methodological and conceptual developments in the field are discussed. These include inter alia no-report paradigms, controls for task-relevance and objective task performance, the relationship between consciousness and attention, the role of expectations and prior beliefs, and the issue of graded vs. dichotomous awareness.

B15 **Poster Presenter:** Felix Klotzsche

Effects of memory load on the contralateral delay activity and induced alpha power in the EEG: studied with a virtual reality setup

Klotzsche, F. [1,2], Gaebler, M. [1,2], Villringer, A. [1,2], Sommer, W. [1,3], Nikulin, V. [1], & Ohl, S. [3]

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Introduction: Combining virtual reality (VR) with EEG and eye-tracking bears new possibilities but also challenges for the investigation of cognitive processes. Specifically, it is unclear whether established findings from studies using desktop monitors can be replicated when using VR head-mounted displays instead. Wearing VR glasses on top of the EEG cap might decrease the signal-to-noise ratio and thereby render expected effects untraceable. Here, we assessed whether well-studied EEG markers of visual short-term memory load, such as the evoked-response amplitude of the contralateral delay activity (CDA) and the power of induced alpha oscillations, can be replicated when using commercial VR glasses (HTC Vive Pro) as the stimulation monitor. **Methods**: We tested the visual memory of 24 observers in a delayed match-to-sample task with bilateral stimulus arrays of either two (low memory load) or four (high load) coloured circles. At the beginning of each trial (720 trials in total), we displayed a cue informing observers which array (left or right from fixation) would be probed in the later memory test. We presented the stimulus arrays for 200 ms, followed by a retention interval of two seconds. Simultaneous eye-tracking allowed us to exclude trials with saccadic eye movements. **Results:** We further excluded the full data sets of three observers due to poor EEG data quality. In accordance with earlier reports in the literature, CDA amplitude and alpha power during retention, increased significantly with memory load. We further corroborated these findings by fitting time-resolved spatial filters to decode memory load from voltage as well as from time-frequency data. Average classification accuracy during the retention interval was above chance level for both, voltage and time-frequency data. **Discussion:** We conclude that commercial VR glasses can be used to show effects of memory load on CDA amplitude and alpha power previously found with conventional monitor setups.

B16 **Poster Presenter:** Elena Cesnaite

Age-related alterations in rhythmic and non-rhythmic resting state EEG activity and their link to cognition in older age

Cesnaite, E. [1], Steinfath, T. P. [1], Jamshidi Idaji, M. [1], Stephani, T. [1], Kumral, D. [1], Haufe, S. [2,3], Sander, Ch. [4,5], Hensch, T. [4,5,6], Hegerl, U. [5,7], Riedel-Heller, S. [5,8], Röhr, S. [5,8], Schroeter, M. [1,5,10], & Witte, V. [1,5,9,10]

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Introduction: Resting state EEG (rsEEG) consists of periodic (i.e., rhythmic) and aperiodic (i.e., non-rhythmic) components both of which have been suggested to be altered with age and to have differential implications for cognition. However, previous results on this topic remain rather inconsistent and thus require further clarifications. Possible reasons for such inconsistencies are: 1) relatively small sample size and 2) a focus on a single rsEEG marker versus multiple ones within a single study. **Methods**: To address these limitations, we examined age-related alterations in periodic and aperiodic components as well as their contributions to distinct cognitive factors in a large sample of elderly participants from a population-based study (N = 1703, Mage = 70, age range between 60 – 80, 880 females). The periodic components included power of theta- (~ 5 Hz) and alpha- (~ 10 Hz) oscillations, and individual alpha peak frequency (IAF), whereas aperiodic component was quantified with the slope of 1/f power spectral density. Three factors derived from cognition battery represented processing speed, episodic memory, and working memory. The link between rsEEG parameters and cognition was explored using multiple linear regression. **Results:** Our results showed that only IAF decreased with age while other parameters showed no age-related alterations despite previous reports. Moreover, we showed that IAF was also positively correlated with working memory performance over multiple cortical areas. Finally, despite an absence of age-related alterations in alpha power, it was negatively associated with the speed of processing in the right frontal lobe. **Discussion:** Taken together, our findings suggest persistent age-related alterations in IAF but not in other studied parameters, and a link between periodic parameters, specifically in the alpha frequency range, and cognitive performance.

B17 **Poster Presenter:** Chiara Caporuscio

Introspective delusions

Caporuscio, C. [1, 2, 3]

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Introduction: Delusions are normally defined as pathological false beliefs about external reality. However, it is unclear whether someone can have an introspective delusions, namely a pathological false beliefs about one's own experience. Research on the aetiology of delusional belief formation seems to deny this possibility: most current accounts of delusions argue delusions are grounded in an abnormal experience, from which the irrational belief arises. Prima facie, the claim that delusions are based on experience seems to entail that the experience of delusional agents will always be in line with their belief: I will call this commitment experiential equivalence. Experiential equivalence is incompatible with the claim that the delusional belief can dissociate from experience, and therefore the possibility of a delusional belief about one's own experience is ruled out. **Methods**: In my view, the conclusion that introspective delusions and bottom-up approaches are mutually exclusive is premature. Within experience-based accounts of delusions, there is large disagreement on the relation between the delusional belief and the abnormal experience contributing to its formation: while some think that the delusional belief comes from endorsing a bizarre experience at face value, others argue that it is a faulty interpretation of experience. **Results:** By clearing the conceptual terrain on delusional belief formation, I will argue that the possibility of introspective delusions should not be ruled out prematurely. Until we have a clearer understanding of what exactly is the role of experience in delusional belief formation, endorsing bottom-up accounts of delusions is compatible with the existence of delusions that inaccurately reflect one's own experience. **Discussion:** This has relevant consequences for the conceptualization of delusions such as thought insertion and Anton-Babinski Syndrome, and raises important methodological and ethical questions on how to treat introspective reports of delusional patients.

B18 **Poster Presenter:** Andrea Hiott

Memory as world-brain relation: how we find and lose our way

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Introduction: We find our way through the space around us developmentally. For the nervous system, space is the ongoing 360°-processing of sensory signals by the body-- light waves, vibration of touch, sound frequencies, olfactory and caloric material. Encountering an environment means processing such components; navigating it means creating active algorithms of statistical sensory clusters in positional alignment, perhaps along the lines of the Tolman-Eichenbaum Machine. **Methods**: As the body translates sensory input, the brain's positional system (place cells, grid cells, etc.) orders and arranges the results into algorithms reflecting the stable outer sensory/positional statistics of the world: These relations recur in stable patterns within ecologies, and the brain's positional system likely orders these sensory clusters into a web of active algorithms which cue according to context. **Results:** This inner/outer alignment allows for greater bodily dexterity and less energy spent navigating. It may also become the template by which further algorithmic meta-data can be added through social communication and interaction. As bodies communicate in shared contexts, they develop shared statistical algorithmic parameters and meta-data (i.e. languages, numerical systems) which build upon navigational templates, leading to semantic memory. This could be methodologically tested through conceptual navigation tasks inspired by research done by the Doeller Lab. Through methods explored in Georg Northoff's work, nested levels of navigation (physical, conceptual) can then be measured in relation to one another and to world-based spatiotemporal algorithms, the input which becomes bodily sensation. **Discussion:** Dynamical forms of spatiotemporal analysis (scale free, power law, etc.) extract patterns in the relationship of conceptual and physical algorithms, the relation of these to the brain's spontaneous activity, and the relation of these to spatiotemporal dynamics of context and ecology. Focusing on nested relational dynamics rather than on isolated function could lead to a metrics of physical and conceptual navigation and help us better understand and treat mental disease.

B19 **Poster Presenter:** Shervin Vencatachellum

Categorization alters perception: Assessing potential predictors of pain categorization biases

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Introduction: A recently developed pain categorization paradigm provided initial evidence that classifying painful stimuli into categories can modulate pain perception. While categorization provides an efficient tool when confronted with an overwhelming amount of sensory information, misperception or misattribution of nociceptive information may result in problematic pain-related cognitions and coping behaviours. In this project, we aimed to refine the pain categorization paradigm and to identify potential predictors of these categorization biases. **Methods**: Study I aimed to provide a proof-of-concept validation of the pain categorization paradigm. Participants were assigned to either a categorization or a control group. In both groups, participants received six increasingly painful thermal stimuli (in increments of 0.5°C). In the categorization group, the stimuli were labelled (‘A1’,’A2’,’A3’,‘B1’,‘B2’,‘B3’) respectively, thereby creating an implicit category border (A vs. B) between stimuli. Stimuli in the control group were labelled S1-S6, hence instead implying a continuum. Participants provided pain intensity and unpleasantness ratings in the first part of the study. In the second part, stimuli were presented without labels and participants had to identify the correct label for each stimulus. Study II comprised only the categorization condition and aimed to assess the influence of several psychological factors (e.g., mindfulness, pain catastrophizing, intolerance of uncertainty) on the categorization effects. **Results:** Participants in the categorization group reported lower within-category variability and higher between-category variability for the pain unpleasantness ratings. The categorization group was also more likely to confuse within-category stimuli than between-category stimuli, relative to the control group. Data from Study 2 are currently being analysed and will be presented at the symposium. **Discussion:** The findings suggest that categorization can lead to increased perceived similarity for stimuli within a category, and reduced similarity for stimuli between categories. Given the prevalence of misinterpreting bodily signals in various chronic conditions, it is important to identify potential predictors of these categorization biases.

B20 **Poster Presenter:** Sarah Hashim

Predicting Music-Induced Visual Imagery Using Occipital Alpha

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Introduction: Music cognition research has shown music to be a reliable cue for visual imagery, suggesting such stimuli can be used to prompt visual imagery formation during neuroscientific investigations. In this study, we explored the extent to which EEG alpha power (8-12 Hz) tracks static and dynamic imagery during music listening. We hypothesised a negative relationship between alpha power and visual imagery ratings, with more pronounced findings for dynamic as opposed to static visual imagery, given the richness of visual sensory content expected to characterise the former. **Methods**: Forty-three participants listened, with closed eyes, to twenty-four musical excerpts conveying joyful, neutral and fearful emotions whilst EEG was recorded, and after each excerpt, rated their static and dynamic imagery experience to the music. We conducted linear mixed models for static and dynamic imagery separately to assess their relationship with alpha power, also exploring the extent to which this relationship was influenced by excerpt emotion (joy, neutral, fear) and time window (start, middle, end). **Results:** We found a stronger negative relationship between alpha power and static imagery ratings compared to between alpha power and dynamic imagery, thus partially supporting our hypotheses. Static imagery was mostly related to occipital brain region, whereas dynamic imagery sensitive electrodes were less localised. Further, while static imagery showed modulation by excerpt emotion and more strongly predicted alpha power towards the end of the excerpt (suggesting sensitivity to emotional content and that visual imagery requires time to build), this was not the case for dynamic imagery. **Discussion:** Our findings confirm occipital alpha as an objective measure of music-induced visual imagery but suggest that there are either more complex correlates for dynamic visual imagery. Alternatively, it is possible that participants are better at introspecting/reporting on static rather than on dynamic imagery experiences.

Poster Session C

Posters Nr. C1-C20 (Zoom Breakout Rooms)

Wednesday, March 17, 2021 at 11:00-11:45 (GMT+1)
Discussion Part 2 | Poster Session C & D | Wednesday, March 17, 2021 at 21:15-21:45 (GMT+1)

C01 **Poster Presenter:** Ege Tekgün and Burak Erdeniz

Influence of Vestibular Signals on Bodily Self- Consciousness: Different Sensory Weighting Strategies Based on Visual Dependency

Tekgün, E. [1], & Erdeniz, B. [1]

[1] İzmir University of Economics, İzmir

Introduction: Previous studies showed that the vestibular system is crucial for multisensory integration, however, its contribution to bodily self-consciousness more specifically on full-body illusions (FBI) is not well understood. Thus, the current study examined the role of visuo-vestibular conflict on the FBI experiment that was induced during a supine body position. **Methods**: In a mixed design experiment, 56 participants underwent through the FBI protocol. During the experiment, half of the participants received synchronous visuo-tactile stimulation, and the other half received asynchronous visuo-tactile stimulation, while their physical body was lying in a supine position, but the virtual body was standing. A questionnaire was designed to assess the FBI. Additionally, the contribution of individual sensory weighting strategies was investigated via the Rod and Frame task (RFT), which was applied both before (in standing and supine conditions) and after the FBI (post-experimental condition) protocol. Furthermore, RFT in standing condition was used to group participants as visual field-dependent/independent based on the weighting of visual-vestibular signals. **Results:** Subjective reports of the participants confirmed previous findings showing that there was a significant increase in ownership over a virtual body during synchronous visuo-tactile stimulation. Additionally, further categorization of participants based on their visual dependency (by RFT) showed that those who heavily rely on visual information (visual field dependents) perceived the FBI more strongly than non-visual field dependents during the synchronous visuo-tactile stimulation condition. Further analysis provided not only a quantitative demonstration of the FBI but also revealed changes in perceived self-orientation based on their field dependency. **Discussion:** In line with the literature, we found effect of synchronous multisensory stimuli on body ownership and self-location. Altogether, the findings of the current study make further contributions to our understanding of the vestibular system and brought new insight for individual sensory weighting strategies during the FBI.

C02 **Poster Presenter:** Deia Ganayim

Writing Units or Decades First in Two Digit Numbers Dictation Task: The Case of Arabic an Inverted Language

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[5] Department of Experimental Psychology, University of Oxford, Oxford, UK

Introduction: The numerical syntactic structure of two-digit numbers in Arabic differs mainly in its order of units and decades. In Arabic, two-digit numbers are read from right to left, i.e. the unit digit precedes the decade digit (24 = four and twenty) in accordance to the text reading and writing direction but opposite to the math direction (left to right). **Methods**: The current study investigated the effect of the syntactic representation of numbers in Arabic on the task of transcoding two-digit numbers from dictation. For this purpose, it used the paradigm of writing two-digit numbers from dictation. The study participants were primary, junior-high and high school pupils in addition to higher education students with Arabic as their first language. They performed transcoding task, namely writing two-digit numbers from dictation. Units first\decades first writing patterns were collected depending on the differential syntactics structure evident in the two-digit number dictated (Teens numbers-units first, Identical units and decades- units first, Whole tens- decades firs, the rest remaining two-digit numbers-units first). **Results:** in general Arabic speakers adopt decades first writing pattern of two-digit numbers especially when it is consistent with syntactic structure of two-digit numbers as in whole tens. This first decade writing pattern becomes more evident in junior-high school, high school and higher education since the proficiency and skills in math, second and third languages improves. **Discussion:** this pattern is modulated depending on a complexity of the units and decades structure that requires more working memory capacity. This complexity is more pronounced in two-digit numbers, where the numerical syntactic structure is more evident than in numbers with a less prominent numerical syntactic structure (numbers 19-12) or in identical units and decades numbers compared to the remaining two-digit numbers category (with an evident syntactic structure of units and decades). Additionally, influences were claimed because of the consistency or inconsistency between the reading direction of text (Right to Left), two-digit numbers reading (Right to Left) in Arabic and math writing direction taught (Left to Right) placing less or more load on working memory.

C03 **Poster Presenter:** Artur Czeszumski and Anne Lang

Hyperscanning: A Valid Method to Study Neural Inter-brain Underpinnings of Social Interaction

Czeszumski, A. [1], Eustergerling, S. [1], Lang, A.[1], Menrath, D.[1], Gerstenberger, M.[1], Schuberth, S.[1], Schreiber, F. [1], Rendon, ZZ, [1], & König, P. [1,2]

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Introduction: Social interactions are a crucial part of human life. Understanding the neural underpinnings of social interactions is a challenging task that the hyperscanning method has been trying to tackle over the last two decades. **Methods**: Here, we review the existing literature and evaluate the current state of the hyperscanning method. We review the type of methods (fMRI, M/EEG, and fNIRS) that are used to measure brain activity from more than one participant simultaneously and weigh their pros and cons for hyperscanning. **Results:** Further, we discuss different types of analyses that are used to estimate brain networks and synchronization. Lastly, we present results of hyperscanning studies in the context of different cognitive functions and their relations to social interactions. **Discussion:** All in all, we aim to comprehensively present methods, analyses, and results from the last 20 years of hyperscanning research.

C04 **Poster Presenter:** Till Nikolaus von Heiseler

Language Evolved From Displaying Natural Signs Referring to Past Actions

von Heiseler, T. N. [1]

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Introduction: The talk discusses the display of natural signs of past actions as possible precursors of linguistic utterances. **Methods**: My proposal is based on two assumptions. The first is known as the social intelligence hypothesis—that the cognitive evolution of humans is first and foremost an adaptation to social demands. The second is the function-first approach to explain the evolution of traits: before a prototype of a new trait develops and the adaptation process begins, something already existing is used for a new purpose. Applied to the emergence of declarative sentences, this suggests that for language evolution to begin, something already existing was used for a declarative purposes: to transmit a proposition. Thus, the evolutionary hypothesis presented here is that before human language began to develop, natural signs (such as hunting trophies) were used for communicative purposes. Simple forms of such trophy display behavior are found in non-human primates. Chimpanzees e.g., carry around killed infants of other tribes without eating them. **Results:** I show that such a behavioral display can imply a conceptual structure similar to that informing the syntax of sentences: the displayer represents the agent, while a displayed object evidencing a past action (e.g., a hunting trophy) plays the role of patient. Adding a mimetic gesture (e.g. as a reaction to the disbelief of an onlooker) would have created the first (signed) sentence expressing a proposition about the communicator's past (e.g. "I killed it"). **Discussion:** The idea presented is compatible with the well-established idea that language evolved for storytelling: in this version, for influencing the reputation of oneself and (later) others. Our model also explains the evolution of another unique human feature: the drive for recognition.

C05 **Poster Presenter:** Marvin Mathony

Transformative Experiences, Cognitive Modelling and Affective Forecasting

Mathony, M. [1], & Messerli, M. [2]

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Introduction: In the last six years, philosophers have discussed the topic of transformative experiences. In this paper, we contribute to a crucial issue that is currently under researched: the failure of cognitive modelling. We argue that cognitive modelling can be operationalized as affective forecasting, and we conduct a meta-analysis comparing studies on transformative and non-transformative experiences with respect to the ability of affective forecasting. **Methods**: The empirical claim of this essay relies on a meta-study conducted by XXX on affective forecasting. For our analysis, we looked into each of the 84 studies listed in their meta-study to categorize them based on whether the affective forecasting task was concerned with transformative or non-transformative experiences. Using a two-tailed Welch's t-test we compared the weighted means of the effect sizes (Hedges's g) in the category of transformative and non-transformative experience. The effect sizes indicate the accuracy of probands' predictions of their future happiness. An equivalence test, the two one-sided test (TOST), was subsequently run. **Results:** The meta-analysis suggests that the weighted average effect sizes of studies on non-transformative experiences ($g=0.696$) and studies on transformative experiences ($g=0.705$) do not significantly differ from each other ($t(2367)=0.696$, $p=0.486$). The TOST procedure reveals that the two effect sizes are statistically equivalent ($t(2367)=7.29$, $p < 0.001$). **Discussion:** The result found is that decision-makers' performance in cognitively modelling transformative experiences does not systematically differ from decision-makers' performance in cognitively modelling non-transformative experiences. This claim stands in strict opposition to XXX's main argument. We propose two reasons why cognitively modelling is always impaired: a) Transformative and non-transformative decisions both are subject to selected cognitive biases. b) The memory one has of non-transformative experiences does not guarantee accurate cognitive modelling as the memory itself will be inaccurate.

C06 **Poster Presenter:** Dimitrios Liokaftos

Mind and Brain in the Psychedelics Renaissance: The case study of microdosing

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Introduction: In recent years there has been a psychedelics renaissance. With substances such as LSD and psilocybin magic mushrooms at its epicenter, this phenomenon includes a) growing scientific research, mainly in clinical psychiatry and neuroscience, that focuses on psychedelics' implications for brain science and mental health therapy, b) a move towards increased commodification of psychedelics, c) an advocacy movement that emphasises psychedelics' role for self-exploration and campaigns for drug law reform. A central aspect of this psychedelics renaissance that has attracted considerable media and scientific attention is the emerging trend of microdosing psychedelics. Microdosing is the regular use of sub-perceptive threshold doses of psychedelic substances. Self-reported benefits include enhancements in cognitive performance, and mood, increased self-awareness and emotional regulation as well as decrease in depressive and anxious symptomatology. **Methods**: To explore the place of 'mind' and 'brain' concepts in this new wave of psychedelics research and popular discourse, I will focus on microdosing as a case study and undertake discourse analysis of various sources. These will include books and interviews on microdosing, official platforms and public communications of psychedelic organisations, and media coverage on the topic. **Results:** The concepts of 'mind' and 'brain occupy a central place in this current wave of psychedelics research and popular discourse. Their meaning is constructed, negotiated and mobilised in practical applications and discourses that range from therapy to human enhancement. Presented as an instrumental, measured approach of using psychedelics for well-planned objectives that resonate with dominant values of productivity and self-improvement, microdosing is juxtaposed to stigmatised ways of using these substances that are seen as hedonistic, risky and chaotic. **Discussion:** Assuming a sociological standpoint, this presentation will ultimately comment on how the social construction of 'mind' and 'brain' is embedded in specific social class values and ideas around science, subjectivity, and the good life.

C07 **Poster Presenter:** Martin Grund

Respiratory and cardiac activity associated with conscious tactile perception

Grund, M. [1], Al, E. [1,2], Pabst, M. [1], Dabbagh, A. [1,3], Stephani, T. [1,4], Nierhaus, T. [1,5], & Villringer [1,2]

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Introduction: Cardiac activity has been shown to interact with conscious tactile perception: detecting near-threshold tactile stimuli was more likely during diastole and heart slowing was greater for detected compared to undetected stimuli. Here, we investigated how cardiac cycle effects on conscious tactile perception relate to respiratory activity given the natural coupling of these two dominant body rhythms. **Methods**: Forty-one healthy participants had to report conscious perception of weak electrical pulses applied to the left index finger (yes/no) and confidence about their yes/no-decision (unconfident/confident) while electrocardiography (ECG), respiration activity (chest circumference), and finger pulse oximetry were acquired. **Results:** For confident but not unconfident trials, we reproduced our findings of lower tactile detection during systole and unimodal distribution of hits in diastole. Locating pulse waves in the finger relative to the cardiac cycle showed that lowest tactile detection rate occurred 250-300ms after the R-peak and thus corresponded to pulse-wave onsets. Furthermore, respiratory rhythms were observed to be locked to tactile stimulation. This locking of inspiration onsets was more consistent in hits than misses. Respiratory cycles accompanying misses were longer as compared to hits and correct rejections. **Discussion:** Cardiac cycle effects on conscious tactile perception seem to depend on decision confidence and coincide with heartbeat perception (pulse-wave onset), which suggests the involvement of higher cognitive processing in this phenomenon possibly related to predictive coding. Additionally, more consistent phase-locking of inspiration with stimulus onsets for hits than misses is in line with previous reports of phase-locked inspiration to cognitive task onsets which were interpreted as tuning the sensory system for incoming information.

C08 **Poster Presenter:** Celia Foster and Tobias Heed

The search for a human homologue of the macaque ventral intraparietal area

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Introduction: The macaque ventral intraparietal area (VIP) is characterised by responses to tactile stimuli on the face and visual and auditory stimuli in the peripersonal space surrounding the head. For many neurons, specific response properties are congruent across sensory modalities. These multisensory and body-related VIP characteristics have fuelled attempts to draw parallels from macaque to human and to test whether the respective region plays a role in human body processing and, potentially, higher cognitive function. Studies have attempted to define the location of a putative human homologue of the macaque VIP (pVIP) by investigating the responses to stimuli that elicit activity in macaque VIP. Here, we compared the locations of proposed pVIP coordinates to determine whether they converge upon a common location. **Methods**: We conducted a comprehensive literature review to find all studies that propose a pVIP location. For each study, we converted the pVIP coordinates into a common coordinate space and projected the coordinates onto the cortical surface to compare their locations. Furthermore, we compared pVIP locations to cytoarchitectonically defined intraparietal and superior parietal regions and proposed human homologue locations of regions neighbouring macaque VIP. **Results:** We found that proposed pVIP coordinates were widely dispersed across a large area of parietal cortex. Furthermore, coordinates from three different commonly used methods to functionally localize pVIP showed converging, bilateral clusters within each method, but separated clusters across the different methods, suggesting that these different localization methods target different functional regions. **Discussion:** Our results demonstrate that attempts to define the location of human pVIP have led to diverging, rather than converging, results. We propose that future studies will need to take a multimodal approach, encompassing cyto- and myeloarchitectonic characteristics, anatomical connections, topology with respect to neighbouring regions, functional properties and topographic mapping, in order to better establish the location of a human homologue of macaque VIP.

C09 **Poster Presenter:** Pragati Gupta

A Comprehensive Review of Asymmetry in Meditation

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Introduction: The brain is said to be asymmetrical when the two hemispheres are distinct from each other, structurally or functionally. Asymmetries are correlated with lateralized behavioral and functional features such as language, motor preferences, emotional processing, etc. Interestingly, some studies have shown potentially different degrees or patterns of lateralization among meditators. Previous studies exhibited distinct asymmetrical findings in Transcendental and Mindfulness meditators using EEG. Recent studies are considering different meditative states such as Loving-Kindness, Open Monitoring, Rajyoga, etc to determine hemispheric differences using DTI, MRI, and EEG to obtain structural, functional asymmetries among meditators. **Methods**: Asymmetry studies among meditators have utilized asymmetry index (anterior) with spectral analysis (alpha/theta power) among various meditators in comparison with healthy as well as patient groups. A newer method is being implemented to compute asymmetry such as the Imaginary part of coherence with other brain oscillations in parietal, occipital, and central regions. **Results:** Overall most of the studies have identified anterior activation in leftward alpha asymmetry among meditators linking it to positive emotions and approach motivational tendencies. Asymmetry has also been observed in parietal channels across hemispheres. MRI findings have observed increased gray matter in the left hippocampus across mindfulness meditators. Theta oscillations in mid-frontal regions for both hemispheres are being detected. Cognitive states related to these asymmetries are associated with attention, meta-cognitive awareness, emotional regulation, etc. On the contrary, some studies have reported no asymmetry suggesting it to be an increased interhemispheric flow of information globally among experienced meditators. **Discussion:** Future studies can explore hemispheric asymmetry variation in terms of onset of meditation, across the whole time span of the particular meditative state and its development through slower to faster frequencies in different channels. In particular, specific meditative states impact hemispheric lateralization uniquely thereby influencing cognition and anatomical asymmetry which needs to be investigated using neurophysiological, neuroimaging techniques for consistent outcomes

C10 **Poster Presenter:** Or Yizhar

Proprioception Has Limited Influence on Tactile Reference Frame Selection

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Introduction: Perceiving the spatial location and physical dimensions of objects that we touch is crucial for goal-directed actions. To achieve this, our brain transforms skin-based coordinates into a reference frame by integrating visual and proprioceptive cues, a process known as tactile remapping. In the current study, we examine the role of proprioception in the remapping process when information from the more dominant visual modality is withheld. **Methods**: We developed a visual-to-tactile Sensory Substitution Device that transforms 2D black-and-white images into a series of vibrations on the inner arm. An image is scanned horizontally from left-to-right (X-axis), capturing a single column (Y-axis) of pixels at a discrete-time point. Each pixel in the column is represented by one of the 15 vibrators that make up the device. Using the device, 72 participants performed spatial localization and orientation tasks in different postures and had to switch postures between trial blocks. As participants were not told which side of the device is down or up, they could freely choose how to map the image's vertical axis. **Results:** We found that participants' initial reference frame selection is highly dependent on their posture and is anchored to an external gravitational axis (the sky is "up"). After switching posture about half of the group maintain an external reference frame, while the other half adopt a reference frame that is centered on the anatomy of the inner arm, and thus invariant to posture. **Discussion:** We observed that in the absence of visual information novel proprioceptive inputs can be overridden after switching postures. This behavior demonstrates that top-down modulations can nullify new proprioceptive information during the process of tactile remapping, ultimately confirming that the weight of proprioceptive information during spatial tasks is considerably weaker compared to the task or other sensory modalities.

C11 **Poster Presenter:** Meghedi Vartanian

Cognitive rehabilitation of visual field deficit due to hypoxic-Ischemia following an interventricular neurocytoma removal: A case report

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Introduction: Patients awakening from the hypoxic-ischemic coma face cognitive and visual deficits that might have far-reaching consequences, affecting daily functioning, independence, and living standards. Here, we present the satisfying process of cognitive rehabilitation treatment of a single case (A.M), who was threatened with the sudden change of oxygen volume, causing left occipital parietal hypoxic-Ischemia after an interventricular neurocytoma removal. The patient was in a coma for the first 48 hours, after which she showed significant memory and visual deficits as she had lost almost a third-quarter of her visual field. **Methods**: Sessions were held twice a week with an overall of 50 sessions. Each lasted about 60 minutes from October 2017 till January 2019. Visual restorative and compensatory training were implemented both on computerized (Rehacom) and non-computerized eye-movement based exercises. The intervention was interrupted several times due to hospitalization for chronic pancreatitis and pregnancy. After several months she was followed up and the rehabilitation sessions were restarted. **Results:** In the assessment module, the detected target rate in the top-left quadrant was increased from 13% to 79%, the bottom-right quadrant from 25% to 38%, and the top-right quadrant from blindness (0%) to 4%. During the training module, there was a statistically significant difference in the scores of the reaction time of saccadic and overview training in the right visual field ($p = .040$, $p = .00$), meanwhile, the left visual field showed no significant difference ($p = .063$, $p = .141$) respectively. **Discussion:** The present study tried to enrich the current available, inexpensive, patient-friendly exercises that can be less time-consuming. However, caution must be taken in drawing firm conclusions from the results of this study as each individual has a different, specific background which may result in different reactions.

C12 **Poster Presenter:** Pankaj Pandey

Non-Linear Analysis of Expert and Non-Expert Meditators using Machine Learning

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Introduction: With three decades of contemplative research, Meditation has been an effective tool to increase attentional engagement, well-being, and states of flow and be beneficial to practice in this COVID-19 situation. But what is challenging, there is no feedback provided to the naive participants for his/her meditative performance, which can be frustrating and less rewarding. With recent advancements, EEG(Electroencephalogram) headset technology provides a mechanism for individuals to track his/her progress. However, processing those EEG signals and extracting features is crucial for classifying the different brain states, helping participants navigate their performance in a more customizable and flexible manner through feedback. **Methods**: Feature extraction plays an essential role in identifying the correct sets of features that provide a robust representation and derive a significant conclusion. We utilize fractal analysis, as this is well suited for the non-linear and non-stationary time series signals. Feature extraction is done by two fractal methods, which are Higuchi and Kat'z algorithms. Once features are extracted, we employ four machine learning classifiers to classify expert and non-expert meditators' brain states. We further reduce the feature dimension by three techniques and later visualize the three components of expert and non-expert. **Results:** We classify the states of expert and non-experts successfully by 89% in the Katz algorithm using Quadratic Discriminant Analysis. We further reduce the feature dimension from 64 to 20, 25, and 30 components and obtain the maximum accuracy of 87% using Locally Linear Embedding. The fractal structure shows the differences between Expert and Non-Expert in three dimensions. **Discussion:** We demonstrate the feature extraction using fractal analysis that further identifies the brain states associated with expert and non-expert meditators. This study contributes to the neural correlates of meditators. We can extend this work to understand the different meditation stages by identifying the features of each stage.

C13 **Poster Presenter:** Ezgi Yalciner

Does a Strong Sense of Agency Make You Take More Risks?

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Introduction: Taking risks constitutes an important part of our daily life. Prior research suggested that the perception of control encourages people to underestimate risks and engage in more risk-taking behavior. However, control is a broad and complex construct, and the processes that trigger the association between control and risk are still unclear. Our study investigated the relation between risk-taking and the sense of agency (SoA)—a sense of causal control over sensory outcomes through one's own voluntary actions. **Methods**: In phase 1, we manipulated SoA in an action-outcome (A-O) interval estimation task by varying A-O contingency (i.e., which balloon color appeared on the screen after one of two keys was pressed). One group saw completely deterministic outcomes, whereas the other saw random outcomes. We measured participants' explicit control ratings as a manipulation check. We also measured the consequences of varying A-O contingency on an implicit SoA measure—the perceived temporal compression of the A-O interval ("temporal binding"). In phase 2, participants performed the Balloon Analog Risk Task (BART) with balloon colors they saw in phase 1, as well as a new balloon color. BART performance was linked to real-world rewards. **Results:** The Deterministic A-O group took more risks than the Random A-O group did in phase 2, but only for balloons they experienced control over in phase 1. Implicit SoA was also lower in the Deterministic A-O group than the Random A-O group **Discussion:** Our study found that a simple SoA manipulation—A-O contingency—can affect subsequent risk-taking in a task with real-world consequences. Importantly, this effect was context-dependent (i.e., specific to balloon colors seen in phase 1). While previous risk-taking studies usually investigated high-level perceptions of control, our study shows that low-level SoA enhancements also increase risk-taking. This finding identifies SoA as a key determinant of behavioral control.

C14 **Poster Presenter:** Daniel Kluger

Respiration modulates rhythmic resting-state activity

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Introduction: Despite recent advances in understanding how respiration affects neural signalling to influence perception, cognition, and behaviour, it is yet unclear to what extent breathing modulates brain oscillations at rest. **Methods**: We used measures of phase-amplitude coupling between respiration and human magnetoencephalography (MEG) data to investigate if, where, and how respiration cyclically modulates oscillatory amplitudes (2 – 150 Hz). **Results:** We show respiration-modulated brain oscillations (RMBOs) across all major frequency bands. Sources of these modulations spanned a widespread network of cortical and subcortical brain areas with distinct spectro-temporal modulation profiles. Globally, high-frequency gamma modulation increased with distance to the head centre, whereas delta and theta modulation decreased with height in the sagittal plane. **Discussion:** Overall, we provide the first comprehensive mapping of RMBOs across the entire brain, highlighting respiration-brain coupling as a fundamental mechanism to shape neural processing within canonical resting-state and respiratory control networks.

C15 **Poster Presenter:** Qianru Xu

Magnetoencephalography responses to unpredictable and predictable rare somatosensory stimuli in healthy adult humans

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Introduction: Mismatch brain responses to unpredicted rare stimuli are suggested to be a neural indicator of prediction error, but this has rarely been studied in the somatosensory modality. Here, we investigated how the brain responds to unpredictable and predictable rare events. **Methods**: Magnetoencephalography responses were measured in adults to frequently presented somatosensory stimuli (FRE) that were occasionally replaced by two consecutively presented rare stimuli (unpredictable rare stimulus, UR, and predictable rare stimulus, PR; p=0.1 for each). The FRE and PR were electrical stimulations administered either to the little finger or the forefinger in a counterbalanced manner between the two conditions. The UR was a simultaneous electrical stimulation to both the forefinger and the little finger (for a smaller subgroup, the UR and FRE were counterbalanced for the stimulus properties). **Results:** The grand-averaged responses were characterized by two main components: one at 30□100 ms (M55) and the other at 130□230 ms (M150) latency. Source-level analysis was conducted for the primary somatosensory cortex (SI) and the secondary somatosensory cortex (SII). The M55 responses were larger for the UR and PR than for the FRE in both the SI and the SII areas and were larger for the UR than for the PR. For M150, both investigated areas showed increased activity for the UR and the PR than for the FRE. Interestingly, although the UR was larger in stimulus energy (stimulation of two fingers at the same time) and had a larger prediction error potential than the PR, the M150 responses to these two rare stimuli did not differ in source strength in either the SI or the SII area. **Discussion:** The results suggest that M55, but not M150, can possibly be associated with prediction error signals. These findings highlight the need for disentangling prediction error and rareness-related effects in future studies investigating prediction error signals.

C16 **Poster Presenter:** Zsofia Samodai

Neuroscientific knowledge mediates perceived “realness” of felt experience

Samodai, Z. [1]

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Introduction: Due to the enormous technological development of brain imaging techniques, brain science has taken on the investigation of topics traditionally associated with the social sciences and humanities. Such inquiries into language, social interaction and emotions increasingly came to be seen as incomplete without discussions on their respective neural correlates. Parallel to these developments, neuroscientific explanations of various human practices also became popular in lay society. In societies where recent neuroscientific findings circulate, humans increasingly understand their own behavior using the language and concepts of neuroscience. This research investigated mindfulness meditation practitioner’s engagement with neuroscience in relation to their own practice in order to exemplify the use of neuroscientific reasoning in lay people’s meaning making process of their own actions. **Methods**: An ethnographic study with semi-structured interviews of Taiwanese mindfulness meditation practitioners was carried out and analyzed using Grounded theory. **Results:** Neuroscientific research about how meditation changes the brain was found to be the measurement of “realness” for multiple practitioners, indicating that the unmediated bodily felt experience of meditation and its effects became real through being justified through data. Mediated information from neuroscientific data and brain imaging therefore was found to have an impact on the ways meditators understood and evaluated their own experience of meditation. Neuroscientific results were often taken up and explained as first-person experience, conflating mediated and felt experience. **Discussion:** The inquiry serves to show the power of neuroscience to shape the very perception of laypeople about themselves. Relating the self to the brain creates forms of subjectification, where the preferred ways of knowing oneself are potentially shifting towards mediated, expert defined neuroscientific means. This research shows an example of how neuroscientific knowledge starts to live its own life outside of the lab, indicating the importance of adequate research into the field of public understanding of neuroscience.

C17 **Poster Presenter:** Mohammad Rostami

Assessing the chance of successful tactile localization for stroke patients; thermal vs physical stimulation

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Introduction: Introduction: Perceiving the location of touch is one the most complex processes of the brain and there is no general scientific framework to comprehensively describe it. Recently, for a few patients with focal brain lesions, it has been reported that they are capable of tactile detection but have poor tactile stimulation localization ability on surface of the skin. There are, however, not many systematic clinical experiments for this phenomena to address this issue. In this research, we investigate the patients' response in locating the stimulation of different types (pain, thermal, pressure). **Methods**: Methods: In this study, 4 patients with brain damage incidents within the past 6 months are considered. These patients were capable of tactile detection but had poor tactile stimulation localization ability on the left side of their bodies. They were blind-folded and were subject to 20 pain stimulations as well as 20 pressure stimulations and 20 thermal stimulations (all 5s long with intervals of 20s) on their left hand fingertips. After each stimulation, they were asked about the finger to which the stimulant was applied. **Results:** Results: The responses were recorded and averaged over. For pain stimulation, there was on average 3 correct answers. These values were respectively 5 for mechanical stimulation and 14 for thermal stimulation. The results suggest that the type of stimulation has a great impact on the rate of successful tactile localization. **Discussion:** Discussion: If based on the considered cases, we accept that thermal stimulation increases perceiving the location of touch, we may argue that signals resulting from this type of stimulation are processed differently in the brain of such patients. Given the fact that for healthy people, thermal stimulation has a smaller chance for being correctly localized compared to other types of stimulation, we may be able to analyze this phenomenon and also extend it to numb-touch patients.

C18 **Poster Presenter:** Michelle Wyrobnik

Altered Event Processing in Persons with Parkinson's Disease

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Introduction: Persons with Parkinson's disease (PD) often show particular problems in seemingly simple routines despite relatively preserved cognitive function. Therefore, the processing of simple events was investigated on behavioral and neurophysiological levels in persons with versus without PD. **Methods**: Persons with (n=22) and without (n=24) PD had to indicate per button press whether three sequentially presented sub-events described a previously defined event. Sub-event sequences were either correct, or one of them did not belong to the event (content violation), or was chronologically wrong (temporal violation). During task execution event-related potentials (ERP) were recorded. **Results:** Generally, task performance was slower and more inaccurate in persons with compared to persons without PD, independently from task conditions. In response to temporal violations, healthy persons expressed a late positive component (LPC), which in persons with PD had an earlier, novelty-P3a-like onset and was diffusely broadened. Upon content violations, healthy persons showed a right lateralized N400 effect, followed by a LPC response. In persons with PD, the N400 was missing and, again, the LPC was of broader distribution. **Discussion:** Persons with PD performed abnormally low and displayed task condition-related ERP alterations. Decreased error detection and missing N400 indicate poor event prediction in PD. Such failure could originate from weak event modelling, partially compensated for by extended signal re-analysis reflected by LPC enhancement.

C19 **Poster Presenter:** Katharina Rischer

Investigating the role of individual differences in the hypoalgesic response to a virtual reality game: An exploratory analysis

Rischer, K.M. [1], Barcatta, K. [1], Battistutta, L. [1], & Holl, E. [1]

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Introduction: Virtual reality (VR) has been shown to be a powerful method of redirecting attention away from pain and is increasingly used in clinical settings as a therapeutic tool for pain treatment. Yet, little is known about the underlying factors that modulate the size of the hypoalgesic response to a VR game, such as cognitive load and inter-individual differences in self-reported pain-related cognitions, emotion regulation habits, gaming skills, and executive functions. **Methods**: 90 healthy participants played two versions of the VR game 'Subnautica', differing in cognitive load (low load vs. high load). In the low load condition, participants navigated along a predefined route. In the high load condition, participants additionally memorized a series of single digits presented along the route. Pain heat thresholds as well as psychophysiological measures (ECG, EDA) were recorded during a passive control condition (in VR) prior to, as well as during, the two interactive sessions. In addition, participants completed several psychological questionnaires and different executive functioning tasks prior to the VR sessions. **Results:** Pain thresholds were significantly higher in the two interactive VR sessions when compared to the passive control condition, whereas the cognitive load of the game had no effect on pain thresholds. Individual differences in pain-related cognitions, prepotent response inhibition abilities and the level of emotional awareness reported by female participants, but not the level of gaming skills, influenced the size of the hypoalgesic effect. **Discussion:** In line with a growing body of studies, we observed a robust hypoalgesic response to playing a VR game, highlighting once more the potential of VR as a tool for pain reduction. Importantly, the hypoalgesic effect was not dependent on the participants' level of gaming skills or the cognitive load of the game, suggesting that the sensory properties of the VR game were sufficient to change the processing of pain.

C20 **Poster Presenter:** Markus Tünte

Respiratory and cardiac interoceptive sensitivity in 9-month old infants

Markus R. Tünte [1], Moritz Wunderwald [1], Stefanie Höhl [1], & Ezgi Kayhan [1, 2]

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Introduction: Interoception refers to the sensing of internal bodily signals, such as heartbeat or respiration. Humans differ with regard to their interoceptive sensitivity, the degree to which they can perceive their internal bodily signals. In recent years theoretical proposals have highlighted how interoception might play an important role in early development. However, empirical results on the development of interoceptive sensitivity in infancy are still lacking. In fact, to date only one published study has explored cardiac interoceptive sensitivity in 5-month old infants. Here we aim at providing insight into early interoceptive sensitivity by reporting preliminary results of a study investigating cardiac- and respiratory interoceptive sensitivity in 9-month old infants. **Methods**: To measure cardiac interoceptive sensitivity we replicated the iBeat task, the only published interoceptive measure in infants. In the iBeat task infants are presented with images pulsating synchronous or asynchronous to their own heartbeat. Further, we created the novel iBreath paradigm to measure respiratory interoceptive sensitivity, which for the first time allows to quantify whether infants already show sensitivity to their own breathing. In the iBreath paradigm infants are presented with images expanding synchronous or asynchronous with their own breath. **Results:** To visualize the data a dashboard was created that allows the viewer to directly engage and inspect the data during the poster session. Descriptive looking time data indicate that in both the iBeat-, and the iBreath paradigm infants are able to distinguish between synchronous and asynchronous conditions. **Discussion:** Our preliminary results indicate that 9-month old infants show cardiac- and respiratory interoceptive sensitivity. Preliminary data replicates earlier findings on cardiac interoception in infants using the iBeat paradigm. Moreover, we provide preliminary evidence on respiratory interoceptive sensitivity in infants using the iBreath paradigm. Data collection is ongoing to further shed light into interoceptive sensitivity in infancy.

Poster Session D

Posters Nr. D1-D20 (Zoom Breakout Rooms)

Wednesday, March 17, 2021 at 11:45-12:30 (GMT+1)
Discussion Part 2 | Poster Session C & D | Wednesday, March 17, 2021 at 21:15-21:45 (GMT+1)

D01 **Poster Presenter:** Karola Schlegelmich

Influences on the visual categorization of naturalistic structures in infancy and early childhood

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Introduction: Detecting and categorizing particular entities in the environment are important visual tasks that humans have had to solve over evolutionary time. Here we investigate whether characteristics of ecologically-significant entities play a particular role during the development of visual categorization. **Methods**: To do this, the current project examined the effects of developing visual abilities, visual properties and ecological significance on categorization. Our stimuli were monochromatic photographs of structure-like assemblies and surfaces taken from three categories: vegetation, non-living natural elements, and artifacts. A set of computational and rated visual properties were assessed for these stimuli. We conducted two empirical studies: (a) two card sorting tasks with 76 preschool children (age: 4.1-6.1 years) and 72 adults (age: 18-50 years) which assessed classification and similarity judgments, and (b) a gaze-contingent eye-tracking search task with 39 infants (8-month-olds) in which target-structure patches were placed on a discrepant background structure, and the impact of properties and categories on infants' search performance was investigated. **Results:** We found that category membership and visual properties impacted the performance of all participant groups. Sensitivity to the respective categories varied between tasks and over the age groups. For example, artifact images hindered infants' visual search but were classified best by adults, whereas sensitivity to vegetation was equally high for all age groups during visual search or similarity sorting. In children and infants, rated depth predicted task performance stronger than shape-related properties. Moreover, children and infants were sensitive to variations in the complexity of low-level visual statistics. **Discussion:** These results suggest that classification of visual structures, and attention to particular visual properties is affected by the functional or ecological significance these categories and properties may have for each of the respective age groups. Based on this, the project highlights the importance of further developmental research on visual categorization with naturalistic, structure-like stimuli.

D02 **Poster Presenter:** Mariya Hristova

Personification of wine in the advertising

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[1] Technical University of Berlin
[2] Humboldt University of Berlin

Introduction: Taste experience is seen as a subjective, individual perception. We lack specific vocabulary for an appropriate description of taste, however this does not mean that we talk less about our taste experience. Apart from our informal conversations, advertising is one of the domains, where we can examine how taste is being communicated. The target of this paper is to examine personification of wine in wine advertising. First, it should be shown how often wine is personified and second, through what types of metaphors according to word classes. **Methods**: The method applied is a qualitative corpus analysis. The corpus consists of 30 advertising texts in German from 2019 from the online wine catalogue Ebrosia. First, all of the metaphors found have been classified in terms of word classes. Furthermore, it has been examined which metaphors express personification of wine. Additionally, it has been discussed through which exact lexemes in the single metaphor examples personification is created. **Results:** The conducted corpus analysis has revealed, that 35,7 % of all metaphors contain a personification. This shows that personification of wine is a preferred stylistic device in the domain of advertising. Furthermore, it has been identified, that the most common metaphors regarding word classes are the verb metaphors. Five subgroups of verb metaphors in terms of the used verb could be distinguished: verbs of emotional involvement, neutral verbs, verbs of success, verbs of care and others. **Discussion:** Metaphors are a preferred stylistic device in advertising, since they have a strong persuasive potential. Furthermore, they could evoke particular emotions in the potential customers. In case of success this moves the reader and the customer to buy the product at the end. What are the concepts that metaphors specifically in wine advertising work with and what are the “hidden” strategies there?

D03 **Poster Presenter:** Birgit Nierula

Mixed nerve and purely sensory somatosensory evoked potentials along the neural axis

Nierula, B. [1], Stephani, T. [2,3], Kaptan, M. [1,3], Mouraux, A. [4], Maess, B. [5], Curio, G. [6], Nikulin, V.V. [2,7], & Eippert, F. [1]

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Introduction: Neuroscientific research on human somatosensation has largely focused on cortical processes. However, before somatosensory stimuli reach the brain, they are already processed in the dorsal horn of the spinal cord. Since a detailed understanding of spinal somatosensory processing is still lacking, we carried out two studies in which we non-invasively recorded somatosensory evoked potentials (SEPs) from the human spinal cord, brain, and compound nerve action potentials (CNAPs) from the peripheral nervous system, in order provide a comprehensive picture of human somatosensation along the neuraxis. SEPs to double-digit stimulation are further thought to be smaller than the expected sum of SEPs to single-digit stimulation. This attenuation effect has been described earlier on the cortical and cervical level. We aimed at replicating this effect in larger samples and demonstrating it on a lumbar level for the first time. **Methods**: Study 1: In 36 healthy participants, we separately stimulated mixed median and tibial nerve fibers with non-painful electrical impulses and recorded the resulting SEPs from target areas in the cervical and lumbar spinal cord, the brain and CNAPs from peripheral nerves. Study 2: We replicated Study 1 in an independent sample of 24 healthy participants and additionally stimulated sensory nerve fibers of the same nerves at the fingers and toes. **Results:** Study 1: Our data showed clear spinal cord potentials with the expected mean amplitude and latency for both median and tibial nerve stimulation. Study 2: We replicated the results of Study 1 and demonstrated the attenuation effect on a cortical and spinal (cervical and lumbar) level. **Discussion:** We demonstrated robust SEPs in the human spinal cord in response to electrical stimulation of upper and lower extremity mixed and sensory nerves. The sub-additive responses of single digit stimulation compared to double-digit stimulation suggest integrative processes on cortical and spinal levels.

D04 **Poster Presenter:** Fabian Kiepe

Probing auditory sensory attenuation in an online experiment using Lab.Js and Jatos

Kiepe, F. [1], & Hesselmann, G. [1]

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Introduction: Sensory attenuation refers to the well-established finding that the intensity of sensation caused by self-generated movement is reduced. One common observation is that another person's hand can tickle us, yet we are unable to tickle ourselves. The predictive coding framework and the active inference theory suggest that the brain weakens the succeeding sensory input of self-initiated actions. In our online study, we examined the relationship between sensory attenuation and sense of agency in the auditory domain. **Methods**: Participants had to compare the volume of two identical tones in a forced choice task. The experiment was divided into two blocks, each including 30 trials. During the active block, participants were instructed to press a button to initiate the first tone. The time interval between the button press and the audio signal randomly varied between 0 - 1000 ms. During the passive block, the tones were presented automatically. In addition to the forced choice task, participants also rated their sense of agency with respect to the presentation of the first tone on a visual analogue scale. **Results:** In a preliminary data analysis, we found a negative correlation between the length of the action-tone interval and the participants' sense of agency, and an influence on the magnitude of sensory attenuation as well. **Discussion:** Due to the coronavirus pandemic our experiment was created online using Lab.Js and Jatos. We will briefly discuss some pragmatic issues related to online data collection in perception psychology.

D05 **Poster Presenter:** Alireza Aliari

The Concept of Subjectivity In Favor of Dennett's Illusionism

Aliari, A. [1]

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Introduction: In this paper, I review some of the most influential, as well as contrasting, interpretations of consciousness, such as Daniel Dennett's 'illusionism' vs. the hard problem of consciousness introduced by David Chalmers. Getting help from these opposites, as well as Paul Churchland's and Thomas Nagel's views, I try to explain how the controversial concept of subjectivity, being denied by Dennett, can justify his illusionism. **Methods**: I will argue about the role of personality and (philosophical) personal identity in the formation process of a philosopher's idea of consciousness. Accordingly, the comparison of Daniel Dennett's biography and David Chalmers',as two philosophers of mind with influential opposite ideas of consciousness, will be employed in order to show how the fundamental differences in Dennett's and Chalmer's experiential backgrounds can direct them to interpret consciousness in two fundamentally different ways. **Results:** A thinker's experiential background or the matter of who he/she is (philosophically) can influence his/her decision to focus more on some certain streams of thoughts (certain topics) most often. It is why D. Dennett emphasizes that consciousness is a bunch of tricks, since he is a real tricky professional persuader, and it can also explain why consciousness can be interpreted in different or even opposite ways, depending on the perceiver's personal identity and personality. **Discussion:** Getting help from the perception process of an ambiguous figure, according to the mechanism underlying the perception of an ambiguity, as soon as an ambiguous figure is noticed, it gives rise to some specific previous conscious experiences of the observer. In other words, the perception of an ambiguity is a function of the observer's experiential background. And since consciousness can be characterized as a subjective ambiguity, we might be able to extend the mentioned process to the perception of consciousness.

D06 **Poster Presenter:** Polina Arbuzova

Relationships between metacognition of motor, visual and memory processes

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Introduction: Several studies and meta-analyses investigated whether the mechanisms enabling metacognitive monitoring are 'domain-general' (a single mechanism can account for the monitoring of any mental process) or 'domain-specific' (metacognition is accomplished by a collection of multiple monitoring modules, one for each cognitive domain). One widely held view is that the mechanisms underlying different perceptual tasks are vastly overlapping, but that they differ from those underlying non-perceptual tasks (namely, memory). It has been speculated that this may be due to two broad categories of metacognitive mechanisms: those that monitor primarily externally-generated vs. those that monitor primarily internally-generated information. **Methods**: To better understand this proposed division, we measured metacognitive ability (m-ratio) in 40 participants that completed a set of different metacognitive tasks, that could be ranked along an internal-external axis of the source of information, namely a visual, visuomotor, motor and memory tasks. We take the visual task to be strongly reliant on monitoring externally-generated information; the memory task to be strongly reliant on monitoring internally-generated information, and the other two tasks to lie between these extremes. **Results:** We found correlations in m-ratios between visuomotor and motor tasks only. There were no correlations in m-ratios between visual and visuomotor tasks, or between motor and memory tasks. **Discussion:** In spite of the task features being very similar between the visual and memory tasks, we found no correlations in m-ratios between them. This is in line with previous findings and speaks for a distinction between the metacognitive mechanisms underlying the monitoring of externally- and internally-generated information. Further, we found no evidence for a correlation between motor and memory tasks, both of which strongly rely on monitoring internally-generated information. We interpret these findings to show that it is not only the internal-external axis that delineates a metacognitive domain, but also the task features.

D07 **Poster Presenter:** Or Yizhar

Body Ownership of Switched Hands in Virtual Reality

Yizhar, O. [1,2], Giron, J. [3], Chetrit, D. [4], Friedman, D. [4], & Amedi, A. [2]

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Introduction: Our body is the source of our experienced sensations and the target of our voluntary actions. Its character is possessive, and we perceive it as our own through self-attribution. Many studies have demonstrated that body-ownership can extend to artificial body parts or avatars in virtual reality. These body ownership illusions are not without constraints. Primarily, ownership is contingent on the fake body-part's anatomical plausibility in relation to the real body part. For example, using the opposite hand in the Rubber Hand Illusion significantly reduces ownership. However, participants in these studies are typically passive or limited to a narrow range of pre-calculated motor movements. In the current study, we use virtual reality to challenge previous assumptions on anatomical plausibility. We developed an immersive environment where participants' hand movements are visually switched and mirrored, such that movement of one hand results in a visual of the other hand's analogous movement. **Methods**: While their hands were switched, 29 participants were asked to perform interactive game scenarios where they had to hit and lift virtual balls. Participants completed a standardized embodiment questionnaire on their subjective sense of body-ownership, agency, and self-location. **Results:** Body ownership and agency ratings were significantly above chance ($p < 0.001$), and individual ownership and agency ratings strongly correlated ($p < 0.001$). Participants felt that their real-hand does not have the same physical location as the virtual hand ($p = 0.008$), and their sense of ownership did not correlate with their lack of self-location ($p = 0.82$). **Discussion:** Our results offer a new perspective on the relationship between anatomical plausibility and body ownership. We show that ecological paradigms can induce strong feelings of ownership, even under anatomically implausible conditions. We suggest that the previously proposed limitations should be applied in the context of specific tasks and scenarios.

D08 **Poster Presenter:** Nils Kraus

Trait Anxiety as a Marker of Aberrant Precision Weighing in Perceptual Decision Making

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Introduction: Predictive coding accounts of human brain functioning conceive anxiety as the tendency to change the reliance on either priors or sensory data in Bayesian belief updating in order to reduce uncertainty. Therefore, with higher levels of sensory uncertainty, trait anxiety scores should correspond to the degree of influence that priors have in perceptual decision making tasks. **Methods**: Participants (N=117) with varying degrees of trait anxiety had to judge the global motion direction of random dot kinematograms. The precision of sensory evidence was varied through the amount of coherently moving dots. Prior expectancies were induced by arrow cues indicating motion direction. A generalized linear mixed-effects analysis was conducted to calculate the impact of sensory evidence, prior expectancies and trait anxiety as well as possible interactions on accuracy rates. **Results:** Results show and interaction effect of the influence of predictive cues and trait anxiety scores on accuracy rates in a motion perception task. The influence of priors on decision making is elevated in high trait anxious individuals. Contrary to preregistered hypotheses, this effect was independent of the quality of the presented sensory evidence. **Discussion:** The finding speak for a possible link of trait anxiety and reliance on priors in perceptual decision making. In a next step, we will investigate whether the influence of priors is globally enhanced in high trait anxious individuals or whether the observed effect is indicative of a general tendency to overcompensate for low precision in one informational domain.

D09 **Poster Presenter:** Sarah Boukarras

Cardiac concomitants of feedback processing during a competence-based social status manipulation

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Introduction: Social status, the relative position occupied by an individual in a hierarchy, can modulate cognitive and affective processing. Previous studies indicate that neurophysiological signatures of feedback processing might be enhanced when participants are assigned a low status position. Error commission and negative feedback elicit activity not only in the central nervous system but also in the peripheral (autonomic) one. Specifically, they induce a deceleration in the heart rate. In the present, study, we investigated whether cardiac signatures of feedback processing can be modulated by the participant's social status in competence-based hierarchy. **Methods**: Participants (N=24) were engaged in a cooperative time estimation task with two same-gender confederates while their heart rate was recorded. On each trial, they were provided with positive or negative feedback depending on their time estimation performance. Their social status varied during the task, so that they were either at the top (high status) or at the bottom (low status) of the hierarchy in different blocks. **Results:** Physiological results showed that heart rate deceleration was significantly modulated by feedback valence in the high status but not in the low status condition. The maximal heart rate deceleration was observed for negative feedback and the minimum for positive feedback during the high-status blocks. **Discussion:** We interpret this result as an increased activation of the performance monitoring system elicited by the desire to maintain a high-status position in an unstable hierarchy. In this vein, negative feedback might be processed as an aversive stimulus signalling a potential threat to the acquired status.

D10 **Poster Presenter:** Marika Constant

Are agency judgments metacognitive?

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Introduction: Agency judgments are often assumed to be inherently metacognitive, because they involve monitoring one's experience of control over one's body and environment. However, the definition of metacognition has recently shifted to represent a narrower set of monitoring processes focussed on uncertainty monitoring, which may not accommodate agency judgments. We challenged the assumption that the computations involved in agency judgments occur at the same level of the processing hierarchy as computations leading to metacognitive confidence judgments. **Methods**: In two novel tasks, participants made hand movements while watching a virtual hand that mirrored their movements in real-time, either in synchrony or with an added delay. Participants then either made a discrimination decision followed by a confidence judgment (Confidence Task), or rated their agency (Agency Judgment Task). In both tasks, sensory noise was manipulated. Using linear mixed-effects models we investigated whether participants' agency ratings responded to sensory noise in the way that would be expected if they were strictly metacognitive, like confidence. We also implemented and compared three computational models of agency judgments, one that involved metacognitive processing and two that did not, in order to better understand the computations underlying agency ratings. **Results:** Our analyses revealed that, although sensory noise does factor into participants' agency ratings, this effect was best explained by a model of agency judgments that did not require any second-order uncertainty estimation, and is hence not metacognitive in the strict sense. **Discussion:** We propose that agency judgments might better reflect first-order measures of the internal signal, without involving second-order, metacognitive monitoring. Our tasks and computational models allowed us to bring agency judgments into a classical metacognitive framework in a novel way, and these findings provide an important step toward clarifying the relationship between agency and metacognition, as well as understanding the mechanisms underlying explicit agency.

D11 **Poster Presenter:** Sandra Stojić

Use of heuristics and hand gestures in time conceptualization among different age groups

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Introduction: The concept of time is uniquely human yet culturally ubiquitous, acquired over childhood and provides a cardinal dimension to organize episodic memory. Because time, unlike distance, does not have a sensory representation, we hypothesized that subjects at different ages apply different heuristics to estimate time; preschool children use availability heuristics, and adults use sampling heuristics. **Methods**: We asked groups of preschoolers (N=46; mean age=4.70; SD=.59), school-age children (N=46; mean age=9.61; SD=.49), and university students (N=46; mean age=22.22; SD=5.2) to compare the durations of two cartoons, an "eventful and exciting" and "uneventful and boring." In addition, participants were asked to express the durations of both cartoons with simple hand gestures intuitively. **Results:** Statistical analysis has revealed a clear-cut change of preference in estimation ($\chi 2(2, N = 138) = 18.22, p < .001$), where the preschoolers estimated the duration of eventful cartoons as „longer," while the school-age group of children and adults claimed the same about the uneventful cartoon. The tendency to represent the temporal durations horizontally was predominant among all three groups ($\chi 2$ (2, N = 138) = 19.42, $p < .001$), with the increasing within-group consistency with age. **Discussion:** These results support the hypothesis that preschool-age children use heuristics to estimate time, and they convert from availability to sampling heuristics between preschool and school age. Furthermore, we demonstrated the bias in predominantly horizontal hand-gesture in the representation of the temporal dimension as an increasing trend across all age groups.

D12 **Poster Presenter:** Lily Martin

Full-Body Motor Markers of Schizophrenia - Using MoCap to quantify Disembodiment

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Introduction: Genuine motor abnormalities (GMA) – independent of medical side effects – can be observed in 50 to 80 % of schizophrenia affected individuals. Therefore the phenomenology-based embodiment approach understands the illness as a form of disembodiment. Although motor abnormalities recently became an independent symptom domain in newly developed research frameworks for mental disorders, such as the NIH funded RDoC, there is no consistent definition of a motor domain in mental illnesses. Hence, in a standard setting of German clinical care motor symptoms are commonly disregarded as markers of schizophrenia. Psychiatric diagnostics fail to include quantifiable motor variables as well as ways to objectively assess them and few assessment tools (e.g. PANSS) examine full body movement. **Methods**: We assessed the movement of 40 participants (20 SCHZ, 20 CNTRL) with full-body motion capture (MoCap) at the Heidelberg Center for Motion Research (HCMR). Participants were recorded while walking (A. simple walk, B. walk + cognitive task) and while doing coordination tasks (Tandem Walk, Star Jump). 8 MoCap cameras (Qualisys, space accuracy 1mm, temporal resolution 120 Hz) captured 48 markers attached to the participants' skin. Furthermore participants' symptom-load (PANSS, BPRS), Neurological Soft Signs (NSS) and self-disorders (EASE) were assessed. In a data-driven analysis (MATLAB, R, SPSS) motion patterns of participants were visualized, exaggerated, quantified and compared between groups (ANCOVA). Resulting motor markers (independent of body physicality and medication load) were correlated with symptom assessment (NSS, PANSS) and self-experience (EASE). **Results:** (Preliminary Results) While walking, SCHZ and CNTRL display significant differences in head posture, rhythmicity/periodicity of gait, arm and elbow sway, lateral body sway, integration of arm and knee sway, goal directedness of limb movement, flexibility of limb movement, coordination and velocity of limb movement. These motor characteristics remain significant when controlling for medication load (OPZ) and body physicality (BMI, hight, mass). **Discussion:** Correlations with symptom load and self-experience are yet to be interpreted.

D13 **Poster Presenter:** Magdalena Gippert

Motor Imagery of Linked Movements Might Enhance Motor Learning

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Introduction: Most movements in daily life are embedded in motion sequences forming linked movements, which are associated with specific motor memories. Interference tasks, where reaches to a target have to be adapted to one of two opposing force fields, have been used to investigate the ability to form two separate motor memories. If the direction of a linked prior movement (pre-movement) is predictive of the force field's direction, adaptation to the forces is possible, while other cues (e.g., static visual) do not allow this. It is yet unclear whether the facilitative effect of linked movements could also be achieved by motor imagery of pre-movements. The aim of the project is therefore to investigate how the sensorimotor system can be modulated by linked active and imagined pre-movements to enhance motor learning. **Methods**: We compared motor learning performance, measured by direction specific adaptation in an interference force field paradigm, of three experimental groups: 1) active pre-movement group, 2) motor imagery pre-movement group, 3) visual cue (no pre-movement) group. Movement kinematics (Kinarm-Exoskeleton-Lab, Kinarm, Canada) and EEG (64 electrodes EEG cap, Brain Products, Germany) were recorded simultaneously to investigate the underlying neural mechanisms involved in the motor learning process. **Results:** In line with previous research, we show that pre-movements facilitate adaptation to opposing force fields. Additionally, preliminary behavioral results replicate previous findings that stationary visual cues, indicative of force field direction, do not allow the formation of separate motor memories. Moreover, we have first tentative evidence that motor imagery of pre-movements might be sufficient for motor adaptation to occur at least to a certain extent. **Discussion:** Outlook: More data needs to be collected to confirm our tentative behavioral results. In addition, we will analyze EEG data to shed light on neural mechanisms during learning of linked movements, including how neural states and movement kinematics relate to each other.

D14 **Poster Presenter:** Anna Francová

Design and Validation of Virtual Social Stress Induction Protocol for Individuals with Borderline Personality Disorder

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Introduction: In general, the human stress response plays an important adaptive role in daily life, but sometimes produces maladaptive responses. We can easily become overwhelmed by social demands and social stress arising from social conflicts, situations when individual feels rejected, ostracized and ignored and minor stressful events can have a strong impact on our mental well-being. The response to and impact of social stressors are highly individual and are mediated by the individual's appraisal of the stressor that is influenced by different coping mechanisms. Exploring reactions to acute social stressors is imporant part of therapeutic work with psychiatric patients. For example, patients with borderline personality disorder (BPD) typically exhibit impulsive behaviours (including self-injury) that manifest themselves under social stress (e.g., ignorance, criticism or social rejection). In this project, we developed two VR social scenarios (neutral and negative) in a restaurant that expose participant to everyday situation – in a negative scenario, the participant is ostentatiously ignored by the waiter (for example, he is giving more attention to other guests, letting participant to wait for the table or speaking in a impolite manner). In neutral scenario, the waiter is acting politely and there is no moment when participant is ostentatiously ignored. This tool aims to induce stress reactions typical for BPD in a laboratory context to explore induced behavioral responses and possible regulation strategies. **Methods**: In the first validation pilot study, we will evaluate reactions of participants with BPD/BPD traits on scenarios to ensure there is a difference between perception of these two and that negative scenario elicit heightened emotional response (in terms of verbal report and/or physiological reaction). Participants (N=30) will be exposed to scenarios in two conditions (neutral/negative) in a randomized order during which we will record subjects' self-reports, behaviour and physiology (heart rate). We hypothetize that reactions to negative scenario will exhibit higher emotional responses (increased heart rate) and more negative verbal report compared to neutral scenario. **Results: -** data collection postponed due to covid to February 2021 (I'd be willing to present either the design and development of the VR tool with planned study and scientific background or pilot data I'll have at that time) **Discussion:** In the future, this project should help individuals with BPD, other neuropsychiatric disorders or healthy volunteers to learn to better recognize changes in their physiological and emotional arousal and increase emotional awareness in situations typically inducing social stress in daily life.

D15 **Poster Presenter:** Xin Li

Implicit power-space associations without instructional biases

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Introduction: The inherent spatial nature of abstract concepts like power have excited great interest in recent years. Power, as a reflection of social stat¬¬¬¬us, is usually regarded as the ability to influence others by controlling limited resources. Previous studies have found that people typically respond faster to powerful words (e.g., boss) presented on the top space but to powerless words (e.g., intern) presented on the bottom space. This was referred as the spatial power association response cods. In previous studies people had always been instructed to perform bi-directional res¬¬¬¬¬¬¬¬-ponses to powerful or powerless words by pressing the corresponding buttons on the top or bottom positions. This raises a question on whether the spatial power association observed in previous work could originate from requirements of explicit spatial directional processing. Recent studies extended a novel methodological development from numerical cognition to power concepts eliminated task-relevant spatial processing, however, terms “High” and “Low” were explicit parts of the response rules, thus introducing indirectly an explicit spatial bias into power trials. Hence, it is still unclear that how power directly activate space without explicit any cues and whether the process is nonconscious. **Methods**: Adopted our recently extended non-spatial Go/no-go task on power-space association, the current study will investigate the power concepts activated the spatial top-bottom image schema in an automated manner. Participants performed a Go/no-go task in which a randomly selected word (powerful human/animal or powerless human/animal) or a verbal label (high/low) was presented on the center of screen in each trial. Participants were instructed to press the space bar only in go trials where a word or a color label matched the response rule displayed at the beginning of each block. This design excluded the possibility of explicit bi-directional task processing among stimuli, response and instruction and excepted that participants judged the color of HIGH or LOW labels (red or green) rather than recognizing these two labels. **Results:** A significant congruity effect was found ($t(20) = 2.802$, $p = 0.011$, supporting the account of implicit spatial nature of power.The result of color label showed no any congruity effect ($t(12) = -0.703$, $p = 0.496$) . **Discussion:** The research indicate that the power-space association originates from the implicit spatial nature and would be observed only when one of the two components of the association (power or space) is activated explicitly.

D16 **Poster Presenter:** Kristin Kaduk

The effect of dorsal pulvinar inactivation on heart rate, heart rate variability and breathing

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Introduction: Cardiac dysfunctions, such as arrhythmias, are a complication of stroke in humans and rely on structural and functional alterations in brain regions belonging to the 'central autonomous network (CAN)'. Since disentangling the contribution of a specific brain region to cardiac activity is difficult in human patients, we here combined local inactivation with ECG in awake monkeys. We tested the causal contribution of the medial pulvinar (mPul) to cardiac activity. Medial pulvinar has reciprocal interconnections with major CAN regions (amygdala, insula, cingulate and prefrontal cortex), and has been implicated in sudden cardiac death in epilepsy patients. **Methods**: We reversibly inactivated neural activity of mPul in three rhesus monkeys using GABA-A agonist THIP (7 sessions) comparing them with control sessions without inactivation (7 sessions). Each session consisted of interleaved blocks of rest and visual decision task. ECG and capnography were recorded. R-peaks and exhaling peaks were detected offline to calculate the respiration rate, heart rate and its variability (RMSSD) per block. **Results:** In one of three monkeys, mPul inactivation significantly slowed down the average heart rate for rest (~31 bpm) and task (~28 bpm), increased heart rate variability (HRV) during task (~3 ms) and decreased the breathing rate during rest (~2 bpm). These inactivation-induced cardiac and breathing changes were reproducible across sessions and in either hemisphere. The other two monkeys did not show consistent heart or breathing rate changes, although the inactivation was effective as evidenced by task-related performance changes. The pulvinar inactivation locations overlapped across monkeys. The three monkeys differed in their baseline heart rate (monkey CO: ~170 bpm, monkey CU: ~110 bpm, monkey MA: ~125 bpm). Monkey CO had the highest baseline heart rate and showed the inactivation effect. **Discussion:** To summarize, while mPul has a causal effect on heart rate and its variability, there seem to be factors that determine such an effect.

D17 **Poster Presenter:** Helena Hartmann

Is your pain my pain? Effects of localized placebo analgesia on empathy for everyday painful situations

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Introduction: The shared representations account of empathy postulates that sharing another person's pain recruits similar underlying brain functions that are also engaged during first-hand pain processing. Previous research reported reduced empathy for pain when reducing first-hand pain by means of placebo analgesia. Critically, causal evidence for shared representations has only been shown in brain areas related to affective pain processing, while the specific contribution of one's own somatosensory system to empathic responding remains controversial. The experimental paradigms used in previous studies did not direct attention towards a specific body part in pain and relied on inferring another's pain via abstract cues, possibly explaining prior absence of effects. Here, we thus aimed to test more specifically whether a localized causal manipulation of first-hand pain affects somatosensory processing during empathy for everyday painful situations in a body part-specific manner. **Methods**: This study was preregistered prior to data collection (https://osf.io/uwzb5). Forty-five participants underwent a localized placebo analgesia induction targeted at the right hand (with the left hand as a control) and completed an empathy for pain task in the MRI scanner where they observed pictures of either right or left hands in pain and rated the pain intensity of the person in the picture as well as their own unpleasantness. **Results:** Contrary to our predictions, we did not find evidence for a location-specific modulation of empathy for pain as a result of the placebo induction, in neither behavioral nor neural measures. However, exploratory data analysis revealed a general downregulatory effect of the placebo on empathy for pain, and increased brain activity in bilateral anterior insula when viewing other's hands in pain that corresponded one's placebo hand. **Discussion:** Hence, somatosensory sharing during empathy does not appear to be modulated by placebo analgesia in a location-specific manner. These results refine our knowledge regarding the mechanisms underlying empathy for pain.

D18 **Poster Presenter:** Niia Nikolova

The Respiratory Resistance Sensitivity Task: a novel method for measuring respiratory interoception and metacognition

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Introduction: The ability to perceive and control respiration, or respiroception, is a core interoceptive and homeostatic process. In addition to accompanying cardiac and respiratory conditions, changes in sensitivity to breathing sensations are associated with psychiatric disorders. For example, shortness of breath (dyspnoea) is associated with increased probability of developing anxiety or depression, and control and awareness of breathing are central in many mindfulness-based therapies. While these associations have stimulated interest in the study of respiroception, the current measurement methods are difficult to administer, require specialised apparati, and have poor measurement precision. Here, we present the Respiratory Resistance Sensitivity Task (RRST), a novel psychophysiological method of measuring respiratory interoceptive accuracy and metacognitive performance, using a fully automated instrument to control the resistance on a breathing circuit. **Methods**: The RRST is used to assess respiratory sensitivity to detecting the presence of resistance on inhalations. In a two-interval forced-choice design, a resistive load is applied to a breathing circuit by mechanically compressing a silicone tube which is used for breathing. Participants decide which of two breaths is more difficult (i.e. has a greater resistance) and report subjective confidence in their judgement. **Results:** We demonstrate the reliability of thresholds obtained from two adaptive psychophysical methods (QUEST and Psi), and the possibility of estimating the slope of the psychometric functions. Further, using a signal theoretic modelling approach we estimated the sensitivity and bias of respiratory metacognition. **Discussion:** Previous methods for measuring respiratory sensitivity are difficult to administer, require up to an hour of testing, and are therefore severely limited in their feasibility of use in clinical populations. The task presented here constitutes a major improvement on existing methods. It requires minimal training of the investigator, takes approximately 30 minutes, and can estimate both the threshold and slope of the respiroceptive psychometric function, as well as metacognitive ability.

D19 **Poster Presenter:** Ebtesam Saleh and Mayyada Wazaify

User Experiences of Prescription and Over-The-Counter Drug Abuse in Aden City, Yemen

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Introduction: Drug abuse and mental health in a war-torn countries like Yemen is a crucial issue, however, studies conducted in similar settings of conflict still scarce. Khat chewing is commonplace in Yemen, but little else is known about the misuse of other drugs, especially how such misuse may intersect with Khat use. The aim of this study was to investigate misuse of prescription and over-the-counter (OTC) drugs in community pharmacies in Aden city, from the users' perspective. **Methods**: A qualitative in-depth-interview study was undertaken with fifteen known or suspected drug misusers, recruited through community pharmacies. **Results:** Thematic analysis was used to identify the main emergent themes around experience of prescription and OTC drug misuse. The majority of interviewees were male (n = 11/15) with an age range of 21–40 years. Benzodiazepines, Tramadol, and Ketoprofen were the most commonly misused drugs. Four main themes were identified: Experience sought with drugs; awareness of problematic drug use; pattern and methods of misuse; and the role of healthcare professionals in responding to misuse. **Discussion:** The study highlighted different issues, such as the practice of mixing different OTC and prescription drugs with Khat to heighten the effects or manage associated pain, and drug misuse by females and by health care professionals. The study also suggested that physicians and pharmacists fear counselling such people, probably with the risk of violence as a contributory factor.

D20 **Poster Presenter:** Lara Maliske

Social brain dynamics: Social domain-specific neural network re-configuration enables understanding of others' thoughts and feelings

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Introduction: A wide range of social processes enable us to navigate throughout our complex social environment and constantly adapt to everchanging environmental demands. Especially two concepts enabling us to interact with our social environment, Empathy and Theory of Mind (ToM), have continuously gained popularity over the past two decades of neuroimaging research. Here, we investigate how the so-called "classical" Empathy and ToM networks interact in contexts wherein multiple cognitive and affective stimuli information must be processed simultaneously. **Methods**: Building on the findings of a recent meta-analysis and hierarchical clustering analysis of 188 social affect and cognition fMRI studies, we perform an adapted form of meta-analytic connectivity modeling to determine patterns of task-context specific network re-configuration. We analyze 140 studies within three distinct task contexts, classical ToM tasks, classical Empathy tasks, as well as tasks that lie at the intersection of Empathy and ToM (sometimes also termed Cognitive Empathy or Affective ToM). **Results:** For classical ToM and Empathy tasks, neural co-activation patterns resembled meta-analytically confirmed Empathy (insula, supramarginal gyrus, inferior frontal gyrus, supplementary motor area) and ToM networks (precuneus, angular gyrus, superior frontal gyrus). For studies at the intersection of Empathy and ToM, neural co-activation patterns contained areas both, typically associated with Empathy and ToM. Furthermore, we observed higher levels of functional network interaction (resting-state networks associated with social affect and cognition) for Empathy tasks and tasks presenting affective and cognitive stimuli elements conjointly, but not for classical ToM tasks. **Discussion:** Network integration (or cross-network interaction) has been discussed in the context of increased task complexity, and we discuss this as a means of integrating mechanisms across unique behaviors. This could be a relevant mechanism in complex, naturalistic social cognition tasks that require simultaneous processing of a multitude of different information, while blocking out those that are irrelevant to the task at hand.

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