

ECHO

UNIGR:ECHO
COGNITIVE NEUROSCIENCE
IN THE GREATER REGION



UNIVERSITÉ DE LA
GRANDE RÉGION
UNIVERSITÄT DER
GROSSREGION



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Technische Universität
Kaiserslautern
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LIÈGE
université



UNIVERSITÉ DU
LUXEMBOURG



UNIVERSITÄT
DES
SAARLANDES



WHEN

12th -13th
March 2026



WHERE

Trier
Germany

ORGANIZED BY

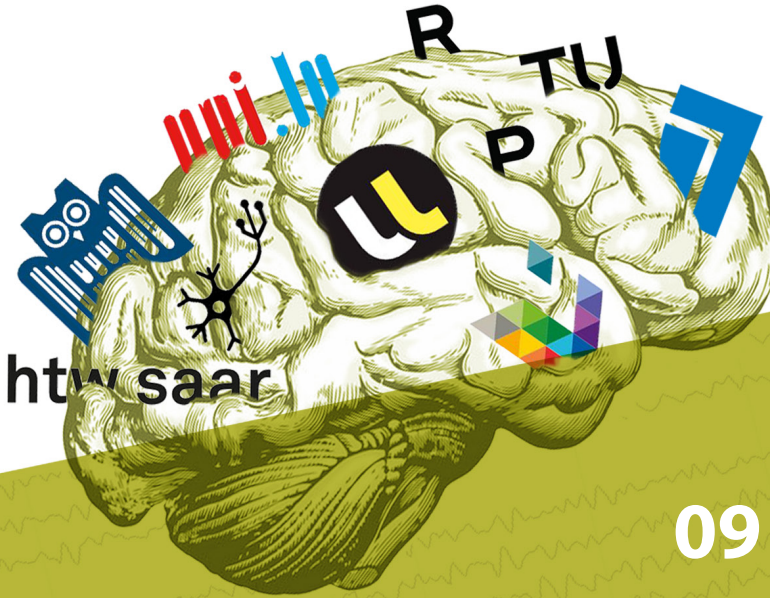


UNIVERSITÄT
TRIER



ICAN

Institute for Cognitive &
Affective Neuroscience



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Greater Region

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ORGANISATION

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SPECIAL THANKS TO

...our Student Volunteers:

Kirsten Schwabe
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Idris Boukhers
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...our colleagues at the ICAN:

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Prof. Dr. Gregor Domes
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Prof. Dr. Roland Pfister

...the President of Trier University:

Prof. Dr. Eva Martha Eckkrammer

...the Vice President for Research:

Prof. Dr. Thorsten Mattern

...Hochschuldidaktik at Trier University

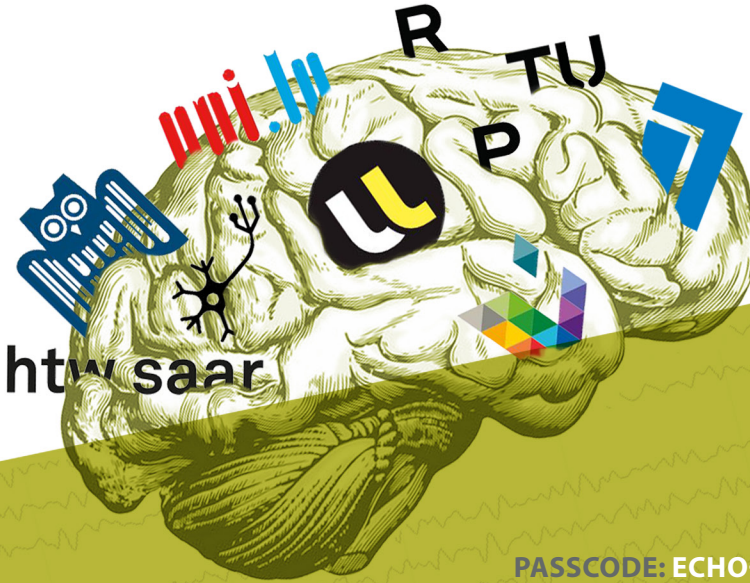
Dr. Ansgar Berger

...the University of the Greater Region

...the Team of the Tagungshaus im Bistum Trier

for all the support (financial, organizational,
administrative, culinary, and otherwise)
during the last monthsof the conference.





PASSCODE: ECHO-26

**SHARE YOUR RESEARCH
INTERESTS AND GET IN TOUCH
WITH YOUR COLLEAGUES BY
CREATING A SHORT PROFILE IN
OUR TASKCARDS BOA**

<https://www.taskcards.de/#/board/9e3909fa-3df1-47b8-a2a9-686c12bb23c?token=f736b896-cc0e-4233-8568-21094028077b>

The board will be accessible for up to
4 weeks after the conference.



CONNECT

THE VENUE

Important information for all guests
Barrier system Access to the car parks
is via Rahmenstraße Important note:

Due to the limited number of parking spaces,
these are reserved exclusively for
overnight guests and the speaker.

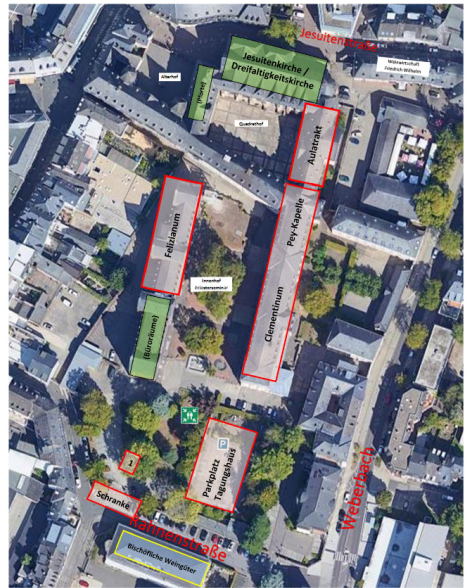
When exiting, the car must be parked next to the
column (number 1 in the picture) for the ticket
so that the exit loop is activated.

DAY VISITORS MUST USE THE CAR PARKS IN THE SURROUNDING AREA.

Car parks in the surrounding area

- Basilika car park, Mustorstraße 2
- Parking spaces at the palace gardens,
Am Palastgarten
- Viehmarkt car park, Viehmarktplatz 1
- City car park Trier, Zuckerbergstraße 31
- SWT car park, Ostallee 7-13

Please follow the parking guidance system.



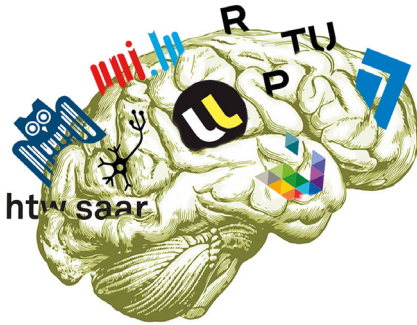
THE EVENT WILL TAKE PLACE IN THE AULATRAKT AND FELIZIANUM.

DOOR OPENER AT THE CLEMENTINUM ENTRANCE

To open the door, please press
the button with the wheelchair logo.

(In the evening/at night, only guests with
a key can enter the building.
The door is then switched off/locked.)





DAY 1

12:00 Reception & Registration
(Room: Foyer)
Coffee, Drinks and Snacks provided

13:00 Welcome
(Room: Aula)

Welcome Address of the President
Prof. Dr. Eva-Martha Eckkrammer

Welcome Address of the Secretary
General of the UniGR - Cornelia Schmidt

13:30 Presentation of the ICAN of the University of Trier
Florian H. Kasten
Presentation of the neuroscientific research topics and infrastructure of ICAN at the University of Trier

13:45 Keynote:
Caitlin Ware, PhD,
Université de Lorraine :
„Neuroplasticity, Subjectivity,
and Emotional Regulation in
Second Language Acquisition“

14:30 Coffee Break
(Room: Foyer)

15:00 Research overview of the institutes and networks in the Greater Region
(Room: Aula)

Liege:
Christophe Phillips,
Christina Schmidt
(GIGA CRC)

Kaiserslautern-Landau:
Daniela Czernochowski
(Center for Cognitive Science),
Volker Scheuss
(Neurobiology)

Lorraine:
Ariane Bazan
(Interpsy Lab)

Luxemburg:
Christine Schiltz

The partner universities of the UniGR will present the focus of their neuroscience research and methods in short presentations.

16:30 Scientific Posters Session
(Room: Foyer)
Scientific poster contributions by young scientists on various topics of cognitive neuroscience

17:45 End of day

18:00 Dinner with random table allocation
(Room: Dining Hall)

20:00 Evening City Tour of the Medieval Trier
(approx. 90 min.)

DAY 2

09:00 Funding and Collaboration Opportunities in the Greater Region

(Room: HS I)

Cornelia Schmidt,
Secretary General UniGR

Programmes of the UniGR/European funding programs for cross-border collaboration

Lorraine Brindel-Schild,
Interreg B Contact Point Germany
An introduction to the Interreg Program of the European Union

Daria Sambuk,
Research Support Office, Trier University
Joint funding lines of national research funding organizations

11:00 „Scientific Speed Dating“ (Rooms: HS I, Conference Room I & II)

1:1 exchange of researchers with similar interests/methods. Researchers are matched on the basis of previously completed questionnaires and present their research with a short “elevator pitch”.

Moderation: Florian H. Kasten

12:30 Lunch (Room: Dining Hall)

13:30 Scientific Talks I (Room: HS I)



Laura Renz (Saarbrücken)
Evoked Potentials, Steady-State Visual Evoked Potentials, Neurophysiological Decoding, Immersion, Attention



Juan-Pablo Robledo (Lorraine)
Advancing cross-domain interpersonal neural synchrony in social neuroscience.
A pilot case of joint musical improvisation and conversation

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Anastasiia Lavrenova (Kaiserslautern-Landau)

Neural and Behavioral Correlates of Retrieval Suppression: The Role of Trait Anxiety and Negative Affect



Christoph Geißler (Trier)

The role of cortical α and β synchronization for maintenance of action plans in complex tasks

15:00 Coffee Break (Room: Foyer)

15:30 Scientific Talks II (Room HS I)

Tanja Maritzen (Kaiserslautern-Landau)

Intersecting deficiency impairs cortico-striatal neurotransmission and causes repetitive behaviors in mice

Mayur Bhamborae (Saarbrücken)

Machine Vision for Contactless Neurocognitive and Affective State Monitoring

Leah Pingen (Trier)

Transcutaneous auricular vagus nerve stimulation enhances stimulus-response binding effects – evidence from drift diffusion modeling

16:30 Round tables :

Potentials for cooperation in the Greater Region

The participants will meet in various focus groups and discuss ways of intensifying research cooperation in the cognitive neurosciences in the Greater Region.

Group 1 (Lecture Hall):

Common Research topics in the Greater Region

Group 2 (Conference Room II):

Research Infrastructure in the Greater Region

Group 3 (Conference Room I):

Exchange Programs Teaching and Research in the Greater Region

17:15 Closing (Room: HS I)



CAITLIN WARE: “NEUROPLASTICITY, SUBJECTIVITY, AND EMOTIONAL REGULATION IN SECOND LANGUAGE ACQUISITION”

Authors: Caitlin Ware

Department: University of Lorraine, Cognitive, Psyché et Cerveau

ABSTRACT: Bilingualism has been linked to cognitive and neural adaptations across the lifespan. Compared with monolinguals, bilinguals often show advantages in executive functioning, including attention, task switching, inhibitory control, and working memory (Ware, 2023).

Neuroimaging research aligns with these findings, revealing increased gray matter density in regions tied to language acquisition and control, as well as greater white matter integrity in striatal–inferior frontal pathways among young bilinguals (Pliatsikas et al., 2020). Notably, brain changes can emerge after only a few months of second language training. Students completing two semesters of Spanish demonstrated cortical thickness increases in the left anterior cingulate cortex and right middle temporal gyrus (Legault et al., 2019). Learners of French and German have shown modifications in language and control network connectivity, including increased white matter connectivity in phonological and semantic subnetworks (Ghazi Saidi et al., 2013; Wei et al., 2024).

Although research with older adults is limited, evidence suggests that second language learning can enhance cognition later in life (Ware et al., 2021). Seniors showed improved episodic memory after 18 months of language training (Demnitz-King et al., 2023), maintained general cognitive scores (Bubbico et al., 2019; Ware et al., 2017), and exhibited modifications in resting-state activity in the medial prefrontal cortex (Bubbico et al., 2025).

Beyond cognition, second language acquisition shapes subjectivity and emotional processes. Using a second language can influence judgment and moral reasoning (Geipel et al., 2016), and some speakers report shifts in identity while learning another language (Hoffman, 1998; Ware et al., 2017). SLA may also facilitate emotional regulation and reduce anxiety during autobiographical recall of trauma (Morawetz et al., 2017; Dylman & Bjärtå, 2019).

These findings raise the question of whether neuroplasticity from language learning extends broadly to thought, emotion, and subjectivity.

RESEARCH OVERVIEW OF THE INSTITUTES AND NETWORKS IN THE GREATER REGION



“INSTITUTE FOR COGNITIVE & AFFECTIVE NEUROSCIENCE (ICAN)”

Florian H. Kasten, Christian Frings, Gregor Domes



“NEUROIMAGING FACILITIES AT THE GIGA CRC HUMAN IMAGING RESEARCH UNIT”

Christophe Phillips, Christina Schmidt



“DEPARTMENTS FOR COGNITIVE NEUROSCIENCE & NEUROBIOLOGY”

Daniela Czernokovski, Volker Scheuss



„INTERPSY LAB”

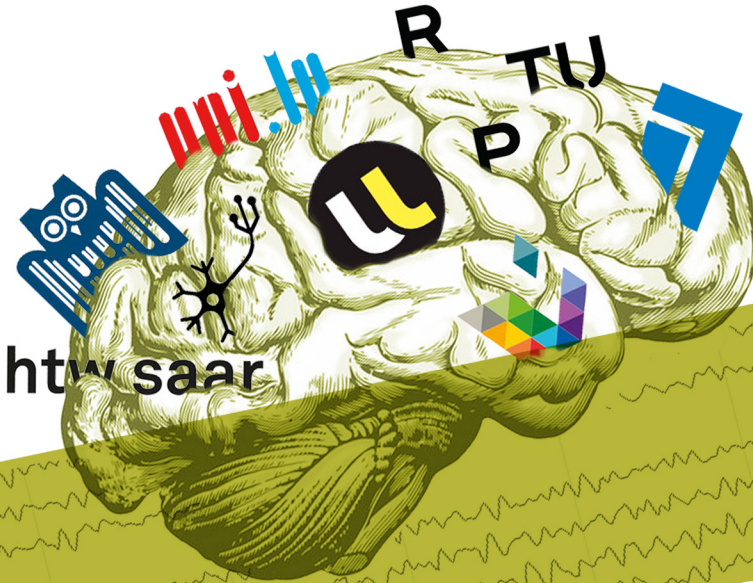
Ariane Bazan



“THE DEPARTMENT OF BEHAVIORAL AND COGNITIVE SCIENCE”

Christine Schiltz





SCIENTIFIC TALKS



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“EVOKED POTENTIALS, STEADY-STATE VISUAL EVOKED POTENTIALS, NEUROPHYSIOLOGICAL DECODING, IMMERSION, ATTENTION”

LAURA RENZ, R. A. Vargas Perera,
F. I. Corona-Strauss, D. J. Strauss

ABSTRACT: Steady-state visual evoked potentials (SSVEPs) are a powerful method in visual perception research. Their application in brain–computer interfaces open up a wide range of possibilities in neurotechnology and applied neuroscience. The presented pilot study aims to place SSVEPs in the context of cinematic experiences and explores their potential as neural markers of visual engagement and attentional shifts. Specifically, the SSVEPs are examined with the goal of using them to quantify immersion and investigated with focus on the role of endogenous and exogenous attention.



“ADVANCING CROSS-DOMAIN INTERPERSONAL NEURAL SYNCHRONY IN SOCIAL NEUROSCIENCE. A PILOT CASE OF JOINT MUSICAL IMPROVISATION AND CONVERSATION”

JUAN-PABLO ROBLEDO, Josie Kearney

ABSTRACT: This project investigated how musical and linguistic interaction shape interpersonal coordination by examining neural synchrony in „non-musician“ dyads using EEG hyperscanning.

While music is often treated as a performative art form, its evolutionary roots lie in participatory, socially embedded interaction. Recent research suggests that making music together can enhance social bonding and behavioural coordination, and that both music and speech rely on shared temporal, motor, and attentional mechanisms.

Building on Robledo et al. (2021), which showed that joint musical improvisation increases subsequent conversational synchrony, NeuroSync explores whether these behavioural effects correspond to changes in neural phase locking. Twelve same-sex dyads (N = 24; undergraduate psychology students) engaged in two semi-guided conversations separated by a joint activity: either a musical improvisation on pentatonic balafons (music condition) or a non-rhythmic collaborative “hands-busy” clay-modelling task (control condition). Dual-EEG hyperscanning, audio, and video data were recorded continuously. Neural coupling was analysed in theta, beta, and alpha frequency bands, selected for their relevance to attentional engagement, motor prediction, and social connectedness. Video-coded episodes of shared musical pulse were mapped onto EEG activity in the music condition.

Preliminary results indicate that musical improvisation—but not the non-musical task—enhanced neural synchrony in the subsequent conversation. Increased theta activity suggests shared attentional and speech-related temporal alignment; elevated beta activity aligns with joint motor action and mutual observation; and enhanced frontal alpha activity may reflect greater social bonding or self–other integration. As a pilot study, NeuroSync demonstrates the promise of EEG hyperscanning for understanding how spontaneous musical interaction functions as a social technology and lays the groundwork for larger-scale investigations of neural mechanisms underpinning human communication.

**"NEURAL AND BEHAVIORAL
CORRELATES OF RETRIEVAL
SUPPRESSION:
THE ROLE OF TRAIT ANXIETY
AND NEGATIVE AFFECT"**

ANASTASIIA LAVRENOVA,
Daniela Czernochowski

ABSTRACT: Actively excluding unwanted memories, or retrieval suppression, supports mental well-being. Yet how mood states and personality traits influence this process remains unclear.

This study uses the Think/No-Think (TNT) paradigm to investigate how suppression of emotional memories is modulated by trait anxiety, state anxiety, subclinical depression, and stress. Twenty-one participants learned cue–target word pairs of varying emotional valence (neutral, negative, positive) and later either retrieved or suppressed specific targets, followed by the final recall tests. For the behavioral analysis, final recall was assessed using two types of tests. The Same-Probe Test (with original cues), showed significant suppression, with greater effects for emotional versus neutral items.

The Independent-Probe Test (with novel, semantically related cues) revealed no suppression effect but a valence effect. As predicted, EEG markers of cognitive control (frontocentral N450) and conscious recollection (left parietal LPP wave, 500–900 ms) showed significant TNT condition effects. No-Think trials elicited a more negative N450 amplitude with shorter latency, with emotional items showing longer latencies compared to neutral items. The LPP mean amplitude was higher in the Think condition. General linear models and Pearson's correlations showed that suppression-induced forgetting depends on emotional valence and is shaped by negative affect & trait anxiety, and their influence on neural activity.

**"THE ROLE OF CORTICAL
 α AND β SYNCHRONIZATION FOR
MAINTENANCE OF ACTION PLANS
IN COMPLEX TASKS"**

CHRISTOPH GEISSLER, Lars-Michael
Schöpfer, Birte Moeller, Christian Frings,
Bernhard Pastötter

ABSTRACT: To form and execute action plans, we must integrate action goals, environmental features, and motor programs. Action control theories propose that these elements are bound into transient "event files." Although event files typically dissolve soon after execution, many studies show that remnants of these bindings influence subsequent actions: full repetitions facilitate performance, while partial repetitions impair it. However, these binding effects, are diminished in very easy or overlearned Tasks. Thus, it has previously been suggested that involvement of prefrontal executive networks in a given task promote binding effects. Nonetheless, it has remained unclear how task difficulty modulates the binding process on a procedural level.

In this study, we compared binding effects in simple and difficult response–response paradigms while measuring prefrontal activity with functional near-infrared spectroscopy and whole-head EEG. As expected, binding effects were stronger in the difficult task, both on a behavioral and neurohemodynamic level. Notably, difficult tasks elicited increased α/β synchronization associated with maintaining event file information between action episodes, and this increase in activity directly predicted the magnitude of behavioral binding effects.

In accordance with previous literature, we suggest that existing long-term memory templates might not suffice to successfully complete difficult tasks. Hence, prefrontal executive networks are additionally engaged to actively maintain complex action

plans in working memory. Because working memory is more susceptible to trial-by-trial priming and interference, reliance on it produces the characteristic facilitation and impairment patterns observed in binding research.



University of Kaiserslautern-Landau,
Nanophysiology

“INTERSECTION DEFICIENCY IMPAIRS CORTICO-STRIATAL NEUROTRANSMISSION AND CAUSES REPETITIVE BEHAVIORS IN MICE”

Dennis Vollweiler, Alexandra Hilse, Jasmeet Kaur Shergill, Gaga Kochlamazashvili, Stefan Paul Koch, Susanne Mueller, Philipp Boehm-Sturm, Volker Hau-cke, **TANJA MARITZEN**

ABSTRACT: Defects in cortico-striatal circuitry are closely linked to obsessive stereotypic behaviors, hallmarks of neuropsychiatric diseases including autism spectrum disorders (ASDs) and obsessive-compulsive disorders (OCDs). However, our knowledge of the essential synaptic machinery required to maintain balanced neurotransmission and plasticity within the cortico-striatal circuitry remains fragmentary.

Mutations in the large synaptic scaffold protein intersection1 (ITSN1) have been identified in patients presenting with ASD symptoms, including stereotypic behaviors. Our characterization of knockout mice deficient for the two closely related proteins ITSN1 and ITSN2 revealed that intersection loss leads to severe ASD/OCD-like behavioral alterations and molecular changes at pre- and postsynapses and defective cortico-striatal neurotransmission. We delineate a molecular pathomechanism for the neuropsychiatric symptoms of patients carrying intersection mutations that correlates with the observation that NMDA receptor dysfunction is a recurrent feature in the development of ASD/OCD-like symptoms.



Saarland University & School of Engineering,
Systems Neuroscience & Neurotechnology Unit

“MACHINE VISION FOR CONTACTLESS NEUROCOGNITIVE AND AFFECTIVE STATE MONITORING”

MAYUR BHAMBORAE

ABSTRACT: My research investigates the utility of machine vision and computational photography for neurocognitive and affective state assessment, offering a non-invasive alternative to traditional sensors and subjective scores.

Recently, we demonstrated that correlates of electrodermal activity (EDA)—and therefore, sympathetic arousal—can be estimated using video data alone. Building on this validation, our current work explores how facial video recordings can serve as an objective supplement to subjective questionnaires in studies involving effortful listening.

Preliminary results are promising and show that camera-based, contactless methods can capture physiological nuances that may be ambiguous or even unclear in self-reported subjective scores. A paper is being currently prepared for submission in early 2026.

My presentation will discuss the possibilities and value contactless monitoring adds to the fields of neuroscience and affective research.

“TRANSCUTANEOUS AURICULAR VAGUS NERVE STIMULATION ENHANCES STIMULUS-RESPONSE BINDING EFFECTS – EVIDENCE FROM DRIFT DIFFUSION MODELING”

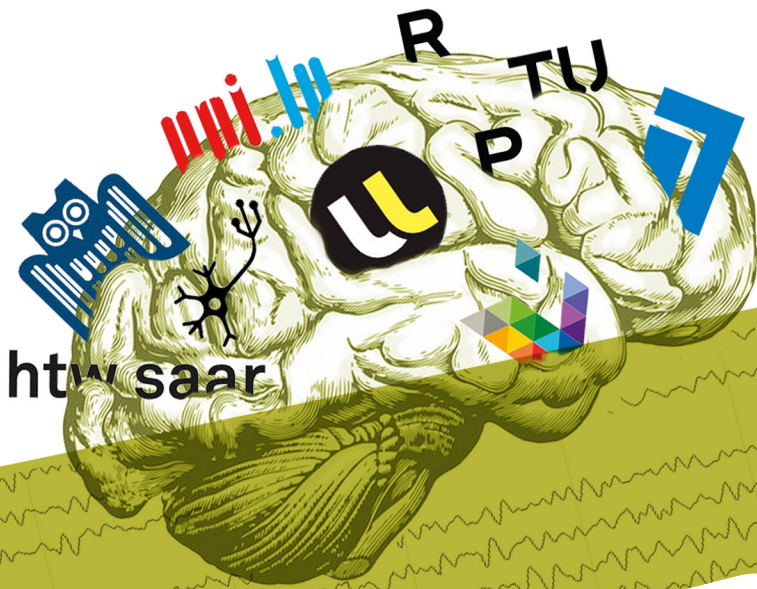
LEAH J. PINGEN, Astrid Prochnow,
Christoph F. Geissler, Alexander Münchau,
Christian Beste, Christian Frings

ABSTRACT: Auricular vagus nerve stimulation (atVNS) has been proposed to modulate cognitive control by sharpening gain processes via an increase in norepinephrine (NE) and gamma-aminobutyric acid (GABA) levels. Yet, its impact on the core mechanisms of action control remains unclear.

According to the Binding and Retrieval in Action Control (BRAC) framework, flexible behavior relies on the integration of stimulus and response features into event files and their subsequent retrieval. Here, we investigated whether atVNS alters stimulus-response (S-R) binding by increasing the signal-to-noise ratio of perceptual-motor representations. In a randomized single-blind design, healthy participants received active or sham atVNS while performing a standard binding task. Behavioral analyses revealed robust S-R binding effects across groups, but critically, active atVNS significantly amplified S-R binding in reaction times, whereas error rates remained unaffected.

To determine which cognitive sub-processes were modulated, we applied drift diffusion modeling (DDM). In line with gain-control accounts, atVNS selectively enhanced S-R binding effects in the drift rate, indicating more efficient evidence accumulation, while boundary separation, starting point, and non-decision time were unchanged.

These findings provide the first DDM-based demonstration that atVNS influences the integration and retrieval processes central to BRAC by sharpening the quality of task-relevant evidence. Taken together, the results suggest that atVNS enhances the strength of binding and/or retrieval, offering a mechanistic link between neurochemical gain modulation and action control.



POSTER



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“LEXICAL ACCESS IN DYSLEXIA: FREQUENCY-TAGGING EEG REVEALS THAT REGULAR WORDS ARE NOT DISCRIMINATED FROM NON-WORDS AT FAST PRESENTATION SPEEDS”

ALIETTE LOCHY, Claire Gigleux, Alice van de Walle de Ghelcke, Emilie Collette, Bruno Rossion, Christine Schiltz

ABSTRACT: The objective of the present study is to explore automatic lexical processes during visual word recognition in dyslexic individuals, adults and children, with a simple and sensitive approach: Fast Periodic Visual Stimulation (FPVS, or frequency-tagging) with electroencephalogram (EEG) recordings.

Two experiments in French-speakers (adults, N=28; 4th graders, N=38) used FPVS-EEG with an oddball design. Sequences (60 sec, repeated 3 times) of periodic and rapid (adults: 10Hz, children: 6Hz) streams of pseudowords are passively viewed, in which a periodic deviant category (words) is inserted every *n*th item (adults: 1.25Hz, children: 1.2Hz). Neural responses at the deviant frequency of presentation (1.25Hz/ 1.2Hz) indicate a differential neuronal processing for words over and above pseudowords, thus lexical discrimination. In both experiments, the impact of regularity was examined by inserting irregular or regular words among pseudowords.

In both adults (DYS: N=14, CONTROLS: N=14) and children (DYS: N=14; CONTROLS, N=24), irregular words were discriminated against pseudowords, revealing lexical processing. For regular words, however, no response was detectable in either dyslexic group while a lexical response was present in control participants. Furthermore in adults, another condition directly tested regular vs irregular words. Dyslexic individuals showed normal detection of

this psycholinguistic characteristic.

Our observations suggest that lexical processes are not automatically activated in dyslexia when decoding processes are enhanced by the context (i.e., pseudoword sequences) but may deploy when overall activation of the lexicon is high (i.e., word sequences). Converging results in adults and children suggest a potential diagnostic value of the FPVS-EEG approach to characterize reading impairments.

“INSIGHTS IN DIVERGENT THINKING: EVIDENCE FROM A MULTI-LAB CONSORTIUM STUDY”

ANASTASIA VANDEN BERGHE,

Kadi Tulver, Nadezhda Moroshkina, Aleksandr Gulkin, Tim George, Steven M. Smith, Manuel Rindle, Selina Weiss, Visheeta J. Chandolia, Christine Chesebrough, Radwa Khalil, Christian Rominger, Matthijs Baas, Mathias Benedek, Claude Houssemand, Carola Salvi

ABSTRACT: The aim of this project is to bring together data from different labs using divergent thinking (DT) tasks, such as the Alternative Uses Task (AUT), alongside insight measures. The primary goal is to examine whether insight experiences, which have previously been considered mainly in the convergent thinking domain, emerge during DT, whether their occurrence is systematically associated with idea creativity, and whether these patterns replicate across objects, languages, and cultural contexts. By measuring insight as a transient cognitive state within generative ideation rather than restricting it to convergent problem-solving tasks, the project tests the generality of insight processes across creative domains.



“HOW AGE AND ACUTE STRESS AFFECT DISTRACTION FROM PAIN – A PSYCHOPHYSIOLOGICAL APPROACH”

ANGELIKA DIEROLF, Marian van der
Meulen, Wolfgang Miltner

ABSTRACT: Cognitive distraction from pain is an effective pain modulation strategy. While inhibition of pain relies on the prefrontal cortex, a structure that is affected by age, little is known how cognitive distraction from pain is influenced by age and age-related cognitive decline. In addition, age has been shown to alter the stress response, which itself is assumed to have a negative impact on cognitive modulation of pain.

To investigate the impact of age and acute stress on distraction from pain, healthy young (18 to 30 yrs) and older participants (60+ years) underwent the Trier Social Stress Test (TSST) and a respective control condition in a two-session design. Before and afterwards, they performed a pain distraction task, a n-Back working memory task with low and high cognitive load, during which participants received individually adjusted transdermal electrical pulse trains in non-painful and moderately painful intensities to the inner forearm. Participants rated them regarding their intensity and unpleasantness. A 64-channel EEG was recorded, and saliva was collected for cortisol analysis.

Preliminary behavioral and electrophysiological results revealed pain-relief by distraction, irrespectively of the cognitive load and age. While older and younger participants were equally stressed by the TSST, showing similar elevated cortisol levels, young participants tend to be more affected by acute stress in their pain-relief than older participants. ERP- and time-frequency analyses showed differences in pain processing for older participants.

The findings suggest that healthy older adults benefit from psychological strategies to reduce pain and acute stress does not diminish their efficacy.



“UNITS FIRST OR TENS FIRST: HOW HOME LANGUAGE AFFECTS TWO-DIGIT AUDITORY-VISUAL NUMBER MATCHING IN BILINGUALS”

ANGÉLIQUE VOLFART, Andreia Borges,
Rémy Lachelin, Christine Schiltz

ABSTRACT: Previous literature suggests that speaking multiple languages greatly affects performance at numerical tasks. However, it remains unclear how the home language (HL) interacts with numerical performance in the two languages of mathematical instruction in Luxembourg (LM1 German switching to LM2 French).

In this online study, adult participants with Luxembourgish (n=29) or Portuguese (n=45) HL were presented with an auditory German (LM1) or French (LM2) two-digit number word and asked to match it with its corresponding Arabic digit form under simultaneous or sequential conditions.

Our results show that, while Luxembourgish HL displayed a typical advantage of LM1 over LM2 in response times, Portuguese HL performed equally fast in both languages in the sequential conditions. Moreover, Portuguese HL made significantly more errors in German than in French while Luxembourgish HL performed similarly in the two languages. Currently this data set is being complemented with additional language profile groups (i.e. French and Slavic) and first pilot data confirm the interactions between HL and language of mathematical instruction. Taken together, these results highlight the

crucial role of HL and its linguistic structure on numerical performance.



University of Liège, GIGA-CRC Human Imaging

“EFFECTS OF TISSUE-SPECIFIC SMOOTHING APPROACHES ON STATISTICAL ANALYSIS IN QUANTITATIVE MRI”

ANTOINE JACQUEMIN,

Christophe Phillips

ABSTRACT: Understanding age-related brain changes is crucial for distinguishing healthy aging from neurodegeneration. Quantitative MRI (qMRI) provides interpretable maps of brain microstructural properties, such as myelination and iron content. However, standard Gaussian smoothing can compromise interpretability due to partial volume effects, particularly at grey matter (GM) and white matter (WM) boundaries.

To address this, we compared three tissue-specific smoothing (Tsmoo) approaches: Tsmoo-LC (linear and compensated), Tsmoo-NC (non-linear and compensated) and Tsmoo-NI (Non-linear, Intensity-weighted). Using open-access qMRI data from 138 healthy participants (19–75 years), we reproduced Callaghan et al. (2014) to evaluate age-related changes.

Tsmoo-LC and Tsmoo-NC yielded similar spatial patterns of age-related iron content increases and myelination decreases, but Tsmoo-LC detected more significant voxels and clusters. In contrast, Tsmoo-NI showed fewer significant voxels and clusters, reflecting lower effective smoothing and higher resel counts. Voxelwise log-likelihood (LL) maps revealed that Tsmoo-NI provided a better model fit at GM-WM boundaries, while Tsmoo-LC excelled in cortical GM and Tsmoo-NC in deep WM. These findings highlight the impact of smoothing strategies on statistical sensitivity and anatomical



specificity. Tsmoo-LC and Tsmoo-NC are suitable for maximizing detection power, with Tsmoo-LC better capturing small variations within cortical gray matter and Tsmoo-NC performing better in the homogeneous core of deep white matter. Tsmoo-NI preserves anatomical detail, particularly at tissue boundaries.

This study underscores the importance of selecting a Tsmoo method based on the scientific objective: maximizing sensitivity or preserving anatomical specificity. This work provides insights into optimizing qMRI analyses for aging and neurodegenerative research.



University of Luxembourg, Department of Behavioural and Cognitive Sciences



“MULTISESSION INTEROCEPTIVE TRAINING ACROSS ORGAN DOMAINS: PRELIMINARY BEHAVIOURAL AND NEURAL DATA FROM CARDIAC AND RESPIRATORY INTEROCEPTIVE ACCURACY TRAINING WITH AN EXTEROCEPTIVE CONTROL AND AN UNTRAINED GASTRIC COMPARISON DOMAIN.”

ANXHELA SULAJ, Selma Dautbasic, Sam Bernard, Tabea Eimer, Livia Guadagnoli, Maaïke Van Den Houte, Lukas Van Oudenhove, Andreas von Leupoldt, Claus Vögele, Nathalie Weltens, André Schulz

ABSTRACT: Interoception, the sensing of internal bodily signals, is conceptualized as a three-stage process: (1) early neural processing, (2) perceptual discrimination, and (3) evaluative interpretation. A key unresolved question within this framework is whether interoceptive abilities are general or domain-specific across organ systems like cardiac, respiratory and gastric.

This study examined the domain-specificity and trainability of interoception. Focusing on Stages I and II, we tested whether multisession, feedback-based, organ-specific training enhances interoceptive accuracy (IAC; Stage II) in a domain-specific manner and modulates neural markers of early (Stage I) interoceptive signal processing. Hence, 18 healthy adults were randomly assigned to one of the three training groups: heartbeat perception training (HBPT), respiratory resistance detection accuracy training (RRDAT), or a visual perception training (VPT), serving as exteroceptive control, while gastric served as an untrained comparison domain. We assessed cardiac and respiratory IAC pre- and post-training using heartbeat counting/discrimination (HCT/HDT) and resistance detection (RRDT) tasks, and gastric sensitivity via a two-stage water load test (WLT-II). Neural processing was indexed by heartbeat-evoked potentials (HEPs) during HCT and respiratory-related evoked potentials (RREPs) during 50 occlusions.

Behaviourally, IAC in the HCT and gastric sensitivity (WLT-II; sat_%) improved significantly from pre- to post-training across all groups. No significant Group \times Time interactions emerged for any behavioural outcome. Neurally, HEP amplitudes and the early RREP (Nf) component did not show significant pre- to post-training changes.

Consistent with prior work showing early sensory responses are relatively stable, our findings suggest Stage I indices are relatively insensitive to short-term training in healthy participants. Overall, the protocol seemed to improve general task performance rather than producing clear domain-specific gains in IAC, highlighting the need for larger samples to detect potential domain-specific effects.

“NORMALIZATION IN CONTRAST MASKING”

AQSA HASSAN, Heiko H. Schütt

ABSTRACT: Contrast masking experiments are an important basis for understanding non-linear interactions in early visual processing, typically modelled as divisive normalization. In this model, the drive of each neuron is divided by a weighted sum over the drive of nearby similar neurons, which explains how similar stimuli mask each other. Based on masking experiments with spatially extended gratings, it is known how large the pool is across spatial frequency and orientation. However, it is not known how large the pool is in space.

To investigate the interactions across space, we set up a 2AFC masking experiment varying the shape of the mask while keeping the spatial frequency and orientation of the mask the same as the targets. We tested 8 different sizes of circular mask gratings. The target grating was always a small Gabor patch with a standard deviation of 0.5 cycles centrally superimposed over the 15% and 40% contrast masks. We tested 1, 2, and 4 cycles per degree vertical stimuli at 0°, 5° and 10° eccentricities Along the horizontal meridian. In the periphery, contrast thresholds increase with increasing mask size and saturates at some point as expected, which allows us to estimate the spatial extent of the normalization pool, by fitting a divisive normalization model.

The spatial extent is typically around 1 degree, anti-proportional to spatial frequency and is surprisingly similar at 5- and 10-degrees of eccentricity. In the fovea however, mask size did not affect detection thresholds such that we cannot estimate pool sizes there.



“NEURAL BASIS OF FAMILIAR FACE RECOGNITION: FREQUENCY-TAGGED LOW- AND HIGH-FREQUENCY SIGNALS FROM HUMAN INTRACEREBRAL RECORDINGS TITLE”

BEGÜM CERRAHOĞLU,

Corentin Jacques, Jacques Jonas,
Sophie Colnat-Coulbois, Stephanie Caharel,
Bruno Rossion

ABSTRACT: Accurate and rapid recognition of familiar faces—integrating visual, semantic and emotional processing—is essential for social interaction. However, whether familiar faces recruit distinct brain regions or modulate the same network as unfamiliar faces remains debated.

Traditional models propose that posterior ventral occipito-temporal cortex (VOTC) encodes structural face features, while anterior VOTC is engaged in person-specific information. Yet, evidence for this division has been mixed, partly due to methodological limitations in fMRI and a predominant focus on high-frequency broadband (HFB) activity in prior intracranial EEG studies.

To address this question, we recorded direct brain activity from depth electrodes implanted across the VOTC in 104 epilepsy patients. Using a frequency-tagging approach, we measured familiar face recognition (FFR) as the differential response to naturalistic familiar versus unfamiliar face images. Low-frequency (LF, 0–30 Hz) FFR responses emerged early in posterior VOTC (~100–150 ms), were broadly distributed—spanning posterior face-selective regions and extending into anterior and medial temporal areas—and showed strong inversion effects. In contrast, HFB analysis (40–160 Hz) revealed far fewer FFR-selective contacts (150 vs. 555). Notably, exclusive familiarity responses—defined as contacts responding to familiar faces but not to



unfamiliar faces—were rare in both signals (LF: 8%, 42/555; HFB: 16%, 24/150).

These findings indicate that although familiar and unfamiliar faces are processed differently, they rely on largely overlapping neural representations in the VOTC and suggest that combining LF and HFB signals is essential to fully capture the prevalence and diversity of familiar-face responses in the human brain.



“LONGITUDINAL DEVELOPMENT OF CURIOSITY-BASED LEARNING ACROSS CHILDHOOD AND ADOLESCENCE: THE INFLUENCE OF METACOGNITION AND AGENCY”

BILLUR YARAN, Pierre-Yves Oudeyer,
Hélène Sauzéon, Matthias Gruber, Yana Fandakova

ABSTRACT: Curiosity motivates to investigate, gain knowledge, and adjust to uncertain situations. Curiosity-driven learning has been associated with enhanced memory and comprehension, establishing it a vital aspect of cognitive growth. Agency, the feeling of having control over one's learning process, might amplify curiosity advantages by enabling learners to guide their own exploration. Metacognitive monitoring also plays a role in curiosity by supporting the evaluation of uncertainty and learning progress. To date, little is known about the ways in which these abilities interact to support curiosity and curiosity-based learning across childhood and adolescence.

The present study combines behavioural, experiential, and physiological measures in a longitudinal design to investigate how curiosity, metacognition, and agency support memory development in child-

ren between 10 and 14 years (planned N = 200). Participants will be assessed at two time points approximately one year apart. Experimental paradigms will assess self-reported curiosity levels, exploratory behaviour, and information prediction errors (IPEs).

These experimental paradigms will vary on the degree to which participants can actively choose what to explore or learn next. We will combine retrospective confidence judgments, with questionnaires and “think-aloud” protocols to assess metacognitive development. Daily sampling for one-week will assess short-term changes in curiosity, affect and self-efficacy at three timepoints across the year.

We expect that children will improve in curiosity-based learning with increasing IPE-effects over time, and that metacognition and agency will positively influence curiosity-based learning.

Together this study aims to clarify how curiosity-based learning develops in childhood across time and methods.



Luxembourg, Institute of Cognitive Science and Assessment



“THE IMPACT OF STRING LENGTH ON NEURAL CATEGORIZATION PROCESSES FOR LETTERS AND DIGITS”

CHRISTINE SCHILTZ, Lucas Rifon, Virginie Crollen & Alette Lochy

ABSTRACT: The impact of string length on neural categorization processes for letters and digits. Letters and Arabic digits are the building blocks of words and numbers. In the visual cortex, these culturally acquired characters are characterized by a differential involvement of the left and right hemispheres. Letters, as language-related symbols, predominantly involve left hemispheric structures in the occipito-temporal cortex, while digits, as

quantity-related symbols, elicit right-hemispheric or bilateral visual recognition processes. However, it remains unclear whether the human brain processes single elements and strings of characters differently depending on their category. This question is important because in the Latin alphabet, letters are usually combined in strings to form words and do not stand alone, while digits have meaning in both cases. Using Fast Periodic Visual Stimulation (frequency-tagging) during EEG recordings, we investigated how adults (N=18) discriminate letters and digits from each other, as a function of their string length (i.e. 1 vs. 5 characters). One category of stimuli (e.g., single letters) was periodically inserted (1/5) in a stream of stimuli of the other category (e.g., single digits) displayed at 10Hz. Results showed clear discrimination responses at 2Hz (i.e., 10Hz/5) with occipito-temporal topography, stronger for strings than for single elements. Digits gave rise to right-lateralized responses whatever the length. Letters displayed a left-lateralized topography only when strings were presented, while single letters were right-lateralized. A second experiment (N=20) replicated these novel and unexpected findings. The results are discussed as potentially indicating that expert readers perceive single letters as visual objects of expertise, whereas letter strings engage linguistic (orthographic, phonological) processes that rely on the left hemisphere.



Trier University of Applied Sciences, Department of Engineering



“PHASE-MODULATED INTERFERENCE STIMULATION AS A TOOL FOR SOMATOSENSORY RESEARCH: PERCEPTUAL BENCHMARKS ON HUMAN FOREARMS”

Simon Merz,
CHRISTOPH MAIER,
KLAUS PETER KOCH

ABSTRACT: Phase-modulated interference stimulation (PMIS) is a non-invasive technique that advances temporal interference (TI) by addressing key limitations of classical interferential stimulation. Unlike TI, which is limited by beat, PMIS uses controlled phase modulation of two equal-frequency sinusoids to generate constructive and destructive interference. This approach enables rectangular-like envelopes, flexible timing, and spatially steerable percepts via amplitude modulation, thereby enabling precise targeting of specific somatosensory regions.

In multiple psychophysical studies on the human forearm, we systematically evaluated how PMIS parameters influence perceptual responses and whether dynamic, spatially „moving“ stimulation can be reliably detected.

Adjusting pulse width (0.75–3.5 ms) yielded stable perception and pain thresholds across durations. Modifying the number of bursts within the stimulation frequency showed robust intensity scaling: 4–6 pulses were consistently perceived as stronger than 2-pulse standards, whereas 1–3 pulses produced similar percepts. Stimulation regularity (regular vs. variable) generally did not affect responses, except for reduced naturalness in regular 3-pulse sequences.

Participants consistently detected both static and dynamic PMIS stimulation and accurately identified movement direction (distal–proximal; radial–ulnar) once motion was perceived. Increasing stimulation frequency from 10 to 100 Hz has no significant effect on directional perception.

Overall, this work represents one of the first systematic perception studies of PMIS in humans, providing foundational insights into its sensory effects and demonstrating its potential as a tool for future research in cognitive neuroscience and somatosensory processing.

“ORTHOGRAPHIC PROCESSING IN BILINGUALS GERMAN–FRENCH READERS: WORD LENGTH AND WORD SUPERIORITY EFFECTS”

CLAIRE GIGLEUX, Alette Lochy

ABSTRACT: This study examines how orthographic transparency and bilingual proficiency influence visual word recognition in Luxembourgish bilinguals (L1 German, L2 French). It tested whether top-down lexical processing (Word Superiority Effect; WSE) and sublexical decoding (Word Length Effect; WLE) differ across transparent and opaque orthographies and whether bilingual proficiency supports efficient reading. The aims were to identify WSE and WLE in each language, compare lexical and sublexical mechanisms, and evaluate the influence of orthographic depth.

Twenty-seven bilingual adults completed a Reicher–Wheeler task (5 letter words, pseudowords, nonwords; target letter in the second, third, or fourth position) measuring the WSE, and a reading-aloud task (6 - 9 letter words and pseudowords; matched in number of syllables) measuring the WLE. The WSE (words > pseudowords) appeared only in reaction times, reflecting rapid lexical access in L1 and L2.

Accuracy was as high with pseudowords than words, typical of transparent orthographies. Letters in earlier positions were identified faster and more accurately than later positions, showing left-to-right decoding for both orthography. A Pseudoword Superiority Effect (pseudowords & nonwords) confirmed orthographic knowledge.

The WLE revealed earlier voice onset for German and shorter latencies for words than pseudowords, with length effects restricted to nine-letter strings, reflecting greater phonological and articulatory demands. Advanced bilingual proficiency supports

high lexical efficiency in both languages. Upcoming monolingual French data will clarify if the WSE bilingual data reflect a L1-L2 transfer of strategies, as well as the influence of orthographic depth.



University of Luxembourg, COSA

“INVESTIGATING THE INFLUENCE OF ORTHOGRAPHIC DEPTH ON VISUAL WORD RECOGNITION: AN FPVS-EEG STUDY”

CLAIRE GIGLEUX, Alette Lochy

ABSTRACT: Behavioral and neural evidence shows that the grain size of information processed during visual word recognition depends on the complexity of the orthographic system, highlighting the plasticity of the reading network. According to grain-size theory, transparent languages such as German promote fine-grained sublexical processing based on reliable grapheme–phoneme correspondences, whereas opaque languages like French require larger orthographic units and stronger reliance on the lexical route.

This study investigates how orthographic depth modulates grain size in Luxembourgish bilinguals (L1 German, L2 French) and French monolinguals adults. Using Fast Periodic Visual Stimulation with EEG, we measure the automatic neural discrimination of words embedded in pseudowords strings. Participants viewed rapid sequences of stimuli (10 Hz) for 60 seconds in French or German, with a word inserted every fifth stimulus (2 Hz). Discrimination of words from the pseudoword base elicits neural responses at 2 Hz and its harmonics. Words differed by condition and consisted of either (i) simple GPCs (1 letter = 1 sound), (ii) complex GPCs (2+ letters = 1 sound), or (iii) irregular words (French only), while the pseudowords always consisted of simple GPCs.



Word-selective responses are expected to be stronger in French, where orthographic opacity favors whole-word recognition. Differences may be larger when comparing German-L1 to French-L1 than to French-L2, reflecting L1-to-L2 transfer in bilinguals. Within French, irregular words are expected to elicit stronger responses than regular words, consistent with prior FPVS-EEG findings. This study will clarify specialization of the reading network across languages and proficiency levels.



University of Trier, Department of Cognitive Psychology



“NEGATION AFTER NEGATION: CONTROL ADJUSTMENT OR BINDING ARTIFACT?”

DANIEL MAURER, Roland Pfister, Christian Frings

ABSTRACT: Negated statements are typically processed more slowly than affirmative ones, but this cost is reduced when a negation is preceded by another negation. This negation sequence effect has been interpreted in the same vein as the well-known congruency sequence effect (or Gratton effect), as reflecting top-down adjustments of cognitive control. An alternative explanation is, however, that it reflects binding and retrieval processes driven by stimulus–response feature overlap across trials.

In our experiment we tested whether the negation sequence effect depends on such overlap. $N = 45$ participants responded to affirmative and negated probes following affirmative or negated primes, with prime–probe relations either sharing the same axis (e.g., not left followed by not right) or involving different axes (e.g., not left followed by not up). This design allowed us to replicate previous findings in same-axis trials. At the same time, we were able to test whether a sequential modulation of negation costs is observed when stimulus–response feature overlap is minimized, namely in different-axis trials.

Although the present data are behavioral, the results are discussed in relation to neural markers proposed for the congruency sequence effect. In a next step, we plan to use EEG and fMRI methods to further disentangle control-based and memory-based accounts of the negation sequence effect.



University of Lorraine, InterPsy



“ONE PUFF AWAY FROM BREATHING: SMOKING AS A REPETITION COMPULSION OF A TRAUMATIC FIRST BREATH”

ELISE KLEIN, S. Detandt, Ariane Bazan

ABSTRACT: Often misconstrued as «slow suicide», tobacco use has been at the center of both healthcare politics and scientific debates for over two decades. But what if people did not smoke to die, but to stay alive? It is the tabacologist Elisabeth Larinier who first made this startling proposal on the basis of her clinical work with both tobacco smokers and cancer patients (Brognon & Larinier, 2015). In that context, the act of smoking might be considered as a repetition compulsion of an initial breath that carries traumatic weight, in particular when the first breath was painstakingly difficult to find. Larinier’s central idea here is that smoking renders the act of breathing conscious by enabling the opening of the diaphragm.

We propose translating Larinier’s proposition within a neuropsychanalytic framework (Bazan & Detandt, 2013). Indeed, even if breathing is a genetically programmed action, finding the access to that program is a historical event: with the first breath, filling the alveoles with air, a dopamine peak marks the shocking body event, and this peak is all the more larger when the wait was long. It is this dopamine motor sensitization that launches a repetition compulsion, in which the subject unconsciously aims to become the actor of a conscious gesture that he was once reduced to find by chance. Thus,

in this framework, smoking is a self-treatment, and quitting it only has a real chance if another way of mastering the breathing movement can be introduced. References Bazan, A., & Detandt, S. (2013). On the physiology of jouissance: interpreting the mesolimbic dopaminergic reward functions from a psychoanalytic perspective.



Leibniz-Institute for Psychology,
Moral Computing Lab



“THE MORAL FOUNDATIONS MRI COLLECTION: A MULTI-CENTER, MULTI-COUNTRY FUNCTIONAL MRI COLLECTION FOR EVALUATING MORAL JUDGMENT”

FREDERIC R. HOPP, Sungbin Youk, Ori Amir, Musa Malik, Kylie Woodman, Brittany Wheeler, Ari Khoudary, Kevin O’Neill, Felipe De Brigard, Walter Sinnott-Armstrong, René Weber

ABSTRACT: We present the Moral Foundations MRI Collection (MOFOMIC), a multi-center, multi-country database of four functional MRI studies spanning data from N=152 healthy adults for probing moral judgment in the brain.

All four neuroimaging acquisitions involved structural MRI and task-based fMRI as well as resting-state fMRI in two studies. Notably, all task-based fMRI data across the four studies was collected while participants evaluated the graded moral wrongness of the same set of validated and standardized moral foundations vignettes as well as photographic socio-moral images in two studies.

Extensively annotated event-files, behavioral responses, as well as demographic and psychometric data are available. For each dataset and data modality, we provide the data in both raw and preprocessed form (both compliant with the Brain Imaging Data Structure), which were subjected to

extensive (automated and manual) quality control. All data is publicly available from the OpenNeuro data sharing platform.



University of Trier, Cognitive Neuropsychology and Development



“INDIVIDUAL DIFFERENCES IN ERROR-RELATED BRAIN ACTIVITY AND POST-ERROR SLOWING IN CHILDREN”

GÜLCE AKIN, Sina A. Schwarze, Ulman Lindenberger, Silvia A. Bunge, and Yana Fandakova

ABSTRACT: Errors play a crucial role in learning and goal-directed behavior by triggering cognitive adjustments to optimize future task performance. One such adjustment is post-error slowing (PES), the tendency to respond more slowly after an error. In adults, PES has been associated with regions implicated in error processing, including the anterior cingulate cortex (ACC) and anterior insula. The prolonged maturation of these regions is thought to contribute to less efficient error processing in children and PES compared to adults. Additionally, while some errors may be immediately corrected, resulting in isolated errors, others may require multiple correction attempts, resulting in consecutive errors. Compared to adults, children may need more attempts to correct their errors due to the ongoing neurodevelopment of error processing.

We investigated age differences in error types and in PES between children ($N = 159$, 8–11 years) and adults ($N = 40$, 20–30 years) during task switching. We tested whether individual differences in error processing-related activation contributed to PES within a subsample of children that performed the task during scanning ($N = 72$). Children made mostly consecutive errors, whereas adults made mostly isolated errors.

PES magnitudes were larger in adults than in children. Children showed enhanced error-related activity in dorsal ACC and the anterior insula. Enhanced error-related activity in the insula was associated with better performance and reduced switch costs.

These findings suggest that the neurodevelopment of error processing in late childhood contributes to the improved ability to adjust behavior following errors, and consequently to task-switching performance.



University of Luxembourg, Department of Behavioural and Cognitive Sciences/Computational Cognitive Science and Modeling



“BAYESIAN COMPARISONS BETWEEN REPRESENTATIONS”

HEIKO H. SCHÜTT, Juan J. Torre Tresols, Sezan Oral

ABSTRACT: A fundamental methodological question for neuroscience is how we test whether the representations in our models and brain areas are similar to each other or not. Due to the high dimensionality of representations comparing them is not easy and it remains unclear which methods are most useful with variations of encoding models and kernel or distance-based methods being the main contenders. Here, we propose novel methods to compare representations based on Bayesian statistics.

For a Bayesian encoding model, we can compute the distribution of predictions, i.e. how likely any particular pattern of outcomes is. To compare a model to brain measurements, one can simply evaluate how likely the measured responses are to be produced by a model. To compare models, one can use distances for probability distributions to compare the predicted distributions. For a linear readout with Gaussian priors, one can solve all computations

analytically without any dimensionality reduction.

We applied these new methods to compare deep neural networks trained on ImageNet to each other and to fMRI data from the natural scenes dataset. The new methods broadly agree with existing metrics but consider smaller sets of representations to be equivalent. They vary less across different random image samples and have some theoretical advantages. Thus, these new metrics nicely extend our toolkit for comparing representations.



University of Lorraine, IMoPA



“AN OBJECTIVE AND SENSITIVE ELECTROPHYSIOLOGICAL MARKER OF WORD SEMANTIC CATEGORIZATION IMPAIRMENT IN ALZHEIMER’S DISEASE”

JUSTINE DAVID , Lisa Quenon, Bernard Hanseeuw, Adrian Ivanoiu, Angélique Volfart, Laurent Koessler, Bruno Rossion

ABSTRACT: While substantial progress has been made in the identification of biological markers of Alzheimer’s Disease (AD) in recent years, the development of novel cognitive measures has lagged behind. Despite their usefulness, current neuropsychological tests present with several limitations due to their reliance on explicit behavioural tasks involving multiple cognitive processes.

Combining electroencephalographic (EEG) recording and fast periodic visual stimulation (FPVS), here we introduce an objective, implicit and sensitive cognitive measure of AD. Twenty-five AD patients and 25 matched elderly healthy controls were tested with a validated FPVS-EEG paradigm in which different written words of the same semantic category (cities) appear at a fixed frequency of 4 words per second (4 Hz) for 70 seconds. Words from a different semantic category (animal) appear every 4 stimuli (i.e., 1 Hz). Frequency domain EEG analysis showed

a robust response objectively identified at specific 1 Hz harmonics over the left occipito-temporal cortex for healthy controls, indexing automatic semantic categorization.

However, only a negligible response, less than 25% of healthy controls, was found in AD patients, this response being inversely correlated with the amount of tau protein in the cerebrospinal fluid. The significant group difference was maximal when including an additional left central region, with only 2.5 min of testing providing a significant group difference.

This study demonstrates that a reduced semantic word categorisation EEG amplitude rapidly differentiates AD patients from healthy controls, offering a valuable implicit measure of semantic categorization impairment in AD.



University of Luxembourg, Department of Behavioral and Cognitive Sciences



“WHY SOME DAYS HIT HARDER: SOCIAL AND GENETIC INFLUENCES ON DAILY STRESS REACTIVITY”

MEHVES KOURIS, Robert Kumsta

ABSTRACT: Daily stressors such as interpersonal conflicts, work demands, and loneliness are common experiences, yet individuals vary widely in how strongly these micro-stressors shape their emotional well-being. Positive social interactions may buffer against the negative impact of stress, whereas genetic predisposition for stress-related disorders could heighten emotional reactivity. This study uses an ecological momentary assessment (EMA) design to investigate these processes in daily life among 420 participants. Multiple times per day, participants completed online questionnaires reporting recent micro-stressors, ongoing activities, social company, and current positive and negative affect. Genotype data were used to derive polygenic scores indexing liability to stress-related

psychopathology. Multilevel models will be used to assess: (1) how exposure to micro-stressors relates to fluctuations in affect; (2) whether social company moderates the association between stress exposure and emotional states, potentially serving as a real-time buffer; and (3) whether genetic liability amplifies momentary emotional responses to stress, reflecting gene-environment interactions. Results will be announced at the conference.



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University of Lorraine, InterPsy



“DEVELOPMENTAL CHANGES IN FREUDIAN PRIMARY AND SECONDARY PROCESS MENTATION: EVIDENCE FROM THE GEOCAT”

Ariane Bazan, Giulia Olyff,
MIGUEL BARBOSA, Linda A. Brakel

ABSTRACT: Primary and secondary processes are foundational to Freudian theory, representing core mechanisms that shape the architecture of the mental apparatus. Primary process is characterized by associative functioning, whereas secondary process follows a spatio-temporal organization and supports goal-directed thought. The GeoCat is a formal, non-verbal index of primary and secondary process mentation, grounded in a neuropsychanalytic model of the mind (Bazan & Brakel, 2023; Bazan, 2023).

It is a forced-choice categorization task in which participants judge which of two figures more closely resembles a master figure: one sharing the same components in a different configuration, reflecting primary-process organization, and another containing different components arranged in the same configuration, reflecting secondary-process organization. The LifeCat project analyzes a large GeoCat dataset (2,880 data points) to investigate developmental changes in mental organization. Previous findings suggest that younger children

rely more on primary-process strategies, whereas older children preferentially use secondary-process strategies, as proposed by Freud (1900). However, it remains unclear whether this shift reflects differences in competence or preference.

To clarify this, we examined three conditions: one offering only attributional viable choices, one offering only relational viable choices, and one offering both. Preliminary results show a marked shift between ages 5 and 6: five-year-olds predominantly rely on primary-process mentation, whereas six-year-olds suddenly largely adopt secondary-process strategies. Notably, the youngest children choose relational similarity over a no similarity option, indicating that secondary-process mentation is accessible before age 5.

This research demonstrates that Freudian propositions can be tested in a falsifiable and empirically rigorous manner. Our research interests focus on the empirical operationalization of classical psychoanalytic concepts, particularly the primary and secondary processes, within a framework that integrates cognitive science and neuroscience. By developing work with formalized, behaviorally measurable tasks such as the GeoCat, we aim to translate Freudian constructs into quantifiable indices of mental organization. This approach allows for systematic investigation of developmental and individual differences in cognitive-emotional functioning, bridging the gap between psychoanalytic theory and empirical research. It also facilitates testing psychoanalytic hypotheses with falsifiable methods, moving neuropsychanalysis beyond purely theoretical discourse toward data-driven validation.

In addition, we are interested in exploring how findings from cognitive psychology and neuroscience can inform and refine psychoanalytic models of the mind. Integrating methods from experimental psychology, developmental science, and neuroimaging provides a multi-level perspective on mental processes, allowing us to examine both behavioral manifestations and underlying neural mechanisms.

By combining classical psychoanalytic concepts with contemporary cognitive and neuroscientific

tools, our work seeks to advance a rigorous, interdisciplinary approach to understanding the architecture of the mind, and to generate insights that are theoretically meaningful, empirically testable, and clinically relevant.



University of Trier, Cognitive Psychology



“TRACKING EXTERNAL VS. INTERNAL ATTENTION USING ALPHA OSCILLATIONS AND VISUAL ENTRAINMENT IN SUSTAINED ATTENTION”

NICOLAS NEZAN, Florian H. Kasten

ABSTRACT: This study investigates the neural and behavioral dynamics of sustained attention, which is defined as the cognitive ability to maintain selective focus over extended periods and is characterized by inherent temporal fluctuations.

The research uses an adapted, 20-minute Gradual Continuous Performance Task (gradCPT) combined with a 3 Hz visual contrast flicker. The gradCPT is designed to place greater demands on endogenous control by using a linear crossfade transition lasting 800 milliseconds between scenes, removing abrupt stimulus onsets that could artificially stabilize attention.

Behavioral analysis revealed a statistically robust increase in commission errors over time, suggesting a gradual decline in inhibitory control or an increase in attentional lapses, consistent with the task design. However, changes in omission errors, mean reaction time (RT), and RT variability did not reach statistical significance at the group level.

Electroencephalography (EEG) analysis confirmed the presence of robust neural markers: strong Inter-Trial Coherence (ITC) peaks at 3 Hz and its harmonics, reflecting stable neural entrainment to the visual flicker, and prominent alpha power (8–12 Hz) over posterior sensors. Alpha power is associated

with internal focus and sensory suppression, while ITC tracks external engagement.

Although preliminary correlational tests did not yield significant relationships between alpha power/variability and behavioral outcomes, the central hypothesis remains that alpha and ITC exhibit an anti-phase dynamic over ultra-slow timescales (~0.06 Hz), reflecting rhythmic alternation between externally and internally oriented attentional states (Dorsal Attention Network vs. Default Mode Network transitions). Future time-resolved analyses aim to empirically test this dynamic relationship.



UNIVERSITÉ DU LUXEMBOURG

University of Luxembourg, Department of Behavioral and Cognitive Sciences/CLIPSLab



“PRESERVED HEART-BEAT-EVOKED POTENTIALS DURING INTEROCEPTIVE ATTENTION IN POST-COVID SYNDROME”

NINA BUNTIC, Marc Schlessler, Jochen Schneider, André Schulz

ABSTRACT: Post-COVID syndrome is a heterogeneous condition characterized by persistent fatigue, post-exertional malaise (PEM), cognitive dysfunction, and pain. Increasing evidence suggests that autonomic nervous system dysfunction and altered interoceptive processing contribute to symptom persistence. Heartbeat-evoked potentials (HEPs) provide a neurophysiological marker of cortical processing of cardiac afferent signals and are modulated by attention.

Previous research has reported reduced HEP amplitudes and impaired attentional performance following SARS-CoV-2 infection, suggesting disrupted cardiac interoception as a potential mechanism underlying long-term symptoms. The present study investigated HEPs during rest and active interoceptive attention in individuals with Post-COVID syn-

drome compared to healthy controls.

Forty-six participants (23 Post-COVID, 23 age- and sex-matched controls) completed a resting-state recording and a heartbeat counting task during simultaneous EEG and ECG acquisition. HEPs were extracted time-locked to ECG R-peaks and analyzed using cluster-based permutation statistics within a mixed-design framework, with Condition (Rest vs. Heartbeat Counting) as a within-subject factor and Group (Post-COVID vs. Controls) as a between-subject factor.

Contrary to earlier findings reporting reduced HEP amplitudes after SARS-CoV-2 infection, we did not observe group differences in baseline HEP amplitudes. Both groups showed comparable modulation of HEPs when attention was directed toward cardiac signals. These results indicate preserved cortical responsiveness to interoceptive attention in Post-COVID syndrome. Reductions in HEP amplitudes may therefore not generalize to all Post-COVID populations or task contexts. Rather than reflecting a uniform impairment of cardiac interoception, interoceptive processing in Post-COVID syndrome may remain functionally adaptable under conditions of explicit attentional engagement.

This nuanced pattern highlights the importance of considering task demands and symptom heterogeneity when investigating interoceptive mechanisms in Post-COVID syndrome.



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University of Lorraine, Department of Psychology/
InterPsy Laboratory



“SIGNIFIER AND THE UNCONSCIOUS : THE REBUS AS AN EXPERIMENTAL PARADIGM”

JULIE PIGEOT, Giulia Olyff, Luis Carlo Bulnes,
Ariane Bazan

ABSTRACT: One of the most contested propositions in Freud-Lacanian psychoanalysis

concerns the “mental effectiveness of the signifier”, namely that phonemic forms, independently of meaning, exert an effect on mental processing. This hypothesis, central to the thesis that the unconscious is structured like a language, has long suffered from a lack of empirical operationalization.

To evaluate one tenet of this proposition, we developed an experimental protocol based on a rebus-priming paradigm. In this paradigm, two juxtaposed images form, unbeknownst to the participant, a new word or rebus: e.g., pain /pɛ̃/ (bread) + seau /so/ (bucket) → pinceau [pɛ̃.so] (brush). After viewing the visual rebus, a target word semantically related to the rebus solution (e.g., toile or canvas) is displayed, and participants then say aloud their first six associations. If more rebus resolutions are produced in the experimental condition than in the control condition (priming with a non-related rebus) we can conclude that the phonological structure induced by the two images, even if not summoned in the experiment, has unwittingly influenced the associations. A funnel debriefing excludes participants who explicitly understood the rebus principle, ensuring that only unconscious effects are considered.

A first study showed that naïve participants generate significantly more associations referring to the rebus solution in the experimental condition than in the control condition (Olyff & Bazan, 2023). The present replication, conducted in laboratory conditions, also includes Eye-Tracking parameters to investigate potential ocular reversal phenomena when images are presented in forward versus reversed order (i.e. seau pain instead of pain seau).

My research interests center on understanding psychic functioning through neuroscientific tools, in line with the neuropsychanalytic approach that guides my work. I am particularly interested in how experimental methods can operationalize psychoanalytic concepts and contribute to an interdisciplinary dialogue between psychoanalysis, psycholinguistics and neuroscience. This framework also supports a broader movement toward the demedicalization of mental suffering (here by conceptualizing language as an active therapeutic agent rather

than a mere medium).

“ERROR CANCELLATION”

ROLAND PFISTER, Samuel Varga,
Katharina Schwarz

ABSTRACT: Clinical research on error processing has often relied on a specific electrophysiological marker, the Error-Related Negativity (ERN), to assess error detection in such diverse conditions as depression, schizophrenia and Parkinson’s disease.

Recent findings from cognitive neuroscience, however, suggest a different functional interpretation of this electrophysiological marker: Rather than tapping into attentional processing related to error detection, the ERN might instead reflect active cancellation of ongoing motor activity.

I will present behavioral and electrophysiological data supporting this novel view and I will outline implications for future clinical directions of this research programme.

“THE EXTENDED MORAL FOUNDATIONS VIGNETTES (EMFV): A COMBINATORIAL STIMULUS DATABASE OF NOVEL SCENARIOS BASED ON MORAL FOUNDATIONS”

SARAH M. MÜLLER, Frederic R. Hopp

ABSTRACT: The Moral Foundations Vignettes (MFV; Clifford et al., 2015) are popular scenarios for studying the neurocognitive basis of moral judgment. However, the MFV are confined to immoral behaviors, outdated conceptualizations of moral foundations, and uncontrolled contextual confounds.

Here we address these shortcomings by developing and validating 200 novel scenarios featuring both positive and negative behaviors, varied systematically across five everyday contexts (work, family, school, relationships, and sports) and nine, recently updated moral foundations: Physical and Emotional Care, Equality, Proportionality, Liberty, Loyalty, Authority, Purity, and Ownership, as well as conventional (non-moral) Social Norms. In a first validation study conducted in the United States, participants provided continuous ratings of perceived moral foundations, realism, and magnitude estimations of moral rightness and wrongness, resulting in 30 judgments per scenario.

Using split-half canonical correlation and factor analyses, we demonstrate that the scenarios are correctly classified into their intended moral foundation and valence categories. We replicate these findings in a second validation study conducted in Germany using a translated German version of the scenarios, for which participants again provided 30 judgments per scenario. The release of the extended Moral Foundations Vignettes (eMFV) in English and German yields a combinatorial database of moral scenarios that is systematically controlled across multiple dimensions, including syntactic structure and complexity, rendering it well suited for neuroimaging research. Together, the eMFV provide a more accurate and complete resource for advancing the study of moral judgment in minds, brains, and machines.

“BAYESCOMPARE: A BAYESIAN REPRESENTATIONAL SIMILARITY METHOD”

SEZAN ORAL, Juan J. Torre Tresols,
Heiko H. Schütt

ABSTRACT: Deep neural networks are widely believed to be good models of the brain, based on similarities of their internal processing and brain measurements. Currently, researchers aim to improve these models further to increase the similarities. A central question to support this research is how these (dis)similarities should be measured. Here, we propose a new method for comparing the representations, BayesCompare, based on a Bayesian treatment of linear-readouts.

To test our method and to compare it to others, we simulate model-to-model and model-to-brain comparisons. For model-to-model comparisons, our method computes a distance between the predicted data distributions. We evaluate whether methods are able to distinguish layers of networks trained on ImageNet-1k across different training schemes and how much the results vary across sets of randomly selected test images. For model-to-brain comparisons, our method computes the likelihood of each candidate model to produce the observed brain activity. For evaluation, we subsample the Natural Scenes Dataset (NSD) and compare representations from participants' fMRI activity with those extracted from deep neural networks.

Qualitatively, the results of our method largely agree with existing methods like encoding models, RSA, and CKA. However, our method performs well in our evaluations and yields results both at the voxel and at the ROI level, combining strengths from existing methods. Beyond that, our full statistical model and Bayesian approach offer inherent uncertainty quantification for a coherent and fast statistical evaluation of model performance, which

does not require complex dimensionality reduction, cross-validation, and bootstrapping methods.

“EXPLORING MOTION PERCEPTION: TESTING THE PREDICTIONS OF THE SPEED PRIOR ACCOUNT ACROSS DIVERSE STIMULUS CONFIGURATION AND CONTEXTS”

SIMON MERZ, Christian Frings

ABSTRACT: This study presents an integrated approach to understanding perceptual biases in localizing dynamic stimuli, the speed prior account of motion perception. Systematic biases, including the Fröhlich effect, Onset-repulsion effect, Representational Momentum, and Offset-repulsion effect, have been consistently observed in the localization of moving objects.

We propose the speed prior account as a unifying theory to explain these phenomena, suggesting that the perceived location of a stimulus results from a blend of sensory input and prior speed expectations. Our research involved diverse experimental setups, including varying stimulus speeds, sizes, and motion trajectories across different sensory modalities, to examine the influence of different stimulus configurations on motion perception.

The data indicates robust patterns across these configurations, reinforcing the speed prior account's explanatory power. Furthermore, the study explored the impact of experimental context, revealing that global speed context significantly influences perceptual biases. This comprehensive approach underscores the relevance of speed expectations in perceptual biases and offers substantial evidence against classical localization theories, positioning the speed prior account as a pivotal framework in

understanding motion perception.



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“UNRAVELING AFFECTIVE STATES FROM THE AURICUOLMOTOR SYSTEM”

S. BONNAIRE, M. J. Bhamborae, D. J. Strauss,
F. I. Corona-Strauss

ABSTRACT: Communication not only occurs verbally. Quite often, messages, and especially information on our inner feelings, are transmitted non-verbally. To name just a few examples, smiling is commonly associated with happiness, while frowning seems related to displeasure. These facial expressions are induced by mimic muscles such as the “frowning muscle” corrugator supercilii. However, auricular muscles like the tragus (TR), antitragus (ATR), or posterior auricular muscle (PAM) are also considered mimic muscles, but research on auricular muscles in relation to affect is very scarce.

In our study, 30 participants (26.2 ± 3.3 years, 13 females) were exposed to various affective videos. Results showed that the surface electromyograms of TR/ATR were significantly increased when positive-arousing or negative-arousing stimuli were presented. Neutral stimuli did not cause significant changes. Further analysis found significant correlations between subjective valence and arousal ratings and TR/ATR activity. This might imply the possibility to decode arousal from auricular muscle activity.



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“MORAL INTUITIONS ARE EVOKED IN THE HUMAN VISUAL SYSTEM”

TIM LAUER, Karolina Drozdź, Sarah M. Müller,
& Frederic R. Hopp

ABSTRACT: Humans quickly detect morally relevant stimuli in their visual surroundings, suggesting that moral perception is attuned to features of the sensory environment. Yet, few computational models describe how combinations of stimulus features evoke discrete moral intuitions in the human visual system.

Here, we develop a convolutional neural network that classifies photographic images into ten, non-mutually exclusive moral intuitions. We train and cross-validate the model on socio-moral images and show that image content is sufficient to predict human ratings of perceived moral intuitions. In two functional magnetic resonance imaging (fMRI) studies (each $n = 30$), in which participants viewed a representative subset of these images, we demonstrate that patterns of human visual cortex activity encode moral intuition-related model output and can decode multiple moral intuition categories. Using four additional fMRI datasets, we investigated whether reading vignettes featuring violations of different moral intuitions elicits dissociable patterns of visual cortex activity.

Indeed, across the four datasets of the MOFOMIC database (study 3, $n = 64$; study 4, $n = 30$; study 5, $n = 27$; study 6, $n = 30$; total $n = 151$; Hopp et al., 2025), visual cortical activity was sufficient to decode the moral category of standardized and validated vignettes. Our results suggest that category-specific visual features can be reliably mapped to distinct moral intuitions and are coded in distributed representations within the human visual system.

“EXPLORING THE FOUNDATIONS OF CREATIVITY: EVIDENCE FROM EEG ALPHA MODULATIONS”

VERA EYMANN, Thomas Lachmann, Ann-Kathrin Beck, Saskia Jaarsveld, Daniela Czernochowski

ABSTRACT: Creative problem solving has been described as an iterative process involving divergent and convergent modes of thinking. Divergent thinking (i.e., the generation of multiple ideas by exploring various directions) is widely recognized as a core process underlying creativity, whereas convergent thinking (i.e., the evaluation and selection of the most appropriate idea) is often exclusively associated with logical reasoning or intelligence.

By analyzing data from two EEG studies, we illustrate how tasks commonly used in the neuroscientific investigation of creativity may provide a condensed representation of divergent and convergent thinking, respectively. We identify several reasons for this: the specific presentation of stimuli and response alternatives within these tasks (“immediate problem space accessibility”), the restricted time on task in well-established creativity paradigms, and the methodological challenges involved in identifying the temporal dynamics of divergent–convergent cycles using standard EEG procedures. Based on our results, we propose that activity in the upper alpha band (10–12 Hz) may disentangle divergent–convergent cycles within creativity tasks and further, could be used as a data-driven marker of task demands related to immediate problem space accessibility.

This conceptualization entails several implications, which are discussed along with directions for future research on divergent and convergent thinking.

“RTM PROTOCOL’S RESEARCH AND DEVELOPMENTS IN WAR-AFFECTED UKRAINE”

VIKTORIIA GORBUNOVA

ABSTRACT: The ongoing Russian invasion of Ukraine has led to unprecedented levels of psychological trauma among both civilians and military personnel, with post-traumatic stress disorder (PTSD) prevalence reaching over 55% among internally displaced persons and more than 12,000 new cases officially recorded by 2024. Traditional trauma treatments such as CBT, EMDR, and NET are limited by their duration, resource demands, and the need for highly trained clinicians, creating a critical need for brief, scalable interventions.

The Reconsolidation of Traumatic Memories (RTM) Protocol, a structured, imagery-based intervention grounded in the neuroscience of memory reconsolidation, has emerged as a feasible and effective approach in these conditions. Since its approval by the Ministry of Health of Ukraine as an evidence-based treatment for trauma-related disorders in 2023, the RTM Protocol has been implemented across different contexts. Research in Ukraine explores three main dimensions: (1) effectiveness and feasibility study; (2) clinical outcomes in treating acute and post-traumatic stress symptoms among combat-injured soldiers in hospitals; and (3) innovation in protocol adaptation, including development of the RTM-C Protocol for children. Preliminary data and case analyses demonstrate significant symptom reduction after three to five sessions, enhanced functional recovery, and high acceptability among both clinicians and patients. Planned interdisciplinary research focuses on digital delivery formats (VR-assisted RTM).

to investigate the neural mechanisms underlying body image disturbances, with specific relevance for testing the allocentric lock hypothesis and advancing the understanding of eating disorder pathophysiology.

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“ERP CORRELATES OF BODY PERCEPTION ACROSS EGOCENTRIC AND ALLOCENTRIC PERSPECTIVES IN VIRTUAL REALITY”

ZANETTI, F., Herforth, J.G., Schönbein, K.,
Botev J., & Lutz, A.P.C.

ABSTRACT: Event-related EEG activity (ERPs) allows investigation of brain activity on a millisecond timescale. Visual stimuli depicting human faces and bodies elicit a negative ERP component that peaks approximately 170 ms after stimulus onset (N170). ERP paradigms require discrete stimuli, making the investigation of egocentric body processing methodologically difficult, as one's own body is always present in the visual field. Virtual reality (VR) provides a unique methodological approach by allowing the controlled replacement of the physical body with a virtual avatar that can be modified in a controlled way. This approach allows systematic investigation of neural processing across different bodily viewpoints. In this study, we combined immersive VR with EEG to examine the neurophysiological correlates of body perception from both egocentric and allocentric perspectives. In order to do so, four experimental conditions were presented using an HTC Vive Pro Eye headset in a 2×2 design (object vs. realistic avatar \times mirror vs. first-person perspective). Each condition was repeated 30 times (2 s per trial). EEG was recorded from 64 electrodes. Preliminary analyses were performed on data from 10 healthy participants (50% male; target sample size $N=40$). These partial results showed higher N170 amplitudes for the realistic avatar compared to the object condition. Moreover, the first-person perspective was associated with longer N170 latencies. Our paradigm is designed to develop viewpoint-dependent assessment tools and

