ABSTRACT BOOK

8th Scientific Meeting of the Federation of the European Societies of Neuropsychology

2nd Panhellenic Conference on Neuropsychology

27-29 September 2023

Makedonia Palace Hotel

Thessaloniki, Greece

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Welcome Letter

Dear Colleagues and Friends,

The Federation of the European Societies of Neuropsychology (FESN) and the Hellenic Neuropsychological Society (HNPS) are proud to welcome you to the 8th Scientific Meeting of the FESN & the 2nd Panhellenic Conference on Neuropsychology in Thessaloniki, Greece.

We are delighted to meet you in person!

The meeting offers world-class researchers presenting new data on scientific topics relevant to neuropsychology and to related fields to both research and clinical practice. It hosts Symposia, Oral Communications and Poster Presentations while it offers 4 Keynote Lectures, 5 Colloquia, a Debate, an Open Discussion and the Cortex Prize Lecture.

Thessaloniki, also known as "the bride of the Thermaikos Gulf", is a port city, the second largest city in Greece, boasting structures from antiquity to modern day architecture, as well as several universities and colleges. It is a culinary capital, rich in history, as it is located at a crossroads between East and West. It is also known for its vivid nightlife, affordable eating, and shopping. The weather in September is pleasant, the beautiful beaches are easily accessible, and the conference venue "Makedonia Palace Hotel" is located right on the beachfront, within walking distance from the city center.

Socialization of science has suffered a huge blow due to COVID-19 pandemic. We have now the opportunity to reunite, to see each other again and to make new contacts for our members and other attendees alike.

Welcome at the 8th Scientific Meeting of the FESN & the 2nd Panhellenic Conference on Neuropsychology in Thessaloniki, Greece.

Hans-Otto Karnath
President of the Federation of European Societies of Neuropsychology (FESN)

Athanasia Liozidou
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Vienna Cognitive Science Hub, Faculty of Psychology
Centre for Microbiology and Environmental Systems Science,
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Keynote Lectures

KL1. Language, aging and neurodegeneration

R. Vandenberghe
Laboratory for Cognitive Neurology, Department of Neurosciences, Leuven Brain Institute, KU Leuven, Belgium
Neurology Service, University Hospitals Leuven, Belgium

Language as a means of meaningful communication is one of the most intriguing and challenging fields within neuroscience. At the same time, acquired language dysfunction is one of the most harrowing experiences of persons with neurological disease. The basic tenets of our language research is that a deeper understanding of the language circuitry in the brain will benefit the diagnosis and treatment of patients and that language dysfunction continues to provide invaluable insight into how the normal brain processes language. This interplay between studying the intact brain and studying patients will be the topic of this talk, mainly based on behavioral studies, deep phenotyping and task-related functional MRI. Examples will be taken from research in Alzheimer disease (in the asymptomatic, prodromal and early dementia stage), frontotemporal degeneration (semantic and nonfluent variant of primary progressive aphasia), and healthy cognitive aging. Language and aphasia research is by excellence interdisciplinary. As such, it has benefited enormously from the recent progress in computational modeling of word meaning in experimental psychology. The relevance for our field of the successes of Natural Language Processing models will also be touched upon.

Keywords: progressive aphasia, Alzheimer disease, semantic processing

KL2. Stroke, brain networks, behavior, and modeling

M. Corbetta
Clinica Neurologica, Azienda Ospedale Università Padova, Italy
Padova Neuroscience Center (PNC), University of Padova, Italy
Veneto Institute of Molecular Medicine, Fondazione Biomedica, Padova, Italy

I will discuss work from the last decade on the behavioural consequences of stroke lesions and their effect on brain network activity and connectivity. I will argue that stroke, to some extent of their location, cause a 'low dimensional' pattern of behavioural abnormalities that are mirrored by a few canonical patterns of brain connectivity alterations. These connectivity alterations cause a reduction in the variability of brain states that the brain can visit. The improvement of these alterations over time correlate with recovery of function. More recently, we have developed several whole brain computer models of stroke lesions and showed that it is possible to model the effect of individual lesions. These computer models are important to explore the parameter space of novel interventions, e.g., neuromodulation, to promote recovery.

Keywords: stroke, behavior, networks

KL3. Tracing the Brain's Hidden Pathways: A Neuropsychological Odyssey

M. Catani
NatBrainLab, Department of Forensic and Neurodevelopmental Sciences, Institute of Psychiatry, Psychology and Neuroscience, King's College London, United Kingdom

This presentation centers on the application of diffusion tractography to explore the anatomical networks that underlie visuospatial learning, language comprehension, and fine motor functions. We will employ both individual case studies and case-control group investigations to illustrate how damage to previously undocumented neural pathways can result in specific symptoms. Our focus will include an in-depth explanation of "Configuration Amnesia" as a novel disconnection syndrome associated with lesions in the Medial Occipital Longitudinal Tract (MOLT). Additionally, we will revisit the models of dorsal and ventral language pathways in light of a dissociation between single-word processing and sentence comprehension observed in patients with Primary Progressive Aphasia. Furthermore, we will explore the development of U-shaped fibers that connect the sensory-motor homunculus and their role in conditions such as autism spectrum disorder and congenital blindness. The results reveal a compelling association between fiber myelination and abilities reliant on tactile-motor integration. The data presented will provide valuable insights into the benefits of utilizing tractography in clinical cases and will also offer a comprehensive understanding of its limitations in the context of connectomic analysis.

KL4. Positive and negative symptoms of schizophrenia: insights from neuroimaging and brain stimulation research

A. Aleman
Department of Biomedical Sciences, University Medical Center Groningen, The Netherlands
Department of Psychology, University of Groningen, The Netherlands

Researchers in neuropsychology have increasingly been using neuroimaging to gain insight into the cognitive and neural basis of schizophrenia. Key findings from such studies will be briefly reviewed in this presentation, regarding delusions and hallucinations (the positive symptoms) on the one hand, and regarding apathy and anhedonia (the negative symptoms) on the other. For auditory-verbal hallucinations (hearing voices), the speech processing system has been shown to be relevant. For negative symptoms, compromised reward processing has been demonstrated. The neuroimaging results have inspired novel treatment approaches, using noninvasive brain stimulation. For positive symptoms, more specifically auditory hallucinations, 1Hz rTMS stimulation of left temporal regions has mainly been used. Results have been mixed, with the most recent findings (including our own) suggesting small to negligible effects. For negative symptoms, studies with rTMS have focused on the lateral prefrontal cortex, at 10 Hz or higher. The location of stimulation is based on theoretical models of the functional neuroanatomy of goal-directed behavior. A meta-analysis of recent findings will be presented that suggests that treatment with noninvasive magnetic brain stimulation may ameliorate negative symptoms. Such stimulation has previously been shown to target circuits with dopaminergic innervation. In our most recent trial, we tested iTBS (intermittent theta-burst TMS) over the right DLPC for improving negative symptoms (especially apathy) in patients with schizophrenia. Results will be discussed in relation to other recent studies. Taking all published findings together, the results of NIBS studies have clinical implications and may aid the development of novel treatment strategies.

Keywords: schizophrenia, hallucinations, apathy, neuroimaging, brain stimulation

Cortex Prize Lecture

Mapping memories that last: Neural patterns that promote durable memory formation

I. Wagner
Faculty of Psychology, University of Vienna, Austria

Some memories are more enduring than others – but what distinguishes them on the neural level, and how can we improve memory? In this talk, I will discuss results from my group attempting to chart the neural markers for longer-term, durable memories. I will first examine the neural patterns dissociating durable from weaker memories that will eventually fade with time. I will then show that spatial-associative memory techniques, such as the method of loci, serve to increase durable memories while simultaneously decreasing hippocampal-neocortical engagement. Such neural efficiency can be achieved not only by world-class "memory champions" but also by mnemonics-naïve individuals after consistent training. Switching gears, recent work has focused on spatially-tuned cells in the medial temporal lobe, including grid cells in the entorhinal cortex. Grid-like codes have been traditionally viewed in the context of spatial navigation. We find that they are also linked to visual information sampling through eye movements that set the stage for memory formation. Overall, my group's efforts strive to understand memory durability from multiple perspectives, ultimately seeking to comprehend the underlying mechanisms of memory-related cognitive decline in aging and neurodegenerative disease.

Keywords: memory, grid-like codes, functional magnetic resonance imaging (fMRI)

Colloquia

COLLOQUIUM 1

Updates on Aphasia Prognosis, Assessment, and Treatment from The International Collaboration of Aphasia Trialists

Organiser

C. Breitenstein
Department of Neurology with Institute of Translational Neurology, University of Muenster, Germany

CQ1. Assessing aphasia & treatment outcome

K. Hilari
Department of Language and Communication Science, City, University of London, United Kingdom

This presentation will cover advances and current thinking in aphasia assessment and outcome measurement. A key consideration is what the priorities are of key stakeholders in terms of what should be assessed. The results of an international study will be presented. It involved a scoping review of aphasia outcome measurement instruments, extensive consultation with people with aphasia and their families (19 nominal groups internationally)1; and aphasia clinicians and managers (n=318 from 25 countries)2 on which outcomes were important to them3, and two international consensus meetings. This work has led to the development of a Core Outcome Set for aphasia, i.e., a minimum set of outcomes that should be measured and reported in all aphasia trials.4,5 The consensus measures for language, communication, emotional wellbeing and quality of life comprised the Western Aphasia Battery Revised (WAB-R), The Scenario Test (TST), the General Health Questionnaire – 12 item version (GHQ-12), and the Stroke and Aphasia Quality Of Life – 39 item generic version (SAQOL-39g) respectively. Evidence on these measures' psychometric properties and adaptations in different languages will be covered. I will also present current work of the Collaboration of Aphasia Trialists Aphasia Assessments and Outcomes Working Group on linguistic and cultural adaptations of aphasia measures. Lastly, current and future research in aphasia assessment and outcome measurement will be highlighted.

Keywords: aphasia, assessment, Core Outcome Set

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CQ2. Evidence-based aphasia treatment

C. Breitenstein
Department of Neurology with Institute of Translational Neurology, University of Muenster, Germany

Aphasia is subjectively one of the most devastating stroke consequences. There is no cure for persistent post-stroke aphasia and thus a need for continuous rehabilitation services to improve communication, language and quality of life. Systematic reviews and meta-analyses consistently supported the general efficacy of (intensive) aphasia treatment, but the quality of evidence ranged from low to moderate. In this overview, I will present the results of recent multicentric randomized controlled trials (RCTs) sufficiently powered to demonstrate superiority of an (intensive) aphasia intervention compared to a no treatment or usual care control (efficacy and effectiveness trials). Additionally, I will discuss the findings of a recent network meta-analysis with 959 individual participant data from 25 RCTs probing the efficacy of aphasia interventions. Both lines of evidence yielded the largest aphasia treatment effects for functionally tailored, mixed receptive-expressive therapy with prescribed home-practice. However, the optimal treatment frequency, intensity and duration varied by language/communication outcome, aphasia chronicity and severity, and age. High treatment intensity seems to work best for working-aged people with aphasia in the chronic stage post-stroke with mild to moderate aphasia. Several trials are currently underway to determine the minimally required and optimal therapy regimen for subgroups of the post-stroke aphasia population.

Keywords: aphasia, treatment intensity, treatment efficacy

CQ3. Adjuvant aphasia interventions, from pharmacological to non-invasive brain stimulation

S. Filipović
Institute for Medical Research, University of Belgrade, Serbia

Along with mobility and motor function impairments, aphasia is among the most frequent post-stroke disorders. Although in some stroke survivors aphasia resolves spontaneously, most of these people require treatment to regain effective language and communication skills. Similar is the case for post-traumatic aphasia. In neurodegenerative aphasias, the need for treatment is even more emphasised. The mainstay of any aphasia treatment is speech and language therapy (SLT). The intense and prolonged SLT has been shown to be able to bring about considerable improvements in aphasias of various aetiologies. However, SLT is a high-professional, time-consuming, and labour-intense activity. Given the number of people with aphasia requiring treatment, even the well-funded and well-organised health systems are struggling to provide adequate SLT to everybody who needs it. Therefore, there is an acute need for adjuvant interventions in aphasia treatment that could enhance and/or prolong the effects of the SLT. Two groups of interventions have been particularly in focus over the last decades. One is non-invasive brain stimulation (NIBS), comprising repetitive transcranial stimulation (rTMS) and transcranial electrical stimulation (tES). The other is pharmacotherapy where several groups of drugs have been shown to be beneficial or potentially beneficial, including memantine and reversible cholinesterase inhibitors, selective serotonin reuptake inhibitors (SSRI), and levodopa and catecholamines. I will present the results of several recent systematic reviews as well as some influential studies covering the mentioned interventions. In addition, I will present recently developed guidelines for the clinical use of rTMS, tES, and pharmacotherapy in post-stroke rehabilitation.

Keywords: aphasia, non-invasive brain stimulation, pharmacotherapy

CQ4. Predictors of aphasia recovery & treatment success

A.E. Hillis
Department of Neurology, Johns Hopkins University School of Medicine, United States of America

Recovery from post-stroke aphasia is highly variable across individuals. I will review longitudinal studies that have evaluated predictors of recovery, including initial severity of aphasia, age, education, lesion variables (e.g. volume and location of stroke), brain health (indicated by white matter hyperintensities and atrophy), medications, certain genetic factors, time since stroke, and presence or absence of speech therapy. Although initial severity and time since stroke are the greatest predictors of recovery, some people with initially severe aphasia show complete recovery, and some people with mild aphasia fail to recover or even decline in language function. Furthermore, while recovery is most rapid early after stroke, many people with chronic stroke show further improvement in language, at least if therapy is provided. I will also review evidence from several trials of treatment at acute, subacute, or chronic stages after stroke that have revealed variables that influence response to specific treatments. Finally, I will review aggregated data that show treatment variables that influence the degree of recovery after stroke, such as type, frequency, and duration of speech and language therapy.

Keywords: aphasia, predictors, recovery

COLLOQUIUM 2

Apraxia: From Cognition and Clinical Symptoms to Neural Mechanisms and Neuromodulation

Organiser

P.H. Weiss-Blankenhorn
Motor Cognition Group, Cognitive Neuroscience, Institute of Neuroscience and Medicine (INM-3), Forschungszentrum Jülich, Germany

CQ5. Cognitive mechanisms underlying apraxic deficits

A. Bartolo
Department of Psychology, SCALab UMR CNRS 9193, Université de Lille, France

Angela Bartolo will talk about the cognitive mechanisms underlying apraxic deficits. In particular, she will elucidate the parameters influencing the execution of meaningful gestures, here pantomimes (Bartolo et al., 2003; Bartolo et al., 2020; Ruotolo et al., 2020), and the difference between pantomime and intransitive manual actions (Bartolo and Cubelli, 2014; Bartolo and Stieglitz Ham, 2016; Bartolo et al., 2019; Lesourd et al., 2018).

Keywords: apraxia, pantomimes, meaning

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CQ6. Apraxic deficits in stroke and other neurological diseases

E. Rounis

Chelsea and Westminster Hospital NHS Foundation Trust, London, United Kingdom

Elisabeth Rounis will describe a unifying mechanism known as the "affordance competition hypothesis" to explain the numerous behavioural factors underlying deficits in apraxia and its presence in stroke and other neurological diseases (Rounis and Humphreys, 2015; Rounis and Pizzamiglio, 2019). An example of this mechanism and their underlying neural correlates will be provided in deficits elicited when grasping familiar objects (known as 'transitive' actions) in apraxia after stroke (Pizzamiglio et al., 2019; Rounis et al., 2017; Rounis et al., 2018; Zhang et al., 2021).

Keywords: apraxia, stroke, Parkinson's disease

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CQ7. Lesion mapping of apraxic deficits

C.C. Schmidt

Cognitive Neuroscience, Institute of Neuroscience and Medicine (INM-3), Forschungszentrum Jülich, Germany

After some introductory remarks on the current methods of lesion-symptom mapping in apraxia (Schmidt and Weiss, 2022), Claudia Schmidt will delineate the cognitive components and their neural substrates underlying praxis deficits (Schmidt et al., 2022) with an emphasis on the effects of gesture meaning in imitation (Kleineberg et al., 2023) and subcortical lesions (Schmidt et al., under review).

Keywords: apraxia, meaning, PCA

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CQ8. Neuromodulation of apraxic deficits

P.H. Weiss-Blankenhorn
Cognitive Neuroscience, Institute of Neuroscience and Medicine (INM-3), Forschungszentrum Jülich, Germany
Department of Neurology, University of Cologne, Faculty of Medicine and University
Hospital Cologne, Germany

Following up on studies investigating the modulation of gesture processing by transcranial direct current stimulation (tDCS) in healthy subjects (3. Weiss et al., 2013), Peter Weiss(-Blankenhorn) will present promising data of a pilot study showing an effect of tDCS on apraxic imitation deficits in stroke (1. Ant et al., 2019). Finally, he will present an on-going randomized controlled trial (RCT) on tDCS in stroke-related apraxia (2. Kleineberg et al., 2020).

Keywords: apraxia, tDCS, TMS

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COLLOQUIUM 3

Unwanted Thoughts and Actions

Organiser

S. Jackson
School of Psychology, University of Nottingham, United Kingdom

CQ09. The Neuropsychology of Unwanted Thoughts and Actions: evidence from Tourette syndrome

S. R. Jackson
School of Psychology, University of Nottingham, United Kingdom

Unwanted, involuntary, thoughts/actions are observed in a wide range of neuropsychological conditions, particularly neurodevelopmental conditions such as Tourette syndrome (characterised by premonitory urges and motor/phonic tics) and OCD (characterised by unwanted thoughts and compulsions). It is noteworthy that these conditions, along with several others linked to unwanted thoughts/actions, are highly co-occurring, which may reflect a common underlying neuropathology and functional anatomy. Furthermore, while these unwanted thoughts or actions can be voluntarily suppressed to some extent, in many cases suppression is accompanied by uncomfortable sensory or cognitive experiences, which are experienced as a strong urge-for-action that becomes difficult to resist. In this talk I provide an overview of the pathophysiology and neuropsychology of Tourette syndrome which provides relevant context for the talks that follow in this symposium.

CQ10. Investigating the functional anatomy and oscillatory dynamics of urge

M.S. Houlgreave[1], E. Uruñuela[2], C. Caballero-Gaudes[2], K. Dyke[1], A. Gialopsou[1], P. Gowland[3], R.M. Sánchez-Panchuelo[3], I. Mohammed[1], E. Boto[3], V. Brandt[4], M. Brookes[3], S.R. Jackson[1,5]
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[2] Basque Centre on Cognition, Brain and Language, Spain
[3] Sir Peter Mansfield Imaging Centre, School of Physics and Astronomy, University of Nottingham, United Kingdom
[4] Department of Psychology, Centre for Innovation in Mental Health, University of Southampton, United Kingdom
[5] Institute of Mental Health, School of Medicine, University of Nottingham, United Kingdom

Aims: Tic expression during neuroimaging is most often required as an overt marker of increased urge-to-tic in Tourette Syndrome (TS), however this can lead to a loss of large amounts of data due to head movement. Our aim is to identify the regions involved in urge and investigate their oscillatory activity.

Method: We examined the urge-to-blink in 20 healthy volunteers. The BOLD signal during the two conditions, "Okay to blink" and "Suppress", were compared to identify brain regions involved in suppression. As participants continuously reported their subjective urge-to-blink using a rollerball device, we also investigated the BOLD signal correlated with the build-up of urge. Using a paradigm free mapping (PFM) approach, the same regions were then identified without prior specification of timings. Wearable optically pumped magnetometer MEG was used to explore the oscillatory activity in the identified urge-related regions during an urge-to-blink paradigm in healthy volunteers and an urge-to-tic paradigm in TS patients. We will compare the oscillatory activity prior to blinks/tics during "Rest" and "Suppress" blocks, and explore activity which correlates with their subjective urge ratings.

Results: Subjective urge scores were correlated with activity in the right posterior and ventral-anterior insula as well as the anterior cingulate and occipital cortices. Furthermore, suppression was associated with activation in the dorsolateral prefrontal cortex, cerebellum, right dorsal-anterior insula and mid-cingulate cortex. The right insula and cingulate cortex were identified using the PFM approach, demonstrating activity associated with suppression can be identified without prior knowledge of task timings.

Discussion: Different regions within the right insula contribute to the urge-for-action and suppression networks. We predict that there will be changes in oscillatory power in the insula and cingulate during feelings of urge.

Conclusions: Understanding what regions are involved in suppression and urge could also allow us to investigate how these regions interact before tics.

Keywords: Tourette Syndrome, urge, multimodal neuroimaging

CQ11. Further characterisation of the rat model of Tourette-related striatal disinhibition: in vivo electrophysiological and behavioural studies

J. Loayza, C. Taylor, J. Renstrom, R. Grasmeder Allen, S. Jackson, T. Bast
School of Psychology, University of Nottingham, United Kingdom

Aims: Tourette syndrome is characterised by loss of GABAergic inhibition, so called neural disinhibition, in the striatum (1). Dorsal-striatal microinjection of GABA-A antagonists, including picrotoxin, produces tic-like movements in rodents and primates that resemble motor tics in Tourette's (2). Here, characterised further the neuro-behavioural impact of striatal disinhibition by electrophysiological and behavioural measurements.

Method: We unilaterally infused picrotoxin (300ng/0.5ul) or saline (0.5ul) into the anterior dorsal striatum of adult male Lister hooded rats and measured changes in neural activity using electrophysiological recordings, tic-like movements using video recordings, locomotor activity using automated photobeam measurements in an open field, and prepulse inhibition (PPI) of the acoustic startle response.

Results: Electrophysiological recordings in the striatum under anesthesia showed that striatal disinhibition by picrotoxin, apart from evoking large spike-wave LFP discharges, markedly enhanced multi-unit burst firing. In freely moving rats, striatal picrotoxin reliably induced tic-like movements of the contra-lateral forelimb and increased locomotor activity and fine motor counts. PPI of the acoustic startle response was not affected, startle reactivity tended to be reduced.

Discussion and Conclusions: Striatal disinhibition caused striatal spike-wave discharges in anaesthetised rats, similar to previous findings in freely moving rats, and enhanced burst firing of striatal neurons. In freely moving rats, we showed that alongside tic-like movements, striatal disinhibition increased locomotor activity, suggesting such disinhibition may contribute to hyperactivity, which is often comorbid with Tourette's. The time course of the fine motor count matched that of tic-like movements, suggesting a simple automated way to measure these. Contrasting with PPI disruption in Tourette's, striatal disinhibition in rats did not affect PPI, suggesting striatal GABAergic inhibition is not required for intact PPI and deficits in PPI are not necessary for tic-like movements.

Keywords: Tourette's, striatal disinhibition

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CQ12. Impulsivity in Tourette disorders

Y. Worbe
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COLLOQUIUM 4

Neuroimaging for Predicting Recovery

Organisers

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CQ13. Predicting post-stroke prognoses from MRI without lesion segmentation

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Aims: Brain imaging data provide important features for predicting recovery from post-stroke aphasia (language impairment), because they allow us to measure exactly where and how much brain damage each patient has suffered. Unfortunately, inferences from these images are complex. The gold standard for this process is labour-intensive manual lesion segmentation, by specially trained staff, and though numerous automated methods have been proposed to circumvent this effort, none has attracted consensus support. The goal of this work was to show that we can potentially circumvent the whole lesion segmentation process, and predict post-stroke prognoses directly from MRI.

Method: In perhaps the largest cohort of its kind in the world (n=1,300), we compared the accuracies of prognoses predicted either: (a) via a standard machine learning model (XGBoost), drawing on lesion information (the baseline model); or (b) a deep convolutional neural network model drawing on MRI, without lesion segmentation. Both models also employed non-lesion factors such as age at stroke onset and time post-stroke when language outcomes were assessed. Both models were trained predict scores representing the quality of patients' speech after stroke. Both models were implemented in Matlab, and tested in 10 times 10-fold cross-validation, using the same folds. Predictions were averaged across the 10 repetitions of the cross-validation.

Results: The baseline model matched (or slightly exceeded) state-of-the-art performance as reported in prior work. The CNN model matched (or slightly exceeded) the baseline model's performance.

Discussion: Lesion segmentation is either time-consuming and expensive when implemented by hand, or unreliable and contentious when implemented with algorithms. This is a significant barrier to the exploitation of post-stroke prognostic models in clinical practice. These results suggest that we might be able to circumvent lesion segmentation, in post- stroke prognoses, by deriving prognostic factors directly and automatically from MRI.

Keywords: prognosis, machine learning, deep learning, stroke, aphasia

CQ14. Predicting long-term recovery of spatial neglect

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Aims: Previous studies demonstrated that spatial neglect – a common neuropsychological deficit after right hemispheric stroke – is a strong predictor for poor performance on a wide range of everyday tasks including general cognitive dysfunction and resistance to rehabilitation. The possibility of predicting long-term recovery of spatial neglect already in the acute phase of stroke is therefore of great relevance for clinicians as well as for affected patients and their relatives. The aim of the present study was to test different variables – imaging and non-imaging data – and to compare their predictive values.

Method: For the prediction of neglect recovery, we investigated the predictive value of individual demographics (age, sex), the acute neglect severity, and acute lesion information (volume, map) from right hemispheric stroke patients. Patients were neuropsychologically tested in the acute and chronic phase of stroke. Prediction models were built using machine learning algorithms with nested cross-validation.

Results: Obtained model performances indicate that acute data can already predict chronic neglect, that the predictive value varies across the investigated variables, and that imaging and non-imaging data were not equally predictive.

Discussion: Findings suggest that the severity of chronic spatial neglect can be predicted by using acute patient information.

Conclusions: Improved neglect prognosis will not only be able to provide realistic expectations but can also offer guidance for individually tailored treatments.

Keywords: prognosis, machine learning, stroke

CQ15. Exploring Connectivity Mechanisms of Focal Brain Lesions

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Aims: Advanced magnetic resonance imaging (MRI) sequences have enhanced our understanding of the brain. Resting-state functional MRI (rsfMRI) allows to explore the "functional connectome" - a hierarchical structure organized into polyfunctional neural networks. Diffusion-weighted imaging (DWI) allowed for the inference of structural connections between regions (structural connectome), complementing the functional connectome. Recently, the emergence of big neuroimaging data (e.g., Human Connectome Project - HCP), enabled the indirect estimation of functional/structural disconnections using large normative atlases. This methodology has the advantage of unraveling patterns of brain dysconnectivity in disorders involving focal lesions, where direct quantification of disconnections is challenging.

Method: In a large cohort of first-time stroke patients, we assessed the link between functional dysconnectivity and cognitive outcomes. Furthermore, we evaluated the potential predictive value of the structural connectome for the overall survival of patients with glioblastoma (GBM) in two independent cohorts. We used a comprehensive normative functional and structural connectome derived from the HCP.

Results: In stroke patients (n=123), the analysis revealed a distinct spatial distribution of functional dysconnectivity. However, despite using an advanced methodology to improve dysconnectivity estimation, network topology showed limited prediction for behavioral deficits following stroke. In our analysis of two independent datasets comprising 92 and 52 patients with GBM, the structural connectome demonstrated a strong predictive power for survival.

Discussion: Dysconnectivity approaches in stroke and GBM showed specific spatial topological patterns, suggestive of a close relationship between focal lesions and network disconnections. This pattern may have a crucial role in predicting clinical outcomes (e.g., survival). However, predicting cognitive deficits may require a more comprehensive approach, as dysconnectivity approaches may not fully capture the complex changes that occur following brain lesions.

Conclusions: Our study sheds light on the importance of understanding the interplay between brain connectivity and cognitive and clinical outcomes in focal brain disorders.

Keywords: brain connectivity, focal lesions, connectome

CQ16. Connectomics/Disconnectomics: an opportunity towards precision neurorehabilitation after stroke

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Stroke is one of the leading causes of long-term disability, especially motor disabilities impact significantly on daily life activities and the return to normal work and private life. Advanced neuro-technological solutions exploiting for example BCI, brain stimulation, robotic or peripheral stimulation systems can increase the efficacy of stroke rehabilitation with promising results. However, the treatment results are still limited in magnitude and heterogenous advocating for a conceptual change from 'one-suits-all' treatment strategies, as applied currently, towards personalized, individual patient-tailored concepts.
Such a paradigm shift and "evolutionary" change can occur only done by detailed understanding of natural stroke recovery and neurorehabilitation. To design personalized interventional strategies based on neurotechnology, it is necessary to have an excellent understanding of the mechanisms determining the effectiveness of a treatment in the heterogeneous population of stroke patients and to determine biomarkers allowing to predict outcome and treatment response for patients' stratification and to tailor treatment.
The present talk will summarize current approaches for 'phenotyping' of stroke patients based on multimodal systems neuroscience with a focus on connectomics/disconnectomics and provide an outlook of how such information might be used for personalized patient-tailored interventional strategies

Key publications

1. Koch PJ, Park CH, Girard G, Beanato E, Egger P, Evangelista GG, Lee J, Koch G, Thiran J-P, Guggisberg A, Rosso C, Kim YH, Hummel FC (2021) The structural connectome and motor recovery after stroke: predicting natural recovery Brain Aug 17;144(7):2107-2119. doi: 10.1093/brain/awab082
2. Wessel MJ, Egger P, Hummel FC (2021) Predictive models for response to non-invasive brain stimulation in stroke: a critical review of opportunities and pitfalls. Brain Stimulation Sep 21;14(6):1456-1466. doi: 10.1016/j.brs.2021.09.006

COLLOQUIUM 5

Center for Cognitive and Behavioral Brain Imaging

Organiser

R. Prakash
The Ohio State University, United States of America

CQ17. The power of early social cognition assessment for understanding neuropsychological development across the lifespan

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Researcher & Director of the Brain & Development Axis, Ste-Justine Hospital Research Center, Québec, Canada

Dr Beauchamp will present a transdisciplinary perspective on the field of social cognition by introducing theoretical models and assessment paradigms at the crossroads of neuropsychology, social neuroscience and other fields. Documenting early social cognitive development, such as theory of mind and moral reasoning, is critical for understanding and tracking social and cognitive competence. Empirical data and case studies from pediatric acquired brain injury and various neurodevelopmental disorders will highlight the ways in which comprehensive social cognitive assessment can inform research and practice.

CQ18. Neuropsychological Contributions to Lifespan Clinical Trials Research

L. Dobson
Neuropsychological Consultant & President of ScandicNeuro Corp, Boca Raton, FL, United States of America

Dr. Dobson will discuss the role of neuropsychology in global clinical trials research. Clinical trial sites are located in a variety of cultural settings and focus on multiple neuropsychological disorders across the lifespan. Due to the complicated nature of global clinical trials, there are interesting topics related to diversity and equity, generalizability of results, and trial participant selection process to explore. Dr. Dobson will highlight the responsibilities related to neuropsychology, including participating in important measurement decisions fine-tuned for the trial aims, test adaptation, and the criticality of the selected neuropsychological endpoints.

CQ19. Understanding Influences on Inter-variability in Frontal Lobe Functioning

S. MacPherson
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A number of factors have been proposed to account for some of the reported variability in cognitive performance among individuals who undergo age-related changes or brain damage of the same magnitude. Dr MacPherson's talk will discuss individual inter-variability in terms of performance on tests used in clinical practice and research to assess executive functioning and social cognition. She will highlight certain cognitive and environmental factors that may account for some of the variability in performance on "frontal" tests based on data from patients with focal frontal lesions and healthy older adults. Better understanding of the mechanisms underlying heterogeneity of brain pathology is important as it may aid clinicians in their ability to predict patients' cognitive outcomes.

CQ20. Imaging Advances Enhancing Lifespan Neurospsychology Research and Practice

R. Prakash
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In this talk, Dr. Prakash will discuss how publicly available datasets such as the Human Connectome Project-Aging can be utilized to build robust and generalizable brain-based models. These models can provide a nuanced and detailed understanding of the maturation and aging of the human brain, as well as its impact for neuropsychological performance throughout the lifespan. Dr. Prakash will demonstrate the use of computational modeling techniques to integrate functional connectivity patterns with cognitive data, with the aim of creating age-invariant and age-variant whole-brain models that can predict attentional control. Moreover, these models have significant implications for age-related changes in fluid cognition, therefore advancing our understanding of adult neuropsychology.

Symposia

SYMPOSIUM 1
Visual Cognition and Oculomotor Control in Neurodegenerative Disease

SP01. Can cognitive tests differentiate Progressive Supranuclear Palsy from Parkinson's disease?

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Progressive Supranuclear Palsy (PSP) is a neurodegenerative disease characterized by a wide range of symptoms including falls proneness, mobility difficulties, akinesia, axial rigidity, and vertical paralysis of the gaze. Owing to the large overlapping of these clinical signs with those reported in the idiopathic Parkinson disease (PD), PSP is often mistaken as PD, at least during the early stages of the pathology. Existing research suggests that people with PSP have problems with visuospatial attention and short-term memory as compared to PD patients, but these factors are not routinely used during diagnosis. The present study aims to test the relevance of these tests in patients suffering from PSP and PD as compared to age-matched control (AMC). Visual attention was assessed using to three visual search tasks in which participant had to identify a target among distractors (defined by its colour, its orientation, or a conjunction of both). The short-term memory task required the subject to recall the colour or the position of one among several objects. Additionally, we used an emotion recognition task to assess social cognition and three tests (saccades, smooth pursuit and reading) to explore the oculomotor system integrity. Overall, PSP group performed worse in all tasks as compared to PD and AMC groups. Especially, visual search discriminated extremely well between PSP and PD patients in the orientation condition, potentially paving the way towards a new and cheap diagnostic tool for clinicians.

Keywords: attention, neurodegeneration, memory

SP02. Characterizing the relationship between attention and visuomotor control based on recent insights into the properties of premotor attention shifts

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Psychophysical dual-task experiments have reliably demonstrated a selective enhancement of visual processing capacities at targets of forthcoming eye and hand movements. This phenomenon implies that motor programming entails a spatially congruent covert shift of attention, providing pivotal evidence for a close link between attention and motor action. The highly influential premotor theory of attention even claims that this attention-action coupling is obligatory, with covert attention shifts arising from neuronal activity within the motor system and reflecting an epiphenomenal byproduct of motor programming. Yet, this claim has increasingly become a matter of controversy in light of the results of various, more recent psychophysical studies on healthy human subjects. As demonstrated in a dual-task paradigm comprising the presentation of two nearby, competing target objects, visual attention does not necessarily shift to the endpoint of subsequent saccadic eye movements. More specifically, visual processing was found to be not enhanced at the endpoint of so-called averaging saccades involuntarily landing between competing target objects – a finding that clearly challenges the notion of a strict dependence of attentional orienting on motor programming. This talk will focus on discussing these and similar findings to revisit the controversy around the well-established attention-action coupling. Doing so will include addressing central insights regarding the properties of attentional mechanisms in the context of visually guided action and outlining how these insights can help to better understand the role of attention in visuomotor control.

Keywords: attention, saccade, oculomotor

SP03. What does Alzheimer's Disease reveal about the relationships of attention, working memory and the Inhibitory control of saccadic eye movements?

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Several theories of visual search and inhibitory control propose a strong contingency between spatial attention, working memory and inhibitory control. Patients with early dementia due to Alzheimer's disease (AD) and Mild Cognitive Impairment (MCI) provide an ideal opportunity to evaluate these theories, given their impairment of working memory. I will present a series of eye-tracking studies conducted in my lab over the last 15 years on Alzheimer's disease. Large group studies revealed that patients with AD have a reliable impairment of inhibitory control in the anti-saccade task (AST). Patients with AD (but not Parkinson's Disease) and patients with amnesic MCI (but not non-amnesic MCI) generate a high proportion of uncorrected errors in the AST. These errors present early in the disease progression and correlate with the severity of the dementia. Detailed single case studies show that the impairments of inhibitory control are dissociated from the impairment of working memory, which presents a challenge for theories that argue that the constructs of inhibitory control and working memory are one and the same. Curiously, the 'gap' effect, inhibition of a recent distractor effect [1] and oculomotor behavior in more ecologically valid tasks such as making a cup of tea are preserved in AD or MCI. Together these findings reveal that a dysfunction of working memory can co-exist with the preservation of selective attention in the laboratory and top-down control during everyday behavior. In addition to the clinical relevance, these findings have implications for cognitive control theories of active vision.

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SP04. Using oculomotor control to help aid the accurate diagnosis and track the progression of Parkinson's Disease

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Currently, we don't have any objective tests for Parkinson's disease (PD). As saccadic eye movements are fast and can be measured objectively and non-invasively, they are a promising candidate for quantifying motor and cognitive dysfunction in PD. Here I will present our work on the use of simple measures of oculomotor control and how we have been using them to help us diagnose and track the progression of PD. Changes in saccadic eye movements can be used to assess the effects of medications such as the well-known levodopa or other treatments such as deep brain stimulation, on motor control. I will also talk a little bit on our recent work on the evaluation of the latency, damping and amplitude of saccades in a population of both PD patients as well as healthy controls. We have developed machine learning approaches to differentiate between patients' groups using the raw saccadic data. Eye movements are a valuable tool in the diagnosis and management of Parkinson's disease and have the potential to provide valuable insights into the underlying mechanisms of the disease and help guide the development as well as the effectiveness of new treatments. Saccadic eye movements and smooth pursuit tests, can be used in conjunction with clinical assessments to aid in the accurate diagnosis of PD.

Keywords: Saccade, Parkinson's Disease, Pursuit

SYMPOSIUM 2

The Memory of Things to Come: Neuropsychological Studies of Future Thinking and Prospective Memory

SP05. Boundary extension and future thinking in Korsakoff patients

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Aims: Boundary extension is the remarkable phenomenon that when people have to reconstruct a previously studied visual scene from memory, they tend to create a zoomed out display of the scene in which its boundaries have been extended. This illustrates that their memories go beyond what was originally contained in the input and make a spatial prediction of the broader context. Boundary extension appears to be an automatic memory phenomenon. It could be a forerunner for future thinking in which participants have to form a deliberate image of a potential situation. In the current research we examined boundary extension and future thinking in amnestic patients (Korsakoff patients).

Method: Twenty Korsakoff patients and matched controls studied scenes of 2 colored cubes against an in-depth grid background including a horizon. After a 10 second delay they had to reconstruct the scene by resetting the horizon and placing and scaling the cubes. In a second study another group of 20 Korsakoff patients and 17 controls were required to describe both past and future events in relation to cue words (e.g., an apple). Descriptions were scored for level of contextual detail. Results: In the first study, controls scaled the cubes as smaller in their reconstructions than originally presented. Patients however did not show this effect. In the second study, patients provided significantly fewer episodic details than controls across both past and future conditions. Discussion. The absence of scaling effects in Korsakoff patients suggests they have limited boundary extension. In parallel, Korsakoff patients displayed severe difficulties in imagining future situations, providing descriptions that lacked contextual detail.

Conclusions: Korsakoff patients display deficits in both remembering the past and in projecting to the future. Automatic boundary extension and deliberate future thinking mechanisms may be functionally related.

Keywords: boundary extension, future thinking, Korsakoff patients

SP06. Episodic future thinking increases the execution of intentions in ADHD

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Aims: Individuals with Attention Deficit Hyperactivity Disorder (ADHD) often have difficulties to plan and implement intentions in everyday life. Empirical evidence indicates that engaging in episodic future thinking (i.e., mentally imagining executing the planned activity) during intention encoding can increase the execution of delayed intentions in typically developing populations in lab-based settings. The present study set out to investigate, for the first time, the impact of episodic future thinking on the implementation of real-life intentions in participants with and without ADHD. Method: To assess the execution of real-life intentions, participants were requested to perform the diary task (Altgassen et al., 2019). In a between-subjects design, 32 adults with ADHD and 31 controls were allocated to the episodic future thinking encoding condition and 31 adults with ADHD and 33 controls to the standard condition.

Results: Analyses of variance indicated a significant main effect of group and a significant main effect of encoding condition. Overall, controls remembered to execute more intentions than individuals with ADHD. Episodic future thinking increased the implementation of intentions as compared to the standard encoding condition. There was no significant interaction effect.

Discussion: This study replicates previous findings of reduced intention execution in individuals with ADHD and is the first to show beneficial effects of episodic future thinking on intention implementation in everyday life.

Conclusions: Episodic future thinking can help individuals with ADHD to remember to execute their delayed intentions and may therefore serve as a simple, yet efficient, encoding strategy in everyday life.

Keywords: future thinking, prospective memory, ADHD

SP07. Not remembering the things to come: Technology as a memory aid for Korsakoff patients

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Aims: Patients diagnosed with Korsakoff syndrome (KS) often fail to remember future actions, appointments and goals caused by this detrimental form of amnesia. While studies in other patients with brain impairment focused on training strategies, many of these methodologies fail to work in KS because of the severity of cognitive impairment. The aim of this project is to directly prompt KS patients with a technology aid called the MyWepp memory watch to see whether patient timing was improved when actively prompted.

Method: In a case study and a case series, inpatients of Korsakoff Expertise Center Slingedael were asked to perform novel tasks (study 1) and regular tasks (study 2). In the first study, a relatively high-functioning KS patient was asked to send pictures or short messages. The MyWepp watch gave visual (pictures) and auditory (a human voice) prompts 10 minutes prior to the event. In the second study, three regular functioning KS patients were asked to perform everyday tasks such as cleaning their room, visiting physical therapy or working in the garden prompted by the nurse or the MyWepp Memory Watch. Moreover, the patients were asked their preferences.

Results: On novel tasks, both the cell phone and MyWepp device were able to prompt the patient with a reasonable effect, while the MyWepp device resulted in somewhat better timing (study 1). On regular tasks, nurses prompting KS patients were equally effective to the MyWepp device, while patients showed a preference for the device.

Discussion: Technology to prompt patients diagnosed with KS has great potential to help patients to regain autonomy.

Conclusions: Smartwatches that give active prompts can facilitate KS patients in their daily routines and in novel tasks. Group studies in KS patients are required to guarantee the benefits over time.

Keywords: prospective memory, memory aids, Korsakoff patients

SYMPOSIUM 3

Space Cognitive Neuroscience: Cognitive, Behavioral, and Brain Changes due to Space Environment

SP08. Orienting voluntary and automatic visuospatial attention in zero gravity

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Aims: On Earth, orienting attention in space requires the integration of vestibular signals and vision, although the specific vestibular contribution to voluntary and automatic components of visuospatial attention1 remains largely unknown. We investigated how unweighting otolith inputs in microgravity might affect the different components of visuospatial attention.

Method: Two versions of the Posner spatial cueing task were used to assess orienting of exogenous (automatic) and endogenous (voluntary) attention. Participants (N=21, 10 F) had to detect the presence of peripheral visual targets which could be preceded by valid or invalid central predictive cues (endogenous task) or valid or invalid peripheral non-predictive cues (exogenous task). Participants were studied during brief periods of zero gravity during four ESA parabolic flight campaigns. They performed the tasks at 1g before the flight, at 0g and 1g on board the flight, and at 1g after the flight. Repeated-measures ANOVAs were performed on reaction times, with validity and condition as within-subject factors and sex as between-subject factor.

Results: For the exogenous task, a larger validity effect (invalid - valid trials) was found in 0g compared to all 1g conditions in males ($p<0.001$). An opposite pattern was observed for the endogenous task for the whole group, where the validity effect decreased in 0g compared to all 1g conditions ($p=0.006$).

Discussion: Microgravity enhanced orienting of automatic attention and reduced the ability to orient voluntary attention. By unweighting the otolith inputs to brain regions that overlap with the ventral attention system1,2, microgravity may have weakened egocentric reference frames in favour of allocentric reference frames3, enhancing stimulus-driven attentional capture.

Conclusions: Findings of this research may have implications for the development of effective countermeasures to be applied in space exploration and, on Earth, for the identification of interventions for the rehabilitation of individuals with vestibular disorders or with disorders of spatial attention.

Keywords: vestibular system, visuospatial orienting, microgravity

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SP09. Astronaut running memory continuous performance testing

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Aims: The WinSCAT (Windows Spaceflight Neuro-cognitive Assessment Tool) is a battery of 5 tasks developed by NASA to assess astronaut cognitive performance during spaceflight missions.[1] The aims of the current study were to assess astronaut running memory continuous performance (CPT, a subtest of the WinSCAT) and compare inflight scores to preflight baseline performance.

Method: The WinSCAT is administered in three phases: preflight (target 6 sessions); inflight (1 session every 30 days); and 1 session post-flight. For this analysis, we chose to focus on CPT throughput (CPTtp) incorporating test reaction time and accuracy. CPT is an attention task in which the test-taker must compare the current number on a screen with the number immediately prior and respond if they are the same. To compare the rate of improvement on this test between pre- and inflight testing, a linear model adapted from interrupted time series analysis was used. Our main parameter of interest was the estimated change in slope between preflight-to-inflight phases which we used to characterize the cognitive pattern into: no change, decrease, or increase in inflight performance improvement.

Results: The sample included 30 astronauts with an average of 5.87 (SD=0.4) pre-flight and 5.17 (SD=1.4) in-flight sessions. 3 subjects had a non-significant overall linear model (a set to <0.05) and were excluded. Of the remaining astronauts, 11 (41%) showed no change, 12 (44%) showed a decrease, and 4 (15%) showed an increase in improvement rate inflight compared to baseline.
Discussion: Significant changes in the rate of improvement between pre- and inflight testing were noted for 59% of the astronauts in this cohort.

Conclusions: This work is important for identifying cognitive changes that may occur during spaceflight and provides a performance metric for assessing possible associations with cerebral structural changes which are well-documented after spaceflight[2,3] but have unknown consequences for cognitive performance.

Keywords: attention, spaceflight, cognition

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SP10. Neural correlates of working memory changes in cosmonauts after long duration spaceflight

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Aims: The current study aimed to investigate retrospectively if working memory performance changes from pre- to post-flight correlate with functional connectivity changes observed in the same cosmonauts after a mission to the International Space Station. Method: Thirteen cosmonauts were included in this analysis. Brain MRI scans were acquired before the ISS mission (89 days (SD=199)) and after (9 days (3). Working memory performance was assessed through an independent study at 151 days (SD=99) before launch and 6 days (2) after landing. Resting-state functional MRI (rsfMRI) data were acquired. The intrinsic connectivity contrast (ICC) is computed. For the working memory task, balls were presented in a grid for two seconds. After a two second delay, the cosmonaut needed to indicate where the balls were located within the grid. Reaction time and errors were used as outcome values. The pre- to post-flight difference in ICC was correlated with the pre- to post-flight difference of the working memory task. The voxel-level threshold was set at $p<0.001$ uncorrected followed by a cluster-level threshold of $p<0.05$ corrected with the false discovery rate (FDR).

Results: Our results show that the ICC change in the right angular gyrus correlates with changes in errors made on the working memory task ($p(FDR)=0.009$).

Discussion: The right angular gyrus is responsible for awareness of action discrepancy and action authorship, relates actions to their sensory outcomes, intersensory conflict detection, and delay detection performance1-3. Based on our data, cosmonauts either show decreased ICC in the right angular gyrus with decreased errors during working memory performance after flight, or increased ICC with increased errors.

Conclusions: Understanding this variability will be important to further uncover the brain's adaptive capacity to the extreme environment of space. These data show the involvement of the right angular gyrus in working memory performance in cosmonauts after long-duration spaceflight.

Keywords: memory, functional connectivity, spaceflight

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SP11. Hippocampal Changes In Response To Long-Duration Spaceflight

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Aims: Data on the effects of spaceflight on subcortical structures critical for neurobehavioral health and cognitive performance such as the hippocampus are lacking. The extreme environmental conditions and operational stressors associated with long-duration spaceflight are expected to be disruptive to hippocampal health.

Method: Here we tested the hypothesis that prolonged spaceflight affects hippocampal structure. We studied 18 male space expeditioners (mean (SD) age: 44 (5) years) who lived and worked on the International Space Station (ISS) for an average of 6 months. We collected high-resolution T1-weighted magnetic resonance imaging (MRI) data on 3T scanners before and after the mission to study changes in hippocampal substructures. Data were collected about 3 months prior to launch, and 10 days after return, and during a follow-up session about 7 months after return. To account for scanner drift and aging effects on brain volume, we also obtained longitudinal data using the same methods from 18 controls living on Earth who were matched for sex, age, and educational background.

Results: We observed a significant mean decrease in bilateral anterior hippocampal volume after spaceflight. The changes were primarily driven by reductions in CA1 and the molecular layer and unrelated to fluid volume expansions of the adjacent ventricular spaces. Seven months after return from the ISS these reductions were no longer evident.

Discussion: This is the first longitudinal study in spaceflight crews highlighting the vulnerability and recovery of the hippocampus in response to spaceflight. The work also builds on previous publications by showing that these findings are independent of cephalic fluid shifts associated with weightlessness.

Conclusions: Extended exploratory endeavors such as missions to Mars may have even more profound effects, requiring further studies to identify the dose-response relationship between brain changes and spaceflight duration, and their impact on crew performance and health.

Keywords: hippocampus, MRI, spaceflight

SYMPOSIUM 4
Numerical Cognition & Emotion

SP12. Math anxiety, personality and physiological reactivity effect on numeracy in higher education students: Do field of study and gender matter?

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Aims: Poor numeracy is a cost especially to females, who are dramatically underrepresented in Science, Technology, Engineering, and Mathematics (STEM). While the cognitive underpinnings of numeracy have been extensively investigated, the effect of non-cognitive factors, such as math anxiety (MA) and personality, has been overlooked. Here we aim at investigating the role of two intertwined factors, namely the field of study and gender, that are sensitive to individual differences in MA and personality. Specifically, we set out to unveil dispositional, affective and physiological mechanisms sustaining numeracy in male and female STEM and non-STEM students.

Method: We conducted three studies, in which we recruited two groups, balanced for gender, of STEM and non-STEM students in higher education. In two online studies, students completed standardized tests assessing math anxiety, personality, intelligence quotient (IQ) and numeracy. In a third laboratory study, students' physiological reactivity (i.e., heart rate variability, skin conductance and salivary cortisol change) was recorded during the numeracy test.

Results: The personality trait neuroticism is negatively associated with numeracy in non-STEM students. However, among female, but not male, STEM students, neuroticism plays a positive mediating role on the effect of MA on numeracy. Moreover, preliminary results on physiological reactivity show that the stress response, indexed by cortisol change, positively correlates with better numeracy in non-STEM students with higher levels of MA.

Discussion: Neuroticism, a trait associated with stress responsiveness, and physiological stress response seem to have an impact on numeracy, which is not necessarily detrimental and depends on the field of study and gender. Depending on the degree of familiarity with math, which differs between STEM and non-STEM students, different affective mechanisms might be at work in males and females when performing numeracy tasks.

Conclusions: The contribution of affective and dispositional characteristics towards numeracy depends on field of study and gender.

Keyword: Mathematics, STEM, stress response

SP13. The anticipation of difficult tasks – Neural correlates of negative emotions and emotion regulation

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Aims: Difficult cognitive tasks are often associated with negative feelings. This can be already the case for the mere anticipation of having to do a difficult task. For difficult math tasks, it was recently suggested that such a negative emotional response may be exclusive to highly math-anxious individuals. However, it is also conceivable that negative emotional responses simply reflect that math is perceived as difficult.

Method: Here we investigated whether non-math-anxious individuals also experience negative emotional responses when anticipating to do difficult math tasks. We compared brain activation following the presentation of a numerical cue indicating either difficult or easy upcoming proportion magnitude comparison tasks.

Results: Comparable to previous results for highly math-anxious individuals we observed a network associated with negative emotions to be activated in non-math-anxious individuals when facing cues indicating a difficult upcoming task. Importantly, however, math anxiety scores did not predict the neural response. Furthermore, we observed activation in areas associated with processes of cognitive control areas such as anterior cingulate cortex, which were suggested to subserve emotion regulation.

Discussion: Activation in the emotion processing network was observed when anticipating an upcoming difficult (math) task. However, this activation was not predicted by individual' degree of math anxiety. Therefore, we suggest that negative emotional responses to difficult math tasks might be a rather common reaction not specific to math-anxious individuals. Whether or not this initial negative response impairs math performance, however, might depend on the ability to regulate those emotions effectively.

Conclusions: While the relevance of emotions and emotion regulation for task performance has been suggested before for the case of highly math-anxious individuals, we propose to extend this account to the case of non-math-anxious individuals. Particularly, the observed response patterns might indicate a general mechanism rather than a mechanism specific to math-anxiety.

Keyword: Number cognition, emotions

SP14. Learning new arithmetic knowledge in the adulthood – Effects of cognitive and non-cognitive factors

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Aims: Number competence is essential at any age for coping with the complex demands of our modern society. Individuals with low numeracy can face limitations in their autonomy in everyday situations. Improvement of number skills must therefore be an important goal of any rehabilitation and cognitive intervention. Here, we aim at investigating the acquisition of new arithmetic competence in healthy adults.

Method: In a first study, we required young and older adults to intensely train on complex multiplication problems (e.g., 28x3=?; training by using routine procedures). In a second study, we investigated the effect of different learning methods. Participants trained at the same time on two sets of new, invented arithmetic problems. One set had to be learned by memorising the associations between problem and solution (memory condition; e.g., 3#11=20), the other set by applying a new invented procedure (strategy condition; e.g., 3§13="[(2ndop+1stop)-10]+2n-dop"=19).

Results: In the first study, both groups showed significant improvements in accuracy and response times following training. However, training effects and transfer effects to untrained related division problems (e.g., 84:3=?) were lower for older adults than for young adults. In the second study, participants showed performance improvements with both learning methods. There were significant associations between training effects, prior arithmetic competence, domain-general cognitive factors (memory, executive functions), and non-cognitive factors (e.g., age, subjective number competence).

Discussion: The acquisition of new arithmetic competence is possible at older age as well. Performance improvements following different training methods are related to inter-individual differences in domain-general cognitive functions. Non-cognitive factors seem also to play an important role.

Conclusions: In general, our results contribute to a better understanding of the acquisition of new number proficiency in the adulthood. Acknowledgements: The second study was funded by EVTZ/Austrian Science Fund (FWF) IPN 135-B.

Keyword: Maths, Aging, Cognition

SP15. Mathematics anxiety – Pending questions and proposals for answers

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Aims: Six decades of research show that some individuals exhibit aversive reactions when encountering mathematics in academic and daily life contexts. This set of negative reactions called Mathematics Anxiety (MA) cannot be reduced to general anxiety or to poor mathematics ability. Even though some uncontroversial conclusions can be drawn about MA, several crucial issues still need to be resolved (1).

Method: A critical review of the MA literature to identify gaps and pending questions.

Results: Gaps and pending questions can be summarised as follows: (i) Understanding of MA: definitions differ either stressing differential or clinical aspects; it is not well-defined what the opposite pole of MA is: positive feelings, being neutral, or even negative feelings without the anxiety component? (ii) What is the empirical support for the validity of the MA construct in terms of convergence between self-descriptive, neural, physiological, and cognitive measures? (iii) Is there a discrepancy between state and trait MA? (iv) What is the prevalence of MA and how should it be estimated? (v) Is the effect of MA the same across different groups, such as highly anxious and highly math performing individuals? (vi) How to apply MA research in the classroom and in policy making? (vii) What are the effects of MA outside educational settings? (viii) What are the consequences of MA on mental health and well-being?

Discussion: Results of this review suggest solutions to the prevalence question (using external criteria), and between study incomparability (large-scale international dataset).

Conclusions: Answering these fundamental questions allows refining future MA research and resolving existing discrepancies between studies.

Keyword: Mathematics, anxiety

Reference

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SYMPOSIUM 5

Leveraging Technology to Improve the Diagnosis of Attentional Deficits Post-Stroke

SP16. Impact of aging and stroke a new computerized test of visual attention in far space

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Aims: In our everyday life we use visual search to locate people, places and objects around us and visual attention plays a pivotal role for efficient and successful visual search. Even though our visual attention operates to find stimuli in both near (within reach) and far (out of reach) space, most of the research in this area has been conducted in near space alone. Impairments in visual attention are very common following stroke with visual neglect as a classic manifestation. While visual neglect has been shown to dissociate between near and far space, currently there is no validated tool that measures visual attention in far space.

Method: We present a new simple, portable, and open-source automated test of visual attention in far space, the Computerized Extrapersonal Neglect Test (CENT). CENT consists of computerised versions of cancellation and line bisection tasks completed on a large screen in far space using a wireless remote. We tested CENT with 179 healthy controls (18-94 years old) and 55 stroke survivors. Aging effects, normative data and internal consistency were established from the healthy control data. Convergent and divergent validity and sensitivity were assessed in 55 stroke survivors (compared to 58 age-matched controls) who completed the CENT and the gold standard validated measures of visual neglect, cognition, and quality of life.

Results: Aging was accompanied by slower search speed and poorer quality of search and both these variables were significantly impaired in stroke survivors. The CENT demonstrated good internal consistency, convergent and divergent validity. Importantly, stroke survivors with neglect were specifically impaired in CENT when compared to other stroke survivors. In fact, the CENT presented higher sensitivity to attentional deficits when compared to standard clinical measures.

Conclusions: The CENT is a brief, automated, easy to administer tool, sensitive to age-related decline, brain injury and attentional impairments.

Keywords: extrapersonal attention, visual search, psychometrics

SP17. Eye see your neglect - Video-oculography during free visual exploration (FVE) is a sensitive, reliable and fast tool to detect neglect.

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Aims: Neglect is a common attention deficit after right-hemispheric stroke and is most accurately diagnosed by a systematic, ecological observation during everyday behaviour, using the Catherine Bergego Scale (CBS). However, the CBS is time-consuming and often omitted in clinical settings, especially stroke units. Over the past years we therefore used video-oculography during free visual exploration (FVE), a fast and promising tool to diagnose neglect, and investigated its usability, sensitivity and reliability in different patient studies.

Method: During FVE, photographs of natural scenes are presented, and the patient's individual eye-movements are measured using a remote, infrared-based, video eye-tracking system. In the off-line analysis data is cleaned, and the mean gaze position (MGP) calculated. The MGP is then compared against age-matched healthy controls.

Results: Study[1] showed that FVE can be performed in few minutes, and is sensitive in mirroring neglect in everyday behaviour.[1] FVE has a high sensitivity and specificity to diagnose neglect and is more sensitive than conventional neuropsychological paper-pencil tests (e.g. different cancellation tests, Line Bisection, Five-Point Test, and combinations thereof). Study[2] revealed good to excellent test-retest-reliability[2] suggesting the usefulness of FVE in longitudinal assessments of patients' neglect severity during neurorehabilitation and in treatment trials. Study[3] focussed on neglect in patients with mild to severe aphasia, in whom conventional neuropsychological tests entailing verbal instructions are very challenging. Since FVE requires only little understanding of simple non-verbal instruction, we show its feasibility in detecting neglect in aphasia patients.[3]

Discussion: Overall, FVE is a sensitive[1], specific[1] and reliable[2] assessment tool to detect neglect. Furthermore, it is easy to use and does not require verbal instructions.[3]

Conclusions: This fast and accurate screening tool allows the initiation of comprehensive neuropsychological diagnostics and therapy from early on. Beyond, FVE can be recommended for the longitudinal assessments of neglect severity during neurorehabilitation and in treatment trials.

Keywords: neglect, eye-tracking, sensitivity and reliability

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SP18. The role of eye and head orientation biases in egocentric reading errors in neglect dyslexia

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Aims: To characterize the relationship between reading errors and biases in gaze, eye orientation, and head orientation in patients with neglect dyslexia (ND).

Method: One participant with ND (ND+), one with spatial neglect but without ND (ND-), and one healthy control (HC) read aloud a passage while gaze, eye orientation, and head orientation were recorded with a wearable device.

Results: ND- and HC had no errors and evenly distributed gaze while ND+ accurately read <10% of the text and had a rightward gaze bias. Both ND+ and ND- had a rightward eye orientation bias, while HC had a slight leftward eye orientation bias. Finally, ND+ had unreliable and highly variable head orientation, ND- had a consistent leftward head orientation bias, and HC had no head orientation bias.

Discussion: Although ND- and HC showed similar performance in terms of reading accuracy and gaze distribution across the text, they showed quite different eye and head orientation patterns. In addition, both ND+ and ND- showed a similar rightward eye orientation bias throughout the reading task. Our findings suggest that individuals with SN may have a consistent eye orientation bias regardless of gaze distribution; and individuals with mild SN and without ND may use a leftward head orientation bias to compensate for a consistent rightward eye orientation bias.

Conclusions: In this study, we found a) a similar, nonbiased gaze distribution for HC and ND- and a rightward gaze distribution bias for ND+; b) a similar rightward eye orientation bias for ND+ and ND-; and c) a leftward head orientation bias for ND- and an uncoordinated head orientation behavior for ND+. These results suggest that the normalized gaze and reading behaviors in individuals with SN but without ND are accomplished by the deployment of leftward head orientation to compensate for a rightward eye orientation bias.

Keywords: neglect, gaze, reading

SP19. A visual search immersive virtual reality serious game for measuring spatial and non-spatial attention in patients with hemiparesis and hemineglect

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Aims: The most frequent impairments following stroke are motor hemiparesis and cognitive hemineglect. Patients with hemineglect have difficulties to perceive spatial stimuli contralateral to their lesion, and this difficulty is augmented by the presence of distractors, suggesting a non-spatial/inhibition component. It is well known that cognitive impairments moderate hemiparesis recovery. Yet, Stroke patients only receive neuropsychology intervention if the neurological assessor believes that the patient has cognitive impairments.

Method: We present a new serious game that measures attention. For spatial attention, the participant finds a target that is randomly presented within a 6 column 4 row grid, allowing spatial performance comparison (contralesional / ipsilesional). The target is presented with 11, 17 or 23 distractors (2-3-4 stimuli per row). Target-distractor salience is manipulated based on single (high-salience) or conjunction (low-salience) feature contrasts, with the low relative to high-salience distractors requiring more inhibition. We tested patients with stroke and aged healthy controls.

Results: For all participants, we replicated experimental literature showing that in the high-salience condition, the time to find the target was not influenced by distractor number. However, in the low-salience condition, the time to find the target increased linearly with distractor number, demonstrating increased inhibition demands. Further, we report that a group of patients with hemiparesis that received no neuropsychology intervention showed greater inhibition costs in the low- relative to high-salience condition, suggesting cognitive inhibition impairment. Finally, we present data from a case-series of patients with hemineglect, showing lateralised differences in target search as well as their non-spatial inhibition profiles.

Conclusions: We present a new test of spatial and non-spatial attention that demonstrates profiles of inhibition impairment in patients with hemiparesis and/or hemineglect. The test brings significant value to clinical assessment, and these data support a need for all patients with neurological profiles to undergo cognitive assessment.

Keywords: virtual reality, attention, assessment

SYMPOSIUM 6

Motivation, Affect, Social Cognition and Inhibitory Control Training in Parkinson's Disease: Recent Progress and Clinical Interventions

SP20. Apathy and impulsivity in Parkinson's Disease: Co-existing syndromes or a dimensional relationship?

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Aims: Apathy and impulsivity are debilitating conditions associated with neuropsychiatric and degenerative brain disorders such as Parkinson's disease (PD). They are also present as traits amongst the 'healthy' population. Yet, the relationship between these 'motivational' states remains unresolved. This study investigates apathy, impulsivity, negative affect and executive function in PD (n=68) and matched healthy volunteers (HV, n=32).

Method: Participants completed the Barratt Impulsiveness Scale, the Dimensions of Apathy Scale, the Hospital Anxiety and Depression Scale, and 2 executive function tests (semantic fluency, Stroop).

Results: Analysis of sub-scale scores revealed a complex relationship. The healthy adults showed associations between executive apathy and the 3 impulsivity subscales (motor impulsivity ($r(32) = 0.54, p<0.01$; non-planning impulsivity ($r(32)=0.53, p<0.01$; attention impulsivity ($r(32)=0.45, p<0.05$) and between initiation apathy and motor impulsivity ($r(32)=0.43$, $p<0.02$). All other associations failed to reach significance (all ps >0.05). In PD, by contrast, significant associations were present between apathy subscales (executive-initiation, $r(68) = 0.38$, $p<0.001$; emotion-initiation, $r(68) = 0.25$, $p=0.041$); impulsivity subscales (attention-non planning, $r(68) = 0.32$, $p=0.007$; motor-non planning, $r(68) = 0.52$, $p<0.001$); apathy-impulsivity subscales (executive apathy-impulsive attention, $r(68) = 0.49$, $p<0.001$; initiation apathy- nonplanning impulsivity, $r(68) = 0.43$, $p<0.001$). Significant associations were also present for negative affect (executive apathy, $r(68) = 0.46$, $p<0.001$; impulsive attention, $r(68) = 0.27$, $p=0.025$; nonplanning, $r(68) = 0.25$, $p=0.044$); and executive function (semantic fluency with executive apathy, $r(68) = -0.27$, $p<0.03$ and emotional apathy, $r(68) = -0.25$, $p<0.04$; Stroop interference errors with initiation apathy, $r(68) = -0.2$, $p<0.02$ and motor impulsivity, $r(68) = -0.25$, $p<0.04$).

Discussion: The positive associations between apathy and impulsivity subscales are consistent with the view that the two syndromes are independent of one another, rather than occupying opposite ends of a single continuum.

Conclusions: Our analyses suggest that at a global level, apathy and impulsivity do not exist at distinct ends of a continuum. Instead, they most often co-exist in PD and amongst the healthy population.

SP21. Depression and Anxiety's predictors in Parkinson's disease: Investigating the role of cognitive reserve

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Aims: The aim of the present study was to investigate the predictors of negative affect manifestations in Parkinson's Disease (PD). Specifically, we tested the hypothesis of a protective role of Cognitive Reserve (CR) on depression and anxiety.

Method: Data from 423 PD patients (mean age 61.5 years) and 196 healthy controls (HC; mean age 60.8 years) enrolled in the Parkinson Progressive Marker Initiative (Marek et al., 2011) were analyzed. CR was estimated considering the years of education, while anxiety symptoms were assessed through the State Anxiety Inventory (STAI-State, Spielberger, 1983), and depression through the Geriatric Depression Scale (GDS-15; Sheikh and Yesavage, 1986). For the patients' group, disease duration and motor symptoms severity (part III of the Movement Disorder Society - Unified Parkinson's disease Rating Scale; Goetz et al., 2008) were also considered.

Results: When compared with HC, PD patients showed higher levels of anxiety and depression ($p<.05$), while years of education did not differ between the two groups. In both PD patients and HC, state anxiety was significantly predicted by years of education ($p <.05$). In PD patients, other significant predictors were disease duration ($p < .05$), and motor symptoms severity ($p <.01$). Depressive symptoms were significantly predicted by age ($p <.001$) and motor symptoms severity ($p <.05$) in PD patients only, and by years of education in both groups ($p < .05$).

Discussion: The results obtained were in line with our hypothesis, showing that years of education, a proxy measure of CR, were significantly related to anxiety and depression in both PD patients and HC.

Conclusions: While additional evidence needs to be gathered to replicate our findings and better understand the association between CR and negative affect manifestations, the present results suggest that individuals with low CR may constitute a vulnerable group for the development of depression and anxiety.

SP22. Deep brain stimulation of the subthalamic nucleus in patients with Parkinson's disease does not change facial emotion recognition

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Aims: Deep brain stimulation (DBS) of the subthalamic nucleus (STN) is successful in improving motor function in patients with advanced PD but may worsen cognitive function, including facial emotion recognition (FER). The aim of the present study is to investigate whether FER changes in PD patients one year after surgery for DBS, both on a group and an individual level, in addition to possible changes in verbal memory, response inhibition and verbal fluency, as commonly found in PD after STN-DBS.

Method: Data from 59 consecutive PD patients with complete pre- and postoperative assessments, who underwent bilateral STN-DBS were reviewed retrospectively. FER assessment was part of the standard neuropsychological assessment prior to and one year after surgery for DBS and all the tests were performed under optimal clinical conditions with medication and stimulation on. FER was assessed by the Emotion Recognition Task. Wilcoxon Signed-Rank tests were used to compare pre- and post-operative assessments on a group level. Individual change scores (between pre- and postoperative assessment) were considered clinically significant if either larger or smaller than 1 SD of the preoperative assessment.

Results: Group and individual analyses showed no changes in FER one year after STN-DBS surgery. On the other hand, response inhibition and verbal fluency showed a post-operative decrease, whereas memory performance improved.

Discussion: Results on FER in the literature so far show inconsistent results, whereas worsening of response inhibition and verbal fluency are frequently reported, both at short and long term after surgery for STN-DBS. Compared to other studies on FER, the present sample is relatively large, the FER assessment relatively sensitive and the follow-up period relatively long excluding surgical effects.

Conclusions: STN-DBS does not change the performance on FER assessment, but FER still may have an impact on the outcome after STN-DBS.

SP23. Can we IMPOWER people with Parkinson's to manage impulse control behaviours? Testing the feasibility of home-based digital training

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Aims: Clinical management of impulse control behaviours (ICBs) in Parkinson's involves withdrawal of medication which can worsen motor symptoms, or psychological strategies, such as Cognitive behavioural therapy, which can be costly and/or difficult to access. Drawing on extensive consultation with people with Parkinson's, we designed an alternative: independent computer-based home training, using an established inhibitory control task (go/no-go). The training involves responding quickly to neutral stimuli but withholding responses to personally relevant images associated with the individual's ICB (e.g., gambling logos). In this pilot study, we aimed to test to evaluate feasibility and the acceptability of the: (i) instructions and training tasks; (ii) training frequency and duration.

Method: Five people with mild-to-moderate Parkinson's (4 female) received a training task over 4 weeks, tailored to the ICB they wished to address. We also tested potential outcome measures (before and after training) including self-reported ICBs and post-training interviews were conducted.

Results: All participants completed some training sessions. Four participants completed the outcome measures and one dropped out of the study for unknown reasons (seemingly unrelated to the training). Two participants described noticing improvements in their behaviour. However, participants reported that the training was not challenging or varied enough, while some felt it would be helpful and motivating to understand more about how the training might work.

Discussion: Participants were willing and able to complete the training independently at home, indicating that the approach is feasible. Further development of the task (clearer instructions, increased variety and challenge) should be conducted prior to evaluating efficacy of the intervention.

Conclusions: This pilot demonstrated the feasibility and acceptability of home-based digital training to manage ICBs, as well as the value of involving people with Parkinson's in the design and development of interventions.

SYMPOSIUM 7

"Pieces of Me": Debating the Constituents of Bodily Self-Awareness along the Lifespan in Healthy and Pathological Populations

SP24. Thermoregulation and bodily self-awareness: is there a link? Evidence from pathological populations

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The sense of body ownership has been mainly defined as the awareness of one's body as belonging to oneself and the feeling that a given body part belongs to one's body. It arises from the integration between internal (e.g., visceral) and external signals (e.g., visual). Recently, it has been demonstrated that, among internal signals, thermoregulation may play a role. Nevertheless, experimental studies on healthy individuals investigating the role of skin temperature in body part ownership have produced inconsistent findings. Studying pathological conditions in which body ownership is altered may represent a complementary method to investigate this topic. Body ownership can deteriorate in many neurological conditions, and in the case of right-brain stroke, patients may present with Disturbed Sensation of limb Ownership (DSO). I will demonstrate how DSO could be associated with thermoregulatory alterations, that is, lower temperature in the affected body regions. Body ownership may also be altered in people affected by neuropsychiatric diseases. For instance, in the amputation-variant of Body Integrity Dysphoria (BID), individuals desire the amputation of an intact and functional limb for which they have a feeling of non-belonging. I will show that this condition may be accompanied by thermoregulatory responses involving the affected body regions. The studies presented in this symposium support the importance of thermoregulatory signals in maintaining a coherent sense of body ownership.

Keywords: temperature, ownership disorders, neuropsychology

SP25. The contribution of skin-mediated interoceptive signals to the sense of body ownership

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Touch plays a vital role in early social and self-development, and in the maintenance of psychological wellbeing in humans. Recent studies showed that the affective aspects of interpersonal touch are processed by a specialised neurophysiological system (i.e., CT afferent fibers), which projects to the insular cortex, a core brain region for bodily self-awareness and homeostatic regulation. Thus, according to some views, some signals from the skin can be re-defined as interoceptive since they provide information about the internal state of the body. Here, I will present a series of behavioural studies investigating body representation using a well-established illusion of ownership, i.e., Rubber Hand Illusion, and particularly the contribution of both interoceptive (i.e., information about the physiological condition of the body, such as affective touch and thermal stimulation) and exteroceptive (i.e., visual cues) signals to the perception of a body part as belonging to ourselves. Our results show that not only spatial and temporal, but also interoceptive congruency might be necessary for the Rubber Hand Illusion to occur. Thus, skin-mediated interoception signals may make a unique contribution to the sense of body ownership, and by implication to our embodied psychological 'self'. Such studies hold the potential to provide empirical confirmation to the idea that our self is built upon caring, embodied interactions with others via multisensory integration processes.

Keywords: interoception, skin, body ownership

SP26. Neural correlates of self-recognition in 6- to 8- month-old infants

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Adult research has showed that multisensory information and knowledge about the body constrain body representations. How these mechanisms interact to construct and maintain a sense of bodily self throughout development is still a matter of debate. In this talk I will present a series of infant studies examining the role of visual-tactile multisensory information and facial appearance in the development of self-face representation. In particular, I will focus on the results of a registered report that aims to disentangle the role of familiarity and own-face specificity for self-recognition by examining ERP responses in 6-to-8-month-old infants. We ran two distinct experiments where we presented infants with images of their face, another peer's face, and their mother's face (N=38, Exp.1); and images of their own face morphed into another peer's face (N=38, Exp.2). For both experiments, brain electrical activity was recorded via Hydrocel Geodesic Sensor Net (Electrical Geodesic Inc.), consisting of 128 electrodes evenly distributed across the scalp and referenced to the vertex. We found a significant difference between the self-face and the mother-face condition 100ms after stimulus onset, with a larger P100 amplitude for self-face than mother-face. Hemisphere analysis also revealed a larger P100 amplitude for self-face compared to both mother-face, and other-face, which were localised on the left hemisphere. Our results suggest that around 7 months, infants can discriminate their own face from other familiar and unfamiliar faces, already 100 ms from stimulus onset. This attentional response could indicate that one's own face requires specific attentional resources at an initial phase compared to other faces. We suggest that P100 modulation for the self-face might represent a precursor of the behavioural advantage in self-identification observed in adults.

Keywords : self-recognition, visual-tactile synchrony, ERP

SP27. The Hearing Body: Exploring the Interplay between Audition and the Bodily Self

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The way we perceive our bodies plays a crucial role in our motor, emotional, and social functioning. Neuroscientific research has revealed that our body perceptions are not fixed, but are continuously updated through sensory-motor experiences that connect us to our own bodies and the world around us. In this presentation, I will present the findings from our research group on the impact of sound feedback on our perceptions of the body. Our studies have shown that the combination of sound feedback with motor and tactile signals can modify our body representations, leading to changes in behavior, emotions, and self-identity. Our research has used novel audio-based paradigms to demonstrate the influence of sound feedback on our body perceptions. For instance, we have shown that hearing the sounds produced by our hand tapping a surface as if they are coming from a greater distance leads to the perception of a longer arm and impacts subsequent arm movements. Similarly, the representation of our body size can change when the sounds produced while walking are perceived as if they were produced by a lighter body, which in turn affects our gait and emotional state. Our studies using gesture-sound interactive systems have also highlighted the potential to influence people's feelings about their bodies, movement awareness, and behavior. Our findings have important theoretical implications as they suggest that body representation is supramodal and open up new opportunities for the design of audio-based applications that support wellbeing. Our research has been applied to various medical conditions, including eating disorders, physical inactivity, stroke, and chronic pain, with promising results.

Keywords: auditory, multisensory, body-representation, bodily self-awareness, embodiment, body transformation experiences, emotion, motor behavior, self-care technologies, wearable sensorial technologies, eating disorders, stroke, chronic pain

SYMPOSIUM 8

An Update on Behavioural and Neural Signatures of Attention and Consciousness States after Brain Damage

SP28. Neglect, attention and consciousness

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The term "attention" encompasses a range of cognitive processes that allow us to prioritize information based on our goals and respond promptly to unexpected situations. These processes rely on the coordinated activity of large-scale brain networks, primarily located in fronto-parietal regions, with a functional and anatomical bias towards the right hemisphere.
In this talk, I will present evidence from MEG and human intracerebral brain recordings that demonstrates the roles of distinct fronto-parietal networks in the two hemispheres, responsible for attentional gain and reorienting. These networks play a central role in shaping conscious report. Damage to these networks, especially in the right hemisphere, frequently results in visual neglect, a condition where there is impaired attention and consciousness towards events on the side of space contralateral to the lesion.
Following a unilateral injury such as a stroke, these networks can reorganize in either adaptive or maladaptive ways. The talk will delve into the factors that influence the evolution of neglect and the mechanisms that limit these processes in time and space. Inter-hemispheric connectivity plays a critical role in compensatory brain plasticity, enabling the undamaged hemisphere to shift from a maladaptive role to a compensatory role.
In conclusion, understanding the factors that influence the evolution of neglect and the mechanisms that constrain compensatory brain plasticity can provide valuable insights into promoting recovery after brain injuries.

SP29. The role of the frontoparietal networks in attention and voluntary imagination

A. Spagna
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How do attentional networks influence conscious perception? I will present data from two studies, one featuring magnetoencephalographic recordings and the other intracerebral recordings assessing the effects of supra-threshold peripheral spatial cues on the conscious perception of near-threshold Gabors. Behavioral and neuroimaging results (both functional and structural) converge over the importance of lateralized front-parietal networks in shaping our conscious perceptions. I'll discuss the relevance of our findings with respect to current theories of consciousness, and conclude by relating to a less-studied form of visual perception: visual mental imagery.

SP30. Conscious and unconscious states after brain damage

A. Demertzi
GIGA Institute, CRC In Vivo Imaging Center, University of Liège, Belgium

During resting conditions spontaneous experience is ongoing, dynamic, and rich in mental content taking the form of mental states. Mental states are transient cognitive or emotional occurrences that are described in terms of particular content (what the state is 'about') and the relation we bear to this content (e.g. imagining, remembering, fearing). Ongoing experience can also show moments of mind blanking during which there is a failure to report the content of thoughts, often accompanied by a post-hoc realization that our mind "went away". Here, I will discuss the possibility of a contentless mind and will delineate the brain physiology which underlies contentless phenomenology. This work essentially proposes that non-reportable mental events can happen during wakefulness, and challenges the view of the mind as a constant thought-oriented operator.
Starting from the clinical mandate, I investigate how consciousness can be inferred in non-communicating individuals due to pathological (brain-injury) or pharmacological reasons (anesthesia). The use of neuro-technologies and computational analyses have aided this endeavor significantly. By means of functional MRI, I will show how systems-level intrinsic functional connectivity combined with machine learning has proved an effective way to determine biomarkers which can separate single patients in different classes. This work has contributed to the understanding of rare clinical cases, such as patients with disorders of consciousness and hemispherotomies, has facilitated the resolution of medico-ethical debates, and paved the way towards an approach to the human mind which embraces both brain and peripheral body functions.

SP31. The differential outcomes training as a non-pharmacological intervention in patients with impaired explicit knowledge and awareness

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In this talk I will present evidence regarding a simple manipulation, the differential outcome training –DOT- which was first shown in animals to enhance discriminative learning (Trapold,1970). That is, by manipulating the way reinforcers were administered after correct responses to stimulus-responses associations to be learned, Trapold (1970) found that learning was accelerated and improved (higher terminal accuracy) when a unique reinforce (outcome) followed a specific S-R relative to a condition where reinforces were randomly administered. Savage and colleagues (e.g., Savage et al., 2004) have shown that the DOT may activate a compensatory mechanism in patients with brain-damage and cognitive impairments that do not rely on explicit and restrospective memory. I will present here evidence from patients with neurodegenerative conditions and cognitive impairments, and discuss how this non-invasive, easy-to-implement, procedure may be an effective tool to enhance cognition, particularly in patients with impaired awareness.

SYMPOSIUM 9

Why Do I Feel Overwhelmed? The Mechanisms Underlying Sensory Hypersensitivity after Acquired Brain Injury

SP32. Insights into the experience and triggers of sensory hypersensitivity after acquired brain injury.

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Aims: Sensory hypersensitivity (SHS), i.e., an over-responsiveness to sensory stimuli, has been described to occur after acquired brain injury (ABI) and can lead to social isolation and lowered quality of life. SHS is usually investigated with questionnaires assessing its presence, rather than exploring the context and triggers that lead to these complaints. Using semi-structured interviews, we aimed to gain information about what triggers SHS to aid hypotheses on underlying mechanisms. We also investigated what individuals use to cope with their symptoms in order to inform clinical practice and evidence-based interventions.

Method: Nineteen individuals (aged 26-65), with ABI and SHS, were interviewed individually on three main topics: subjective experiences of SHS; triggers and situations that influence SHS; ways to deal with symptoms. The interviews were audio-recorded and transcribed verbatim.

Results: Five main themes were identified using inductive thematic analysis; (1) "There's a mismatch", (2) "Altered experience of ordinary stimuli", (3) "It affects all aspects of living", (4) "Avoid, approach, accept", (5) "It is not only different for everyone but also directly contradictory".

Discussion: These themes describe the chronological process where factors (e.g., loss of control, cognitive strain) trigger SHS because they create a mismatch between how much energy someone expected to spend and what was necessary for a situation. This leads to SHS, 'an altered experience of stimuli' of various modalities, which affects physical, cognitive, psychological, and social aspects of living. Coping includes avoidance, approaching and accepting. However, SHS varies greatly between and within individuals.

Conclusions: This study identified circumstances that trigger SHS and coping strategies that alleviate SHS, which provides information for potential mechanisms and interventions. However, the results stress the heterogeneity in SHS, which suggests that there is likely not one solution, but that clinicians should investigate the interplay of contributing factors and possibilities for each individual separately.

Keyword: sensory hypersensitivity; acquired brain injury; individual differences

SP33. Post-stroke visual hypersensitivity: preliminary evidence for a relationship with sensory processing abilities

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Aims: After stroke, patients can experience an increase in sensory sensitivity resulting in a hyperresponsiveness to visual stimuli (visual hypersensitivity). They, for instance, feel overwhelmed when surrounded by bright or fast-moving visual stimuli. To date, it remains unclear whether post-stroke hypersensitivity symptoms are related to atypical sensory processing. The current study aimed to compare the visual processing abilities of subacute stroke patients with versus without sensory hypersensitivity using a whole report task.

Method: 14 patients with post-stroke visual hypersensitivity (mean age: 54 years) and 34 stroke patients with a low to average post-stroke visual sensitivity (mean age: 68 years) participated in this study. During the whole report task, participants had to correctly identify a single target letter that was presented for 17 to 100 ms. To assess whether performance of each patient with post-stroke visual hypersensitivity was different from the performance of patients without post-stroke visual hypersensitivity we used univariate normative comparisons.

Results: We found that four of the patients with post-stroke visual hypersensitivity were significantly better than patients without post-stroke visual hypersensitivity at identifying the target when it was displayed for just 17 ms.

Discussion: These results suggest that the underlying mechanisms of visual hypersensitivity may include higher sensory processing abilities when stimuli are displayed for a short amount of time. However, further research is needed to assess how these results are influenced by factors such as age, gender, lesion location and time since stroke. In addition, it must be noted that sensory processing abnormalities did not explain visual hypersensitivity symptoms in the majority of our sample of patients with post-stroke visual hypersensitivity.

Conclusions: Heightened sensory processing at short stimulus durations may cause post-stroke visual hypersensitivity in some stroke patients. However, further research is needed to investigate the role of other biopsychosocial mechanisms.

Keywords: visual hypersensitivity, stroke, sensory hypersensitivity

SP34. The Relationship Between Sensory Hypersensitivity Complaints and Multisensory Integration in Patients with Acquired Brain Injury

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Aims: Sensory hypersensitivity complaints are often reported after acquired brain injury (ABI). In many patients these complaints can persist for years after the ABI and have a major impact on their quality of life. The underlying causes of this increased sensory sensitivity are still unknown, inhibiting the development of effective treatments. This study explores altered multisensory integration as a possible underlying cause of sensory hypersensitivity after ABI.

Method: The relationship between multisensory integration and sensory hypersensitivity complaints was investigated in 140 patients with ABI and 86 healthy controls. The participants took part in an online study consisting of a self-report questionnaire regarding sensory sensitivity (Multimodal Evaluation of Sensory Sensitivity, MESSY) and a response time task (Redundant Target Paradigm) to determine the presence of multisensory integration by looking at race model inequality (RMI) violation.

Results: 32-50% of the patients reported increased sensory sensitivity after ABI where patients scored significantly higher on the MESSY compared to the control group across different sensory modalities (total, multisensory, auditory, and visual). Overall, patients responded slower to visual and audiovisual, but not to auditory stimuli compared to the control group. Splitting the patient group into two subgroups based on their MESSY scores revealed that the higher sensory sensitivity group showed a significant slowdown of responses to auditory, visual and audiovisual stimuli compared to the lower sensory sensitivity patient group. No significant relationship between the MESSY scores and the RMI violation measure were found.

Discussion: The results show a potential relationship between response times to visual, auditory and audiovisual stimuli and MESSY scores. Future studies are needed to further explore the role of multisensory perception in sensory hypersensitivity complaints.

Conclusions: High self-reported sensory hypersensitivity was related to slower response to uni- and multisensory stimuli, but not to RMI violation as a measure of integration after ABI.

Keywords: Sensory Hypersensitivity, Multisensory Integration, Acquired Brain Injury

SP35. Sensory Hypersensitivity after Acquired Brain Injury: Its Relationship with Insomnia, Hyperarousal and Perceived Stress

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Aims: Sensory hypersensitivity following acquired brain injury (ABI) is frequently reported and has profound effects on quality of life, yet is poorly understood. The current study aimed to examine the relationship between sensory hypersensitivity and insomnia in patients with ABI and whether self-reported hyperarousal and/or perceived stress is mediating this relationship.

Method: In an online cohort study among 188 chronic ABI patients (TBI, CVA, brain tumour) of University Medical Centre Utrecht and 61 healthy controls, sensory hypersensitivity was measured by the Multimodal Evaluation of Sensory Sensitivity (MESSY). In addition, the Insomnia Severity Index, Hyperarousal Scale and Perceived Stress Scale were administered.

Results: 124 (66.0%) of the ABI patients reported an increase in sensitivity to sensory stimuli since the ABI. The total score on the MESSY was significantly higher in ABI patients ($M = 63.84$, $SD = 20.86$) compared to controls ($M = 52.28$, $SD = 15.12$), $t(247) = 4.00$, $p < .001$). A Model 4 PROCESS mediation analyses supported a positive relationship between sensory hypersensitivity and insomnia in ABI patients ($t(187) = 5.25$, $p < .001$), which was mediated by hyperarousal (Bindirect = 1.47, 95% CI 0.39-2.78) and perceived stress (Bindirect = 1.67, 95% CI 0.73-2.76).

Discussion: The results underline sensory hypersensitivity as a frequent and persistent complaint after ABI. Moreover, the results support the presence of a sensitivity-sleep relationship, mediated by hyperarousal and perceived stress. Future studies are necessary to investigate the directions of this relationship and its mediation effects.

Conclusions: Insomnia, hyperarousal and perceived stress should be considered in clinical evaluation of ABI patients who report increased sensory hypersensitivity and vice versa to better understand the impact of ABI on a patient's quality of life. A better understanding of the mechanisms underlying sensory hypersensitivity might help to improve treatment of these complaints after ABI.

Keywords: acquired brain injury, sensory hypersensitivity, insomnia, hyperarousal, stress

SYMPOSIUM 10

Treating Spatial Neglect Using the Latest Technology

SP36. The feasibility and efficacy of an immersive VR application for patient-tailored rehabilitation of neglect: preliminary findings

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Aims: Many treatments for spatial neglect use cueing, which is seldom tailored to the patients' visuospatial attention profile. We designed an immersive virtual reality (VR) app (HEMIRehApp) that measures spatial attention across the visual field and trains spatial orientation using audiovisual patient-tailored cueing. In this study we had two aims: to investigate the effect of patient-tailored cueing on the recovery of neglect symptoms, and to assess the feasibility of VR in stroke patients.

Method: Stroke patients in rehabilitation hospital UZ Leuven Pellenberg were consecutively recruited since May 2021. The study protocol (pre-registration: https://osf.io/b4xfg) consisted of two phases: (A) adult stroke patients were screened for neglect with multiple tests in and outside VR, (B) stroke patients with left neglect were subsequently enrolled in a 4-week training (10 hours active and 10 hours placebo training).

Results: A total of 86 stroke patients were screened for neglect of which 42 patients enrolled in a VR neglect test. Nine patients had neglect on a digital neglect screen of which 4 commenced our treatment (3 dropped-out). Regarding VR feasibility, cybersickness was low and was significantly lower after VR than before VR exposure ($t(40)=-3.26$, $p<.001$). User experience ratings of our VR system were on average positive (Experience: $M = 3.9$, $SD = 0.7$; Usability: $M = 4$, $SD = 0.7$; 5-point scale).

Discussion: Our results illustrate that VR can be applied in a safe and enjoyable way in stroke patients. However, the results also suggest that neglect may be less prevalent (11%) than commonly reported (30-50%). High-powered studies evaluating treatment efficacy for neglect at the group level may thus not be feasible, at least in certain clinical settings.

Conclusions: Further research is necessary to evaluate the efficacy of our VR neglect treatment.

Keywords: Virtual reality, hemispatial neglect, rehabilitation

SP37. Misaligning virtual and actual arm movements to induce improved attention and spatial processing toward the neglected side of space

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Aims: To examine a novel virtual reality (VR) treatment designed specifically for addressing spatial neglect (SN)

Method: A multi-baseline experiment was conducted in three stroke survivors with left-sided SN due to right brain damage. The participants, all living in the community, included 2 females and 1 male (age: 53-70 years; time post stroke: 394-574 days). Participants completed baseline assessment 3 times (2-3 days apart) using the conventional subtests of the Behavioral Inattention Test (BIT-c), followed by 5 VR sessions within 10 days. Outcomes were measured using the BIT-c immediately and two weeks after treatment. During each VR session, participants completed 2 rounds of the treatment game, about 10 minutes each. The treatment game required reaching and touching the nose of each of 100 animals that ran toward and stood in front of the participant. After every 3 consecutive successes, the virtual and actual hands were decoupled by 0.75-1 degree. At the end of the game with 100% success, the actual hand would have gradually moved toward the left of the midline by 30 degrees while the virtual hand appeared as if straight in front of the participant. No participant reported awareness of the misalignment.

Results: The immediate post-treatment BIT-c score was greater than the baseline average and the baseline maximum in all 3 participants. Two participants' two-week follow-up scores remained greater than their own baseline performance.

Discussion: We demonstrated the potential efficacy of the VR-induced visuomotor misalignment on SN improvementin this case-series study. 5 two-round sessions may be sufficient for immediate improvement in chronic SN.

Conclusions: VR technology enables the development of the novel treatment packaged into a game-like activity, which may be much more difficult to deliver in real-world than virtual environments. The finding encourages further large-sample investigations to unveil treatment efficacy and its neural mechanisms.

Keywords: Spatial neglect, virtual reality, rehabilitation

SP38. Feasibility, usability, and safety of using a mixed-reality rehabilitation system, RehAtt, for spatial neglect

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Aims: To reveal the feasibility, usability, and safety of the RehAtt using the latest technology of mixed reality Smart Glasses (Microsoft HoloLens 2) as part of spatial neglect care. The first evaluation of intervention with the RehAtt using 3D glasses showed promising results on symptom reduction, function improvement, and brain connectivity changes in the dorsal attention network in individuals with chronic spatial neglect. Since then, the RehAtt has changed its operating equipment and software designs.

Method: 50 healthy adults and 10 individuals with spatial neglect after right-sided ischemic stroke were recruited from the community to participate in the feasibility study conducted in a clinic. Participants performed RehAtt activities that were designed with the goal of stimulating interhemispheric connectivity using a combination of top-down and bottom-up methods. Activities were like playing games with environmental enrichments to provide motivation. High intensity repetitions of cognitive and physical exercises were facilitated through interacting with multisensory 3D holograms projected and positioned in the real environment. After using the RehAtt, participants completed anonymous ISO-standard self-report questionnaires for usability, feasibility, safety and acceptance of the RehAtt system. Results and Discussion: All participants reported moderate to high levels of utility, ease of use, acceptance, and satisfaction with the RehAtt system. We found a high level of feasibility, usability and safety. No side effect was noted.

Conclusions: This study provides evidence for the feasibility and safety of implementing the RehAtt system into rehabilitation settings for spatial neglect treatment. The information generated from the project justifies conducting a large-scale, randomized controlled trial to investigate the clinical effectiveness of the RehAtt system.

Keywords: Spatial neglect, mixed reality, rehabilitation

Oral Communications

Rehabilitation

OC01. Looking Back and Moving Forward in Aphasia rehabilitation

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Aims: The purpose of this study is the implementation and evaluation of an integrative approach to the treatment of post-stroke aphasia, by combining typical speech and language therapy (SLT) with a cognitive rehabilitation intervention.

Method: Post-stroke patients with transcortical motor aphasia were randomly assigned to two rehabilitation groups. Patients with stroke onset less than a month or over 12 months, multiple infarcts, neurological signs or diagnosis of a psychiatric disorder were excluded from the study.The first group of patients received aphasia specific SLT (SLT group), while the other group received aphasia specific SLT combined with cognitive rehabilitation, via a computerized assisted rehabilitation program (ReHaCom) (SLT+CR group). Treatment duration in both groups consisted of 2 personal hourly sessions per week for a total of two months. Sessions were conducted by professional speech therapists and clinical neuropsychologists. Patients underwent a comprehensive neuropsychological and language evaluation prior to treatment, one week and six months post treatment.

Results: Our preliminary data indicated that patients in the SLT+CR group improved their scores in tasks requiring attention, memory and executive functions post treatment as well as aspects of language abilities. Higher levels of improvement were noted in cognition and language compared to the SLT group. The treatment also ameliorated perceived quality of life in both groups.

Discussion: Recent research data suggest that typical SLT alone may not be adequate in improving post stroke aphasia symptoms. Clinical and neuroimaging studies highlight the interconnection of language with other neural networks supporting several cognitive functions. Implementing an integrative cognitive – linguistic intervention in aphasic patients may provide higher efficacy rehabilitation rates and improved quality of life.
Conclusions: This study provides data that aphasia patients who receive both typical SLT combined with cognitive rehabilitation tend to have better rehabilitation outcomes and improved quality of life.

Keywords: aphasia, rehabilitation, cognitive-linguistic approach

OC02. Strategy Game Supported Goal Management Training: A Randomized Controlled Trial Evaluating the Efficacy on Untrained Task Performance in Daily Life

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Aims: In recent years, computerized cognitive training (also known as 'brain training' or 'serious gaming') has become popular as an intervention to restore executive functions in individuals with acquired brain injury. Although this intervention type seems innovative, its efficacy has almost always been measured using outcomes similar to the task, making the evidence with respect to transfer to daily life limited. Furthermore, many trainings adopt the restorative approach, aiming to strengthen executive functions rather than practice compensatory strategies that may be more effective. The primary objective of the present study is to evaluate the efficacy of a computerized cognitive training based on a widely-used compensatory strategy called Goal Management Training (GMT).

Method: To evaluate the efficacy of the strategy game supported GMT intervention on daily life functioning an assessor-blinded randomized controlled trial is conducted. Individuals in the chronic stage after acquired brain injury (i.e. > 3 months post-injury) were randomly allocated to either the experimental treatment (ET), strategy game supported GMT, or a control treatment (CT), information group training (IGT). Assessment takes place at baseline and directly post-treatment. The primary outcome measure, task performance on two untrained daily life activities, and the secondary outcome measure, goal attainment scaling rated by patients and proxy, are used as indications of daily life executive functioning.

Results: To date, twenty-one individuals have been included (Age: M = 55 SD = 9,75), fifteen of whom have completed treatment (ET: n = 7, CT: n = 8) and six are currently undergoing treatment (ET: n = 4, CT: n = 2).

Discussion and conclusions: If the strategy game supported GMT intervention is effective, the new approach ensures a reduction of executive function problems in daily life, by using a less labour-intensive and more time-efficient treatment, which is favourable for patients as well as for therapists and healthcare costs.

Keywords: Executive functioning, Goal Management Training, computerised cognitive training

OC03. The Leiden Navigation Training: a blended strategy training for navigation impairment

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Aims: Navigation impairment is often reported after Acquired Brain Injury (ABI). The Leiden Navigation Training (LNT) was developed to improve navigation performance in people with ABI through training compensatory strategies in a serious game format. The LNT is a blended care program, including psycho-education and personalized serious games. The aim of the current work is to examine the effectiveness of the program in both self-reported and objective measures of navigation performance.

Method: 42 people with ABI either completed the 6 week LNT or were in the treatment-as-usual condition of a randomized control trial. The LNT consists of 6 minigames in virtual environments, where selected navigation strategies need to be applied. Participants completed the virtual Tübingen navigation test battery, the Wayfinding Questionnaire, and a goal attainment scale before and after the LNT.

Results: The personal goals set by participants were attained after training. Self-reported navigation ability significantly improved directly after training and 4 weeks after completion. Scores on the objective navigation test battery were not significantly affected by the training.

Discussion: The LNT has a positive impact on the goals set by participants; completing the training allows them to reach their personal goals. The self-reported level of navigation ability also increases due to the LNT. The objective navigation assessment scores used in this study was not affected by LNT, which could be due to methodological characteristics of the objective measure used.

Conclusions: The LNT in blended form shows to be beneficial for people with ABI. After completion of the LNT participants obtain personally set navigation goals and experience improvement in their daily life proficiency in navigation. Further examination of the LNT in a clinical setting is recommended.

Keywords: spatial navigation, cognitive rehabilitation, blended intervention

OC04. An Investigation of the Reliability of Home-Based Teleneuropsychological Assessment in a Turkish Sample: a Within-Subject Design

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Aims: There has been a growing interest in teleneuropsychology, and current findings yield promising results. The majority of these studies focus on clinic-based remote assessment, whereas those focusing on home-based remote assessment are relatively limited. Current study, therefore, aims to investigate the reliability of home-based teleneuropsychological assessment.

Method: Current sample included 129 participants, with their ages ranging between 50 and 85 years. Among this group, 92 were cognitively healthy, and 37 were diagnosed with mild cognitive impairment or early-stage Alzheimer's dementia. The following tests were applied to the participants: Digit Span, Oktem Verbal Memory Processes Test, Hooper Visual Organization Test, Warrington Recognition Memory Test, Clock Drawing Test, Wechsler Memory Scale-Logical Memory Test, Verbal Fluency Test, Boston Naming Test, and Auditory Trail Making Test. All tests were administered in both face-to-face and videoconference settings. The ordering of the settings was counterbalanced. The time span between administrations ranged between 7-20 days.

Results: Interclass correlation coefficients (ICC) were calculated to estimate the consistency between face-to-face and online applications. The results revealed that except for Hooper Visual Organization Test and Clock Drawing Test, application of all other tests showed moderate to excellent levels of interclass correlations, with ICC coefficients ranging from .50 to .90. In addition, test performances did not significantly differ from each other across applications (face-to-face vs. online).

Discussion: The findings suggest that teleneuropsychological assessment, especially with regard to tests that rely on verbal administration, can be a reliable alternative to standard assessment procedures. Even though the results seem promising, it is important to consider and control potential disadvantages and limitations of remote assessment, such as controlling the participant's environment, eliminating distractors, etc.

Conclusions: The preliminary findings indicate that when necessary, home-based teleneuropsychological assessment might be a good alternative to classical neuropsychological assessment.

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Motor Function

OC05. Cognitive reserve can modulate motor and non-motor basal ganglia circuits in early Parkinson's Disease

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Aims: Dysfunctional circuitry between the basal ganglia (BG) and dorsolateral prefrontal cortex (DLPFC) is typically observed in Parkinson's disease (PD). The understanding of factors contributing to differential susceptibility to pathology capable of mitigating disease-related neural decline is gaining attention. Among these factors, Cognitive Reserve (CR) refers to processing resources accrued by being engaged in mentally-stimulating activities throughout the lifespan. We tested the hypothesis that CR may play a modulating effect on the BG and DLPFC atrophy in early PD.

Method: Fourthy-five early PD patients and 20 age-gender-matched healthy controls (HC) were administered the Cognitive Reserve Index questionnaire (CRIq)1, to quantify CR by deriving three indices (CRI-Education, CRI-Working Activity, CRI-Leisure Time). All subjects underwent a structural MRI examination (3T, PRISMA Siemens). Morphometrical neural measures for BG (bilateral putamen, caudate, pallidum volume) and DLPFC (cortical thickness) were extracted. ANCOVAs were performed to test for differences between HC and PD groups on BG volumes and DLPFC thickness. Then, two multiple regression analyses were computed to detect potential BG and DLPFC structural integrity predictors.

Results: CRIq was associated with cognitive level and disease severity in PD individuals. From regression analysis emerged that BG volume was significantly predicted by CRI-Education ($p=0.022$), sex ($p=0.005$), and Total Intracranial Volume ($p<0.001$). Instead, the DLPFC thickness was predicted by CRI-Leisure Time ($p=0.043$) and age ($p=0.018$).

Discussion: CR, quantified by education and leisure-time activities proxy measures, significantly impact on the structural integrity of BG and DLPFC, regions in which pathological changes occur in PD.
Conclusions: Our results support a protective role of CR on the frontostriatal circuit, potentially not only on cognition but also on the motor component.

Keywords: Cognitive Reserve, Parkinson's Disease, Magnetic Resonance Imaging

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OC06. From unveiling to boosting the cerebellar activation for social prediction abilities: evidence from Transcranial Direct Current Stimulation studies in healthy adults and in patients with cerebellar malformation

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Aims: Despite patients with congenital cerebellum malformation (CM) show social prediction difficulties, rehabilitation of these abilities is often neglected. We tested how cerebellar transcranial Direct Current Stimulation (ctDCS) can affect prediction of social and physical events in healthy adults and improve social prediction in pediatric patients with CM.

Method: Study 1) 24 healthy adults received anodic-/cathodic-/sham-ctDCS for the whole duration of two tasks requiring the prediction of social (action) or physical events. Both tasks encompassed an implicit-learning phase, wherein the co-occurrent frequency of specific events and contextual cues was manipulated to induce strong or moderate expectations. Subsequently, the testing phase assessed how these expectations affect participants' ability in predicting uncertain (temporally occluded) events. Study 2) 25 healthy adults received anodic-/sham-ctDCS only during the testing phase of the action task. Study 3) 20 young with CM received anodic-/sham-ctDCS during the whole duration of the action prediction task.

Results: In Study 1 participants' action prediction abilities in the testing phase were hindered after cathodic- vs anodic- and sham-ctDCS for the strong-expectation condition and boosted after anodic- vs sham-ctDCS for the moderate-expectation condition. The prediction of physical events was unaffected. In Study 2 and 3 a facilitation after anodic vs sham-ctDCS for the moderate-expectation condition was observed either in healthy or CM participants.

Discussion: ctDCS induced task-specific, polarity and expectancy dependent effects in healthy adults when either applied during the whole duration of the taks or only during the testing phase, pointing to the involvement of the cerebellum in using, and not only in forming, predictions. The same results of an improvement in social prediction abilities after anodic ctDCS was found in pediatric patients with CM.

Conclusions: These findings encourage the exploration of rehabilitative effects of ctDCS in patients with social perception deficits, also in pediatric age.

Keywords: cerebellum, transcranial Direct Current Stimulation, social prediction

OC07. Investigating neuronal noise as a mechanism of tic generation

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Aims: Tourette syndrome (TS) is a neurodevelopmental disorder characterised by chronic involuntary motor and vocal tics. Previous research has suggested the tics could reflect motor noise, resulting in uncertainty of the voluntary movement and the occurrence of tics. This enhanced neuronal noise may reflect the reduced sensorimotor gating and imprecise forward model of action planning, inherent in TS (1). Experimental data has confirmed increased 1/f noise in the TS population during a sensorimotor task (2). This study aims to quantify the difference in the neuronal noise between TS participants and age and gender-matched controls (HC).

Method: We define neuronal noise as the variability of the cortical oscillations during median nerve stimulation (MNS) and the cortical excitability during single-pulse TMS. We recorded the recruitment (IO) curve of single-pulse TMS recorded by EMG electrodes placed over the first dorsal interosseous muscle. Then, we measured the cortical MEP during single-pulse MNS placed over the dominant hand, using a 64-channel electroencephalography (EEG) system with active shielding.

Results: We predict the precision of the cortical MEPs in response to MNS differ significantly between TS and HC participants, with the latter showing variable evoked and induced cortical MEPs. Similarly, the TMS-induced MEPs will show greater variability, with an overall steeper IO curve for the TS compared to HC participants. These predictions are supported by our preliminary findings.

Discussion: Increased variability of the cortical MEPs and IO curves could indicate an increased motor noise in TS participants, which could lead to the generation of involuntary movements. Novel interventions aiming to entrain targeted neuronal oscillations could reduce the neuronal noise and prove to be therapeutically beneficial.

Conclusions: Our results, confirming reduced precision of the MEP responses and the IO curves, could pave the wave for greater understanding of the underlying mechanism involved in tic generation in Tourette Syndrome.

Keywords: Tourette Syndrome, TMS, MNS

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OC08. Semantic Transparency in Motor Resonance Phenomena: Evidence from Neuromodulation Over the Motor Cortex

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Aims: Though it is well known that observing actions and understanding sentences with motor actions activates corresponding motor processes, findings regarding action verbs in figurative context are still controversial. The current study aimed to address how language and transparency (different types of idiomatic expressions, e.g., opaque and transparent) affect motor resonance in the primary motor cortex.

Method: Twenty-six Spanish and eleven Turkish participants underwent continuous theta burst (CTBs) stimulations to the primary motor cortex (M1) area. Following CTBs applications, participants underwent an Overt Priming Task with Self-Paced Reading task in their native language on a PC, where they judged the relatedness of a priming word and the corresponding sentence.

Results and Discussion: Linear mixed effects models analysis revealed a facilitation effect in sentences with literal motor actions. Regarding the idiomatic context, all participants processed transparent idiomatic sentences much faster than opaque idiomatic ones after cTBS application compared to the sham condition. We argue that the facilitation effect observed only in transparent idioms is because the distance between the figurative and literal meaning is much closer in transparent idioms, and literal meanings of transparent idioms included a hand motor verb.

Conclusions: Our results confirm the embodied approach, supporting the idea of a functional role of the M1 area for comprehension of motor actions, and we propose novel motor resonance results among different types of idioms.

Keywords: motor resonance, idioms

OC53. Sex Differences in Cognitive Decline in Early Parkinson's Disease

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Aims: We aimed to assess Parkinson's disease (PD)-specific sex differences in (1) cognitive functioning at time of diagnosis, and (2) rate of cognitive decline over three years.

Method: 87 PD patients (72% male) and 95 age-matched healthy controls (HC; 51% male) were included. The following cognitive domains were assessed: memory, attention/processing speed, executive functioning, visuospatial functioning, and social cognition (emotion recognition). PD patients were assessed at time of diagnosis (baseline) and three-year follow-up (FU3). Patients were treatment-naïve at baseline. HC were only assessed at baseline. First, raw neuropsychological test scores were compared between groups (male and female PD and HC). Second, difference scores (FU3-baseline) were calculated for each neuropsychological test, and compared between male and female PD patients to assess sex-differences in cognitive decline.

Results: Analyses of neuropsychological data show that male patients perform significantly worse than male HC on all tests ($p<.05$), whereas female patients did not differ from same-sex controls. Sex-differences were found in both groups in the domains of memory, attention/processing speed and executive functioning (males<females). PD-specific sex-differences were only found in the social cognitive domain (males<females). A sex-difference for visuospatial functioning was found in the HC group only. Longitudinal difference scores of the PD group did not significantly differ between sexes.

Discussion: At time of diagnosis, only male patients presented with lower performance compared to same-sex HC. A PD specific sex-difference was found in the social cognitive domain. Interestingly, there was no sex- difference in visuospatial functioning in the PD group. The rate of cognitive decline did not differ between sexes. Male patients were lower educated than female patients and male HC, this should be taken into account.

Conclusions: De novo male PD patients seem more prone to cognitive deficits than female patients. However, rate of cognitive decline over three years does not differ between sexes.

Keywords: Parkinson's disease, Cognitive functioning, Sex differences

OC54. Peripheral misreaching in a large stroke cohort

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Aims: Damage to posterior parietal regions of the brain can lead to changes in visually guided actions, such as pointing, reaching, and grasping. Optic ataxia is a specific deficit in reaching to peripheral targets that is not caused by primary motor weakness or sensory loss. Peripheral misreaching is easily missed in standard neuro (psycho) logical assessment and may go unnoticed as a sign of parietal disfunction or disconnection. Most studies investigating optic ataxia involve case reports and small case series that examined hypotheses about the cognitive mechanisms underlying the disorder. Here, we systematically address peripheral misreaching in a large stroke cohort and investigate the diagnostic characteristics of optic ataxia.

Method: A standardized paradigm and scoring method were developed to assess visually guided reaching and grasping. Data from 90 patients who suffered unilateral stroke and 22 age-matched healthy controls were used for analyses. A peripheral misreaching index was calculated to screen for optic ataxia. Each patient also underwent an experimental visual battery and short neuropsychological assessment. Damage to white matter connections was quantified using tractography data from healthy controls to map the structural reaching network.

Results: The developed paradigm is sensitive to individual differences in reach-to-grasp performance. Exploratory case-control comparisons showed that around one-third of stroke patients scored more than two standard deviations below healthy controls for the peripheral misreaching index. At group-level, peripheral reaching performance did not differ between right- or left-sided lesions. Structural disconnection mapping predicted disconnections associated with peripheral misreaching.

Conclusions: Findings suggest that changes in peripheral reaching are common after stroke, though few cases met the full diagnostic criteria for optic ataxia.

Keywords: connectivity, stroke, optic ataxia

OC55. An integrated approach for rehabilitation by means of TMS and cognitive remediation training in schizophrenia

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Aims: Schizophrenia is a severe and disabling psychiatric condition in which clinical symptomatology is accompanied by a global cognitive and social disability, strongly affecting patients' lives. In addition to pharmacological and psychological treatments, new therapeutic tools are needed to help patients to improve their daily functioning. The present study aimed to evaluate whether intermittent theta burst stimulation (iTBS) combined with a cognitive training (CT) can induce improvements in cognitive functioning of patients affected by psychotic disorders.

Method: So far, 17 participants completed the study. Patients were randomized in real vs. sham iTBS conditions. iTBS was delivered over the left dorsolateral prefrontal cortex in 3 consecutive weeks (15 sessions). Half of participants in each condition received daily CT after stimulation. Clinical, cognitive and social functioning were tested at different timepoints (pre and post treatment, 1, 3 and 6 months after treatment end). Linear mixed models' analyses were performed, with Stimulation (real vs sham), Training (with vs. without CT) and Time (5 levels) plus their interaction entered as fixed factors and tests scores as dependent variables. Subjects intercept was added as random structure.

Results: The analysis on the cognitive total score revealed an interaction between Stimulation and Time, with significant differences in cognitive scores between the baseline and 1-month follow-up in the real iTBS condition. Cognitive scores were inversely correlated with negative symptoms and depression index, whereas they positively correlated with everyday level of functioning.

Discussion: The results suggest that iTBS can induce improvements in global cognition, independently from a combined cognitive training. In turn, the improvement in cognitive abilities can indirectly affect clinical symptomatology and functioning.

Conclusions: iTBS can induce long-lasting changes, improving the cognitive performance of psychotic patients. iTBS could be therefore considered in the treatment of psychosis to reduce cognitive impairments and ameliorate patients' global functioning.

Keywords: TMS, schizophrenia, cognition

OC56. Virtual Reality Social Prediction Improvement and Rehabilitation Intensive Training (VR-SPIRIT) in congenital cerebellar diseases: preliminary efficacy results

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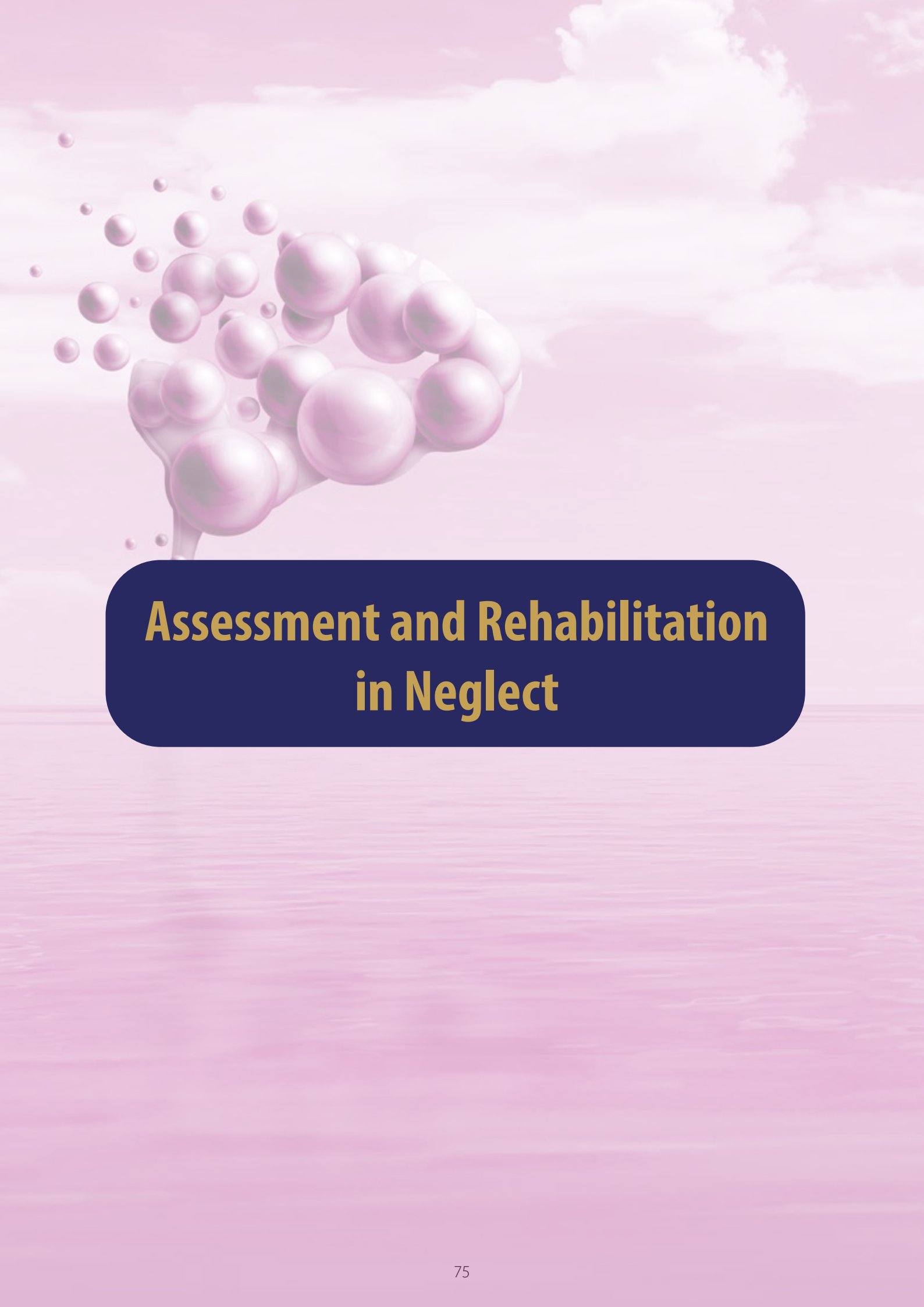
Aims: Cerebellar alterations entail not only motor or cognitive disorders, but also important deficits in social cognitive processing, which may be accounted for by impairments of the predictive function exerted by the cerebellum. Here, we tested the efficacy of a Virtual Reality Social Prediction Improvement and Rehabilitation Intensive Training (VR-SPIRIT) to boost social prediction in pediatric patients with non-progressive malformations of the cerebellum.

Method: The study was a preregistered (ISRCTN 22332873) interventional controlled trial that randomized 28 patients with congenital, non-progressive cerebellar malformations (age range: 7-25yo; Full Scale Intelligence Quotient: 46-137) to the experimental VR-SPIRIT or an active control training, both consisting of eight 45-min sessions in two weeks. VR-SPIRIT required participants to compete with different avatars for reaching recreational equipment by implicitly prompting them to form expectations about avatars' playing preference. The active control training proposed standard motor rehabilitation VR-games. An evaluation session with a different VR-scenario, a context-based action-prediction task, and a battery of neurocognitive tests were administered at the beginning (T0) of the two trainings (T1), at the end (T2) and in a follow-up session after 2 months (T3).

Results: No difference between groups was reliable at T0. At T2, the VR-SPIRIT, but not the control group improved use of predictive strategies in both the VR-scenario and the context-based action-prediction task. Furthermore, both groups improved visuospatial processing, but only the VR-SPIRIT group also improved Theory-of-Mind and affect recognition. The effects were maintained at T3.

Discussion: The results suggest that a short-lasting, but intense VR training designed to boost the learning of statistical regularities in others' behavior can reinforce context- based predictions across different scenarios and social perception abilities.

Conclusions: The study paves the way for new approaches to the rehabilitation of social difficulties in neurological and neuropsychiatric disorders based on the predictive computational mode of the cerebellum.
Keywords: cerebellar cognitive affective syndrome, predictive coding, virtual reality



Assessment and Rehabilitation in Neglect

OC09. Immersive Virtual Reality Baking Tray Task: the Center of Mass as a new measure of Unilateral Spatial Neglect severity

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Aims: Unilateral spatial neglect (USN) is essentially assessed by limited paper-and-pencil tests. Ecological assessments, such as the Baking Tray Task (BTT), have been developed to better assess daily life difficulties. In the BTT, patients must place 16 cubes inside a board as evenly as possible. An asymmetry of more than 2 cubes between each side of the board is considered pathological. However, this single measure does not provide information on USN severity. Using an Immersive Virtual Reality (IVR) BTT could automatically compute the spatial positions of the cubes and calculate the Center of Mass (CoM), which is the mean of their lateral positions. In the present study, the relevance of the CoM was explored and compared with a severity index from a cancellation task, named Center of Cancellation (CoC).

Method: 11 right-stroke patients with USN (63.0 years ±7.29) and 24 healthy participants (59.3 years ±5.09) were recruited. The Bells test and the classical and IVR BTT were proposed. Classical measures were completed with the CoC for the Bells test and the CoM for the IVR BTT. After group comparisons, a single-case method analysis was performed to investigate each patient's performance. The correlation between CoM and CoC was also explored.

Results: Results in the IVR and classical BTT are similar. In the IVR BTT, 9 patients were pathological on the CoM while, in the Bells test, 6 patients were pathological on the CoC. The CoM significantly correlated with the CoC for patients (r=.65, p=.014).

Discussion: The IVR BTT appears more sensitive than the Bells test, suggesting its relevance for USN diagnosis. The CoM also provided severity information, which is congruent with the CoC.

Conclusions: The IVR BTT could be relevant for clinical practice as it is easy to implement with stroke patients and provide detailed information on USN and its severity.

Keywords: Unilateral spatial neglect, Virtual Reality, Baking Tray Test

OC10. Mentalizing Neural Pattern During Naturalistic Task: fMRI Adaptation Of The Edinburgh Social Cognition Test

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Aims: Investigating neural underpinnings of mentalizing abilities during real-life social situations is still challenging. Previous neuroimaging studies mostly used non-naturalistic tasks revealing the role of social brain networks. We pilot-tested the fMRI adaptation of the Edinburgh Social Cognition Test (ESCoT)1,2 which includes animations of daily-life interactions and social norm adhesion/violation.

Method: Fourty-two healthy individuals (mean age=33.00±13.32, 24 females) were administered the fMRI adaptation of ESCoT in a 3T Siemens PRISMA MRI scanner (Gradient echo sequence TR/TE=2000/30ms) to explore implicit and explicit (silent and overt two-choice answers) mentalizing reasoning neural correlates. The task was composed of two conditions (mentalizing versus physical condition), each including ten 23s lasting silent movies. Before each video, the subjects were instructed to focus either on social interactions or on physical elements (implicit reasoning) and to give a silent answer followed by an overt two-choice button-press on the characters' states of mind or physical characteristics (explicit reasoning). SPM 12 was used for preprocessing following a standard pipeline. First-level analyses (General Linear Model) included: mentalizing (implicit/explicit) vs physical elements reasoning. At group-level, a random effect analysis was performed with a statistical threshold of pFWE <0.05.

Results: Considering the mentalizing network, the implicit mentalizing neural pattern included superior and middle-temporal (Left>Right) and left inferior-frontal areas. Explicit mentalizing reasoning extended to the bilateral temporal pole and inferior-temporal cortex, middle-frontal cortex, and left precuneus (silent), bilateral insula, inferior-parietal areas, temporal-parietal junction, and right precuneus (overt). Moreover, activations of bilateral precentral, calcarine, and fusiform areas were observed.

Discussion: In line with a previous study3, naturalistic mentalizing animations are effective in activating mentalizing networks. Also, explicit mentalizing reasoning revealed wider activations than implicit reasoning.

Conclusions: The ESCoT fMRI adaptation is a suitable task to explore mentalizing abilities, a relevant issue in several clinical conditions.

Keywords: mentalizing, fMRI task, social brain

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OC11. Active exploration training in neglect with the new augmented reality app "Negami" - a randomized controlled trial

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Aims: A widely applied and effective rehabilitation method in stroke patients suffering from spatial neglect is the 'visual exploration training'. Patients improve their ipsilesional bias of attention and orientation by training of exploration movements and search strategies towards the contralesional side of space. Here we investigate the effectiveness of the augmented reality (AR)-based app "Negami" for the treatment of spatial neglect in a randomized control trial. Negami combines a visual exploration training with active, contralesionally oriented rotation of eyes, head, and trunk.

Method: Twenty patients with spatial neglect were randomly assigned to the experimental Negami group or to a group receiving standard neglect therapy. Over a period of two weeks, both groups received five training sessions per week (à 25 minutes). Neglect behavior was assessed weekly over a five-week period, with the Negami therapy group receiving a second follow-up assessment at one-to-two-month intervals after completion of training.

Results: Both groups improved significantly. While the Negami therapy group improved in four of five neglect tests used, the standard therapy group improved in only one of these tests. We observed significantly better improvement in the Negami group already after the first week of training. This difference was also significant after the end of the training as well as one week after the end of training and remained stable one to two months after the end of treatment.

Discussion: Negami can be used as an effective alternative or addition to current standard neglect therapy, and may even be superior to it.

Keywords: Spatial neglect, augmented reality, stroke rehabilitation

OC12. Objective Assessment of Visuospatial Neglect Using pupillometry

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Aims: visuospatial neglect ("neglect") is a frequent and disabling disorder after stroke. The core deficit is a lateralized attention bias. Most neuropsychological tasks that are used to assess neglect require the patient to actively interact with the external world and/or to overtly respond. We present a novel, pupillometry-based method to assess covert attentional orienting in a direct way. The method is based on the principle that changes in pupil size associated with changes in light level are not purely reflexive, but are modulated by spatial attention. More specifically, the pupil changes size as covert attention is moved to parts of the visual scene of differing brightness. We evaluated whether this phenomenon could be exploited to assess neglect.

Method: in this proof-of-principle study, stroke patients with left-sided neglect after a right-sided lesion admitted to inpatient rehabilitation (N=4), patients with hemianopia or quadrantanopia (N=7), and age-matched healthy controls (N=12) viewed alternating black/white and white/black hemifields or peripheral bars while fixating the center of a visual display. Pupil size was measured with an eye-tracker. We assessed whether pupil light responses predominantly reflected the brightness of the left or right side of the screen.

Results: in the patients with left-sided neglect, pupil size strongly reflected the right side of the visual display, indicating a default rightward attentional bias. Patients with hemianopia or quadrantanopia showed a similar pattern, where the pupil light responses were stronger for the side of the intact rather than defect visual field. This was not seen for the age-matched controls.

Discussion and Conclusions: pupil light responses reveal neglect, without the need for an explicit response. This method can be exploited to improve assessment of neglect following stroke, which is relevant not only for clinical diagnosis (to provide psycho-education and to select appropriate treatment), but also for outcome measurement in clinical trials.

Keywords: visual perception, visuospatial neglect, pupillometry

Social Cognition and Syndromes

OC13. Hormonal abnormalities in alexithymia

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Aims: Alexithymia is a personality trait characterized by difficulties in emotion recognition and regulation that is associated with deficits in social cognition. High alexithymia levels are considered a transdiagnostic risk factor for psychiatric and medical conditions, including depression, anxiety, and autism. Although hormones are known to affect social–emotional cognition and behavior in humans, few studies investigated hormonal influences on alexithymia. Here, we provide an overview of the current evidence linking alexithymia to hormonal abnormalities.

Method: We reviewed studies that investigated associations between the neuropeptides oxytocin and vasopressin, the steroid hormones testosterone and estradiol, the stress hormone cortisol and thyroid hormones with alexithymia and alexithymia-related impairments in emotion regulation and reactivity, stress response, and social cognition.

Results: Existing evidence suggests that alexithymia is linked to reduced oxytocin levels, possibly underlying alexithymia-related deficits in social cognition. Notably, a randomized controlled trial demonstrated that intranasal oxytocin administration improved social-emotional functioning in high-alexithymic individuals. Further, an altered function of the hypothalamic-pituitary-adrenal (HPA) axis is observed in alexithymia, specifically, reduced basal HPA activity, higher norepinephrine/cortisol ratios, a reduced cortisol awakening response, and an exaggerated adrenocorticotropic hormone stress response. Moreover, there is evidence for altered thyroid hormone levels, indicative of thyroid dysfunction, in relation to alexithymia.

Discussion: The existing evidence indicates significant links between alexithymia and hormonal abnormalities, particularly with regard to oxytocin, cortisol, and thyroid hormones. However, there is a striking lack of research on the influence of the sex hormones testosteron and estradiol and of the neuropeptide vasopressin on alexithymia and alexithymia-related deficits in social-emotional cognition and behavior.

Conclusions: There is accumulating evidence for significant links between alexithymia and hormonal dysregulation. Future studies should investigate the mechanisms underlying alexithymia and individual vulnerability to stress, and the extent to which individual differences in alexithymia levels mediate susceptibility to affective disorders.

Keywords: alexithymia, hormones, emotion

OC14. Impaired Social Cognition in Korsakoff's Syndrome

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Aims: Social cognition refers to the ability to process social information and interpret the thoughts, feelings, and beliefs of others. The purpose of this study was to assess the cognitive and affective social cognitive abilities in patients with Korsakoff's syndrome (KS), a chronic neuropsychiatric disorder characterized by severe anterograde amnesia and executive deficits.

Method: The study compared 21 KS patients with 21 healthy controls matched for age and gender using three standardized tests that assess social cognition. The tests included the subtests of the mini-Social Cognition and Emotional Assessment battery and a specialized version of the Sally-Anne Test. In addition, a sample of 30 KS patients completed the Social Norms Questionnaire-NL (SNQ-NL) to assess their abilities to judge social norms.

Results: KS patients showed significant impairments in all domains of social cognition, including the ability to recognize emotional faces, the number of errors made in faux pas situations, less knowledge of social norms, and the incapacity to correctly take perspectives on the Sally Anne Test. All tests were carried out with additional conditions to account for the effects of amnesia. Executive deficits were found to explain difficulties in emotion recognition but not other aspects of social cognition.

Discussion: The results of this study suggest that individuals with KS have significant impairments in both cognitive and affective abilities related to social cognition. Their ability to recognize emotions, take the perspective of others, and understand socially awkward situations is severely compromised. These impairments in ToM functioning are largely distinct from the executive disorders commonly present in KS.

Conclusions: This study highlights the importance of thoroughly evaluating ToM function in neuropsychological assessments for individuals with a possible diagnosis of KS.

Keywords: Social cognition, Theory of mind, Korsakoff syndrome, executive functioning

OC15. Social cognition in patients with low-grade glioma: the relationship with tumor location and tumor volume

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Aims: Patients with low-grade gliomas (LGG), selected for proton therapy, generally function well at the time of diagnosis and have a favorable prognosis. However, LGG can have impact on cognitive functioning of patients. To date, little is known about social cognition (SC) in patients with LGG. Therefore, the aim of the present study was to investigate SC, in particular emotion recognition, in patients with LGG and the relationship with disease-related factors, i.e. tumor location and tumor volume.

Method: 125 patients with LGG, eligible for proton therapy, were matched with 152 healthy controls (HC). SC was measured with a test for emotion recognition, i.e. the Facial Expressions of Emotion Stimuli and Tests (FEEST), after surgery.

Results: Patients with LGG performed significantly lower on the FEEST total score compared to HC. Also, compared to norm data used in clinical practice, 35% of the patients showed an impaired performance. Patients with frontal tumors did not significantly differ in performance on the FEEST from patients with non-frontal tumors. However, within the patient group with frontal tumors, infiltration in the lateral prefrontal cortex (LPFC) was related to poorer performance on the FEEST. Overall, larger tumors were associated with poorer performance on the FEEST.

Discussion: Patients with LGG are on average impaired in emotion recognition, which is related to larger tumor volume but not to frontal tumor location. However, within the group of frontal tumors, this SC performance is related to lesions in the LPFC. Therefore, it is important to be alert to patients with LGG with a large tumor volume and lesions in the LPFC, considering the particular associations with SC.

Conclusions: Based on our results, neuropsychological examination, including measurements for SC, at an early stage is crucial to inform and alert patients with LGG and offer appropriate psychoeducation, even though a relatively favourable prognosis.

Keywords: low-grade glioma, social cognition, emotion recognition

OC16. Cingulate cortex sensitivity to subtle cues of affective deception

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Aims: The present event-related fMRI study aimed to evaluate behavioural and neural responses to facial expressions of pain, particularly searching for evidence indicating sensitivity to subtle cues of deception (1).

Method: During scanning, twenty-four healthy women (mean age=20,7) watched video clips displaying neutral faces or faces of genuine, deceptive or suppressed pain. Outside the scanner, participants rated the stimuli for the intensity of the facial expression (IE) and the intensity of the pain (IP).

Results: The behavioural results showed significant differences in IE and in IP in the three types of expressions. Deceptive received the highest IE ratings, followed by genuine and suppressed; genuine received the highest IP ratings, followed by genuine and suppressed.
The functional results showed common activations for genuine and deceptive with respect to neutral expressions, including superior, middle and inferior temporal gyri, inferior parietal and supramarginal gyri, inferior frontal gyrus, insula and portion of the occipital cortex. Suppressed expressions evoked activation in a less extensive pattern of cerebral regions, namely in the temporal and frontal cortex. Greater BOLD response for the observation of genuine compared to deceptive facial expressions was observed in the anterior mid-cingulate cortex (CC). A parametric analysis showed that activation in a portion of the mid-cingulate cortex significantly increased with the IP perceived.

Discussion: Our behavioural results suggest that participants were explicitly able to discriminate facial pain expressions. Although circuits involved in the recognition of genuine and deceptive pain expressions overlapped, functional data confirmed that different portions of CC contribute to the discrimination of real from fake pain, and of different intensities of the IP.

Conclusions: The CC sensitivity to subtle cues of affective deception discovered in the present research agrees with the impaired theory of mind and emotional recognition abilities found in patients with CC lesions (2).

Keywords: emotions, pain, facial expressions

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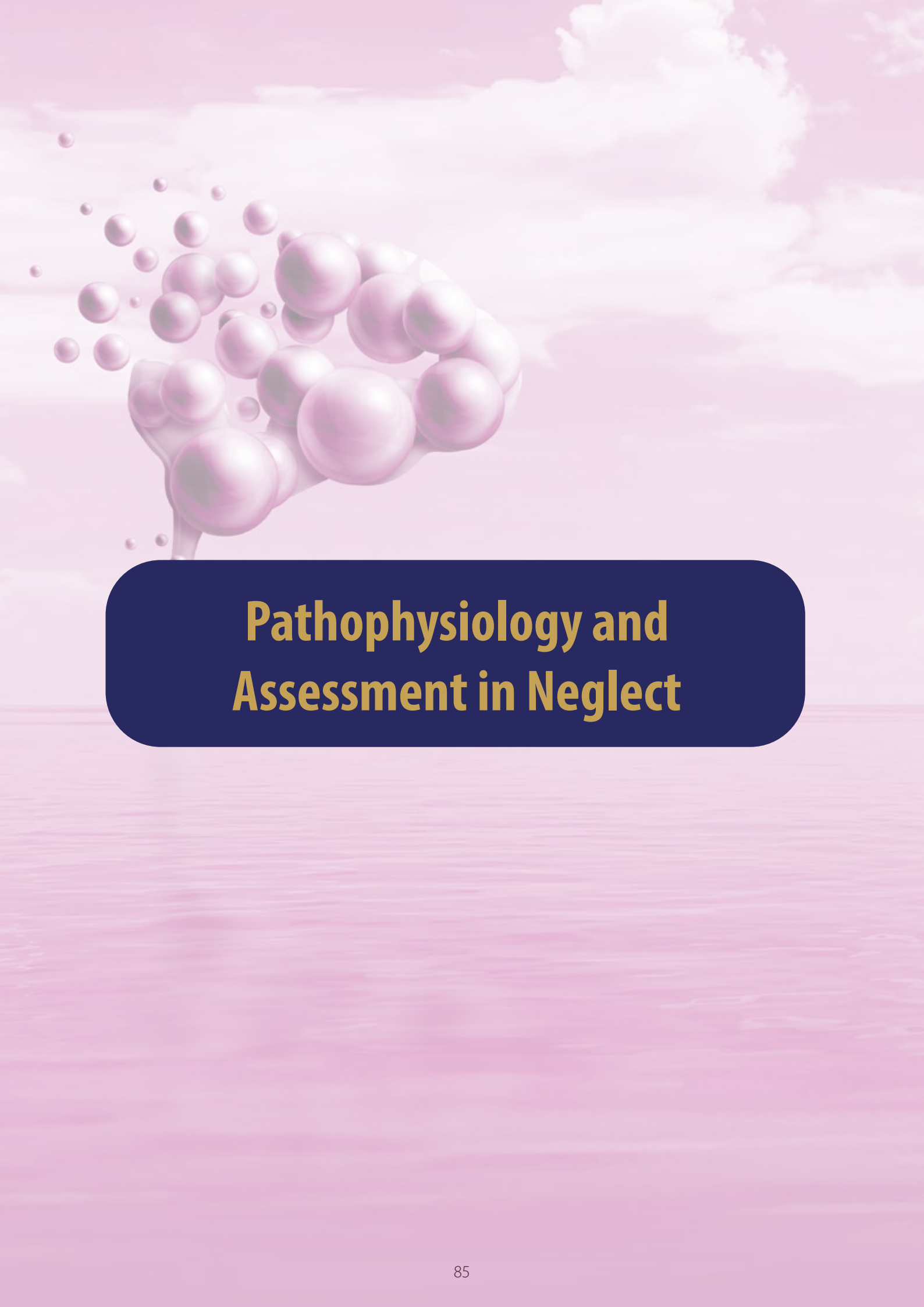

Pathophysiology and Assessment in Neglect

OC17. Brain circuits associated with neglect: insights from lesion network mapping

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Aims: Lesion-to-symptoms mapping studies have shown that lesions causing neglect can occur in multiple brain structures (1). This discrepancy might depend on the effects of lesions on distant but structurally and functionally connected spared brain areas (2). Here, we aimed to map the severity of neglect symptoms to brain circuits, rather than single areas, by means of the lesion network mapping (LNM), a technique that allows to identify brain regions functionally connected with the lesion site using normative connectome data

Method: Thirty right stroke patients (15 with signs of neglect) underwent neglect assessment and structural MRI session within two weeks since stroke. Lesion masks of single patients were used as seeds to generate voxel-wise resting-state functional connectivity (rs-FC) lesion network maps, based on a local database of 18 healthy individuals. Next, each of 30 maps was split in positive and negative binary maps and then entered in the Support Vector Regression LNM (SVR-LNM) analyses along with the neglect scores, to identify brain regions showing significant ($p<0.05$, FWE corrected) positive or negative connectivity with brain lesions as function of neglect severity.

Results: SVR-LNM analyses identified two bilateral sets of neglect-relevant lesion-derived circuits. Specifically, lesions causing more severe neglect were: i. functionally coupled with regions of the dorsal and ventral attention, somatomotor networks as well as basal ganglia; ii. anti-coupled with areas of the default mode and fronto-parietal networks.

Discussion: The identified neglect-relevant lesion-derived circuits are strongly consistent with the systems showing pathological rs-FC in neglect patients, i.e., inter-hemispheric breakdown of attention/somatomotor networks and their loss of anti-correlation with default mode network (2). Hence, these results offer a potential link between structural damage, network dysfunctions and neglect severity.

Conclusions: Present findings suggest that LNM is suitable to identify neglect-relevant brain circuits. Therefore, it might be a useful tool for rehabilitative purposes.

Keywords: Spatial neglect, functional connectivity, lesion network mapping

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OC18. The potential of immersive virtual reality for the assessment and training of visuospatial neglect in chronic stroke patients

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Aims: The application of immersive Virtual Reality (VR) has great potential for neuropsychological assessment and cognitive rehabilitation, especially for visuospatial neglect after stroke (1, 2). The aim of this study was to evaluate the clinical utility of two immersive VR systems for (a) the assessment of discrete neglect symptoms in chronic stroke patients using the immersive virtual road crossing task (iVRoad) and (b) a neglect intervention using VR optokinetic stimulation therapy (VR-OKS).

Method: The iVRoad task (3) shows a virtual intersection with two parallel busy roads. Participants have to cross roads and drop letters into a mailbox. The intervention applied OKS, an evidence-based treatment for patients with neglect, in a VR setting. The VR-OKS provided instant real-time feedback (for both the participant and the therapist) on head posture and gaze deviations. Additionally, eye tracking was used to interact with the environment and monitor the participants' attention. A total of 60 participants, including two right hemisphere stroke groups with left neglect (n=20) and without neglect (n=20), and healthy controls (n=20), participated in the diagnostic session with iVRoad. In addition, data of a preliminary evaluation of the VR-OKS training will be presented.

Results: Both VR systems were clinically applicable without causing side effects, participants were highly motivated and behavioural measures in iVRoad were neglect specific. Most of these were lateral temporal measures, reaction times, head movements and error types. Discussion: By applying machine learning to the iVRoad measures, six features were coined as the most appropriate neglect predictors. Furthermore, the VR-OKS training was engaging and allowed neglect-specific behaviour (e.g., rightward deviations, inattention) to be measured and adjusted immediately.

Conclusions: Clinical VR applications have high potential to assist in the neuropsychological assessment and cognitive rehabilitation of visuospatial neglect after stroke.

Keywords: neglect, virtual reality, stroke

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OC19. Neural Activation of the Oculomotor Network During Smooth Eye Pursuit Exercise Is Correlated with Visual Neglect Severity Among Individuals with Traumatic Brain Injury (TBI)

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Aims: A staggering 30-45% of TBI patients in inpatient rehabilitation may suffer from visual neglect, which significantly hinders recovery (1). Patients with visual neglect may fail to explore the full extent of their surroundings and demonstrate a gaze preference to one side of space. Smooth eye pursuit exercise (SP) with repetitive optokinetic stimulation has been successfully used to improve visual exploration in stroke (2) We aim to uncover the neural correlates of SP in individuals with chronic TBI.

Method: Eight participants viewed videos of 70 randomly distributed red dots coherently moving leftward or rightward against a black background while their brain activity was monitored with a 3T Siemens MRI Scanner. Participants either picked a dot and followed it with their eyes, until it disappeared off the edge of the screen (SP trials) or ignored the moving dots and fixated on a central white dot (fixation trials). To ensure task compliance, eye movements were recorded using MRI-compatible eye tracker. Visual neglect was assessed using a multi-test diagnostic method. Neglect severity was defined as the total number of tests performed below healthy cut-off. Evidence for left and right neglect was considered separately.

Results: SP activated bilateral oculomotor network, including superior parietal cortex, frontal and supplementary eye fields. During rightward SP, activity in the right inferior parietal lobule correlated with severity of right neglect. During leftward SP, activity in left superior frontal and supplementary motor cortex (SMC) correlated with severity of right neglect; and activity in the left SMC, bilateral frontal pole, right superior parietal sulcus, supramarginal gyrus and bilateral precuneus correlated with severity of left neglect.

Discussion: We showed, for the first time, separable neural correlates of right and left visual neglect in the TBI population. This study addresses the current lack of neuroscience-based targets for visual neglect rehabilitation in this population.

Keywords: Visual Neglect, TBI, Smooth Eye Pursuit

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Aphasia

OC21. Linguistic and non-linguistic control in bilinguals with Mild Cognitive Impairment

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Aims: Bilingual language control (BLC) is a dynamic processing system that allows speakers to avoid cross- language interference while speaking and switching between languages. Research has shown that neurodegenerative diseases may affect the efficiency of language-switching abilities in bilinguals, especially those affecting the frontostriatal pathways (e.g., Calabria et al., 2021; Cattaneo et al., 2020). However, it is unknown whether the neurodegeneration that affects other neural pathways may impact the efficiency of BLC or not. In the present study, we have focussed on Mild Cognitive Impairment (MCI) which mainly affects the mesial temporal structures and precuneus.

Method: 40 patients with MCI and 30 older adults took part in the study. All participants were early and highly proficient bilinguals in Catalan and Spanish. All participants performed five tasks. One task for language control (language switching) and four non-linguistic control tasks: task switching, n-back, Spatial Stroop, and flanker task.

Results: MCI patients showed larger switch costs (switch minus repeat trials) than controls, but the same mixing costs (repeat minus single trials) to them. In the non-linguistic control domain, MCI patients performed significantly poorer than controls only in the n-back task. The regression analysis model that included the performance of the non-linguistic tasks as predictors of language switching performance was not statistically significant.

Discussion: Language control abilities may be impaired also in bilingual patients that don't have neurodegeneration in the brain areas traditionally associated with language selection and inhibition, such as basal ganglia. However, the presence of language control deficits is not associated with executive control deficits, suggesting that these two control domains are not completely overlapping.

Conclusions: Language-switching abilities are more affected by cognitive decline than by monitoring the two languages. Additionally, language control deficits are more sensitive to MCI than other non-linguistic deficits.

Keywords: bilingualism, language control, Mild Cognitive Impairment

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OC22. A ReadFree tool for the identification of reading disorders in monolingual and minority-language children

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Aims: We present the "ReadFree tool", a computerized battery of 12 visual and auditory tasks developed to identify poor readers also in Minority-Language Children (MLC). These students have a peculiar language experience that interferes with the adoption of standardized reading tests. Language-independent tasks can be used, in this context, to evaluate the cognitive profiles of these children to search for universal markers of developmental dyslexia (DD)[1], and thus determine whether MLC reading difficulties should be ascribed to a learning disorder[2].

Method: We tested the tool on 142 Italian-monolinguals (8-13 y.o) divided into poor (n = 37) and good readers (n = 105) according to standardized Italian reading tests. In a preliminary unidimensional approach, task-specific discriminant power was tested on monolinguals using logistic regression models, then performances at the discriminant tasks were entered into a classification and regression tree (CART) model to identify poor and good readers using a multivariate approach. The set of classification rules extracted was lastly applied to the MLC's performance and the ensuing classification was compared to the one based on Italian standardized reading tests.

Results: Six out of 12 tasks discriminated between good and poor readers. Based on the multivariate approach (CART model), auditory Go-No/Go, RAN and Entreinment were the most discriminant tasks. The CART model accuracy was 86% for the monolinguals' classification and 76% for the MLC one.

Discussion: Based on the decision tree, executive functions emerged as the best cognitive predictor of DD. Moreover, supporting the double deficit hypothesis [3], two different branches, one more related to rapid naming skills and the other one related to auditory and timing skills, seem to characterize DD.

Conclusions: Overall, the ReadFree tool emerges as a valid test for preliminary screening of learning abilities, and it supports the use of language-independent tasks as a solution to face the difficulty in evaluating MLC.

Keywords: developmental dyslexia, classification and regression tree (CART) model, bilingualism

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OC23. How individual characteristics affect brain responses during a noun naming task?

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Aims: The aims of this study were to identify 1) whether individual characteristics (age group, gender) of the participants impact electroencephalographic event-related responses during a noun naming task and 2) to build an Artificial Intelligence (AI) model predicting their actual age based on electrophysiological patterns of activation.

Method: 36 (18 males) individuals who were equally assigned either to the young or to middle-aged groups participated Neurophysiological data acquisition was performed through high density electroencephalography. Event Related Potentials (ERP) amplitude and response latency to the naming task were the outcome measures.

Results: A two-way ANOVA investigating age group and gender effects was performed. There was a statistically significant main effect of age group on ERP amplitude for a) P200 on the left anterior cluster (p=0.04)], b) N100 on the left fronto-temporal cluster (p=0.011), Slow Positive Wave (SPW) on the right fronto-temporal cluster (p=0.004) and a a significant main effect of gender for a) N100 on the right anterior cluster (p=0.011) and b) Slow Negative Wave (SNW) on the right fronto-temporal cluster (p=0.011). In addition, there was a a significant main effect of age group on response latency for the P300 on the right fronto-temporal cluster, (p<0.001). and a statistically significant main effect of gender for the a) SNW on the right anterior cluster, (p=0.04) and b) SNW on the left fronto-temporal cluster, (p=0.03). A Support Vector Machine model with a linear kernel was developed to predict the actual age of participants with 83.34% accuracy.

Discussion: Individual characteristics seem to modulate the ERP components and naming response latencies. This allow the development of machine learning tools able to predict the actual age of the participants based on neurophysiological markers.

Conclusions: This study is a first step towards the development of a neurophysiologically driven cognitive marker able to accurately predict brain age.

Keywords: event related potentials, noun naming, artificial intelligence

OC24. Nonverbal memory, working memory, and executive functions in left-hemisphere aphasic persons: relationship with linguistic measures, functional assessment, and sites of lesion

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Aims: To examine the relationship between verbal and nonverbal tests in persons with aphasia (PWA) and to relate both to fluency, comprehension, functional assessment, and sites of lesion.

Method: Participants were 27 PWA due to single, unilateral left-hemisphere stroke, and 35 healthy controls. PWA were administered a Greek version of the Boston Diagnostic Aphasia Examination and two functional assessment scales. All participants were administered a neuropsychological battery comprising nine verbal and nine nonverbal tests. Test performance of PWA was compared to that of controls and to normative data. Lesion location was traced onto the Damasio & Damasio (1989) templates. ABC/2 and od-value were used for the lesion volume estimation.

Results: Using an impairment cutoff of 1.5 SD below the mean or a score lower than the 95th percentile for tests with skewed distributions, 17 PWA were impaired on all nine verbal tests and three were impaired on all nine nonverbal tests. Verbal impairment (number of verbal tests below the cutoff) but not nonverbal impairment (number of nonverbal tests below the cutoff) correlated with fluency, comprehension, and the functional assessment measures after correction. Of the nonverbal tests, Visuospatial Memory was the most frequently impaired test, and the span tests were the least frequently impaired tests. None of the short-term/working memory verbal tasks correlated with the short-term/working memory visuospatial tasks. Different left hemisphere lesions correlated with different types of tests.

Discussion: Although impairment in nonverbal tests was not as extensive or severe as impairment in verbal tests, as expected, there was great interindividual variability in test performance. Different nonverbal tests showed different frequencies of impairment, which are discussed with respect to domain-general and domain-specific process deficits and the multi-dimensional nature of most neuropsychological tests.

Conclusions: Nonverbal impairment is very variable in PWA with different tests being associated with different frequencies of impairment.

Executive Functions

OC25. Graph lesion-deficit mapping of fluid intelligence

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Aims: Fluid intelligence is arguably the defining feature of human cognition. Yet the nature of its relationship with the brain remains contentious. Influential proposals drawing primarily on functional imaging have implicated multiple demand' frontoparietal and more widely distributed cortical networks, but extant lesion-deficit studies with greater causal power are mostly small, methodologically constrained, and inconclusive. We aimed to conduct the first large-scale investigation of the distributed neural substrates of fluid intelligence in the focally injured brain.

Method: We assessed 165 healthy controls and 227 frontal or non-frontal patients with unilateral brain lesions on the best-established test of fluid intelligence, Raven's Advanced Progressive Matrices (RAPM), employing an array of lesion-deficit inferential models responsive to the potentially distributed nature of fluid intelligence. Non-parametric Bayesian stochastic block models were used to disentangle functional from confounding pathological distributed effects.

Results: Impaired performance was confined to frontal patients (frontal worse than non-frontal and healthy controls), more marked on the right (right worse than left and controls). Non-frontal patients were indistinguishable from controls and showed no modulation by laterality. Neither presence nor extent of multiple demand network involvement affected performance. Both conventional network-based statistics and non-parametric Bayesian stochastic block modelling heavily implicated the right frontal lobe. Crucially, this localization was confirmed on explicitly disentangling functional from pathology-driven effects within a layered stochastic block model, prominently highlighting a right frontal network involving middle and inferior frontal gyrus, pre- and post-central gyri, with a weak right superior parietal lobule contribution.

Discussion: Combining novel graph-based lesion-deficit mapping with detailed investigation of cognitive performance in a large sample of patients provides crucial information about the neural basis of intelligence.

Conclusions: A set of predominantly right frontal regions, rather than a more widely distributed network, is critical to fluid intelligence. RAPM is a useful clinical marker of right frontal lobe dysfunction.

Keywords: Frontal lobes, fluid intelligence, lesion-symptom mapping

OC26. Comparison of brain activation during executive functioning in healthy elderly from Okinawa, Japan and Groningen, The Netherlands: fNIRS study

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Aims: The current study aims to take the first step in comparing brain activation patterns during executive functioning in Okinawan elderly individuals compared to Western-European elderly individuals (Dutch elderly). Okinawan elderly individuals have been reported to suffer less from age-related diseases, including dementia, compared to elderly individuals from other regions. However, there has been a lack of research examining the functional brain characteristics of successful aging in Okinawan elderly individuals.

Method: Eighty cognitively healthy older adults participated in the study, 39 from Okinawa and 41 from Groningen, matched for age, gender, and handedness. Brain activation was measured during the performance of a visual n-back task and a verbal fluency task, using functional near-infrared spectroscopy (fNIRS) in the bilateral frontal cortex. Data was analyzed using nirs-toolbox software, with a general linear model applied to estimate hemodynamic response function and its derivative. Lateralization index was calculated for both tasks.

Results: During the n-back task, there was significantly lower activation in the bilateral anterior frontal gyrus in the Dutch group compared to the Okinawa group and higher activation in the dorsolateral prefrontal cortex. During the verbal fluency task, the Dutch group showed higher activation in the medial parts of the frontal gyrus and lower activation in the lateral parts of the frontal gyrus compared to the Okinawa group. We found a different lateralization index during the category task, with higher left lateralization in the Okinawa group compared to the Dutch group.

Discussion: The findings of the different activation suggest that Okinawan elderly individuals may require fewer executive processing resources to perform tasks, which may be related to cognitive reserve.

Conclusions: These results provide a first step in understanding the functional brain characteristics of successful aging in Okinawan elderly individuals and highlight the need for further research in this area.

Keywords: fNIRS, executive function, Okinawa

OC27. The Effect of Cognitive and Brain Reserve on Cognitive Performance in First-Episode Schizophrenia Spectrum Disorders

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Aims: The main objective of this research was to analyze and compare the role of cognitive (CR) and brain reserve (BR) in first-episode schizophrenia spectrum patients (FES) and healthy controls (HC) in relation to their cognitive performance. In schizophrenia, the current literature suggests both reserves may have an impact on cognition and serve as a predictor for clinical and functional outcomes of patients1,2.

Method: Participants were 25 clinical cases meeting the ICD-10 criteria for schizophrenia or acute and transient psychotic disorder, and 15 HC who completed neuropsychological and brain imaging (MRI) assessments. CR was calculated using the Cognitive Reserve Assessment Scale in Health3 and BR was operationalized as a total gray matter volume adjusted to age and gender. The relation of CR/BR to cognitive domains and global cognition was tested with a series of linear regression analyses. A logistic regression was performed to test the predictive value of CR/BR for each group (FES vs. HC).

Results: The results showed that CR had a significantly higher impact on speed of processing, working memory and global cognition in FES compared to HC. Additionally, CR could distinguish between FES and HC and the model correctly classified 79% of the cases. Contrary, BR was not related to any cognitive domain nor global cognition in FES and HC.

Discussion: The study compared effects of CR and BR on cognition proposing that in patients, CR has a more prominent impact on some cognitive domains and global cognition compared to HC. However, BR seemed to be unrelated to cognition in both diagnostic groups and only predicted symptom severity.

Conclusions: These findings confirm the impact of CR on cognitive functioning in schizophrenia and suggest that in first-episodes, CR may be a more accurate predictor of cognition and symptomatology compared to BR.

Keywords: cognitive reserve, brain reserve, schizophrenia

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OC28. Cognitive neuropsychology of executive control: The case of cognitive flexibility

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Perseverative behavior represents a cardinal symptom of frontal-lobe damage. This well-known clinical observation has stimulated scientific research in a better understanding of cognitive (in-)flexibility. The author presents a series of studies in healthy people and in neurological patients that are focused around perseverative errors on Wisconsin card-sorting tasks and related task-switching paradigms. Their common denominator is that we concurrently measured behavioral indicators of habitual, goal-directed, and meta-cognitive levels of executive control. Three studies are highlighted. The first study showed that the occurrence of behavioral indicators of cognitive inflexibility hinges upon the formation and retrieval of associative bindings between sensory, motor, and cognitive events. The second study showed that measuring the suppression of perseverative errors that occurs under certain circumstances provides a behavioral indicator of the balance between habitual and goal-directed levels of executive control. The third study showed that measuring integration errors provides a behavioral indicator of meta-cognitive rule-inference processes that seem to be closely related to working-memory capacity. Based on these data, the author develops an empirically grounded, functional architecture of cognitive flexibility that bridges habitual, goal-directed, and (meta-)cognitive levels of executive control. This theoretical approach provides testable predictions for the identification of related functional neural systems (vertically along the basal ganglia – frontal cortex axis, horizontally along the rostral – caudal prefrontal cortex axis). Theoretical and translational perspectives for clinical neuropsychology will be discussed.

Keywords: executive control, cognitive flexibility, frontal lobes

Apraxia

OC29. Gesture meaning modulates the neural correlates of effector-specific imitation deficits in left hemisphere stroke

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Aims: Previous studies on left hemisphere (LH) stroke patients reported effector-specific differences in imitation performance. Furthermore, imitation performance differed between meaningless (ML) and meaningful (MF) gestures. We tested the hypothesis that lesion correlates of effector-specific imitation deficits are affected by the gesture's meaning.

Method: We investigated whether meaning, i.e., ML vs MF gestures affects the lesion correlates of the effectors bucco-facial vs arm/hand in gesture imitation using behavioural data and support vector regression-based lesion-symptom mapping (SVR-LSM) in a large sample of 194 sub-acute LH stroke patients.

Results: Behavioural data revealed a significant interaction between the effector used for imitation and the meaning of the gesture. SVR-LSM revealed shared lesion correlates for impaired imitation independent of effector or gesture meaning in the left supramarginal (SMG) and superior temporal gyri (STG). Besides, impaired imitation of bucco-facial gestures was associated with more anterior lesions, while arm/hand imitation deficits were associated with more posterior lesions. MF gestures were specifically associated with lesions in the left inferior frontal gyrus and left insular region. Notably, an interaction of effector-specificity and gesture meaning was also present at the lesion level: A more pronounced difference in imitation performance between the effectors for ML (versus MF) gestures was associated with left-hemispheric lesions in the STG, SMG, putamen, precentral gyrus and white matter tracts.

Discussion: The current behavioural data show that ML gestures are particularly sensitive in assessing effector-specific imitation deficits in LH stroke patients. SMG and STG portray important hubs in the left-hemispheric praxis network independent of effector and gesture meaning. Additional distinct lesion correlates for the effectors and gesture meaning exist, supporting separable cognitive requirements. Moreover, a gesture's meaning modulated the effector-specific lesion correlates of bucco-facial and arm/hand gesture imitation.

Conclusions: Our data emphasize the importance to consider both, gesture meaning and the different effectors in apraxia assessments.

Keywords: Apraxia, bucco-facial gestures, support vector regression-based lesion-symptom mapping (SVR-LSM)

OC30. Hand preference in stuttering: Meta-analyses

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Aims: Reduced hemispheric asymmetries, as well as their behavioral manifestation in the form of atypical handedness (i.e., non-right, left-, or mixed-handedness), are linked to neurodevelopmental disorders, such as autism spectrum disorder, attention deficit hyperactivity disorder, and several psychiatric disorders. One neurodevelopmental disorder that is associated with reduced hemispheric asymmetries, but for which findings on behavioral laterality are conflicting, is stuttering. The aim of the present study was to meta-analytically integrate studies that report handedness (assessed as hand preference) levels in individuals who stutter (otherwise healthy) compared to controls.

Method: Articles were identified via a search in PubMed, Scopus, and PsycInfo (29 June 2021). On the basis of a total of k = 49 identified studies totaling n = 2,533 individuals who stutter and n = 16,001 controls, five random effects meta-analyses were conducted: four using the odds ratio [left-handers (forced choice); left-handers (extreme); mixed-handers; non-right-handers vs. total) and one using the standardized difference in means as the effect size.

Results: We did not find evidence of a left (extreme)- or mixed-handedness difference or a difference in mean handedness scores, but evidence did emerge, when it came to left-handedness (forced-choice) and non-right-handedness. Risk-of-bias analysis was not deemed necessary in the context of these meta-analyses. Differences in hand skill or strength of handedness could not be assessed as no pertinent studies were located.

Discussion: Our findings do not allow for firm conclusions to be drawn on whether stuttering is associated with reduced hemispheric asymmetries, at least when it comes to their behavioral manifestation. This is in contrast to other neurodevelopmental disorders, such as autism spectrum disorder, for which strong evidence of a relationship with atypical handedness is reported.

Conclusions: A disorder-specific approach is important when investigating handedness differences in different neurodevelopmental and psychiatric disorders.

Keywords: lateralization, stuttering, handedness

OC31. Apraxia in the 21st century: towards a diagnostic instrument for digital tool use

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Aims: Despite the importance of devices like smartphones and tablets for daily living and mHealth, and despite the evidence that traditional tool use can be impaired after brain damage, there is a lack of studies evaluating digital competencies in neurologic patients. We introduce the "DIGI" as a novel approach to assess digital competencies using smartphones and tablets. The goal was to determine its feasibility in healthy adults and neurologic patients.

Method: The DIGI includes 16 basic interactions with smart devices, divided into two subsets. Tasks involved for example taking a photo and making a phone call. In study 1, healthy young (N=16) and older (N=15) adults participated. In study 2, a small group of mildly affected neurologic patients with stroke and traumatic brain injury (N=6) took part. Participants in the healthy groups performed all 16 tasks with a smartphone and a tablet. The neurologic patients completed one 8-item subset per device. Furthermore, traditional apraxia of tool use was evaluated with the Diagnostic Instrument for Limb Apraxia (DILA-S).

Results: In study 1, we found that the performance in the older adults' group was significantly worse compared to the younger group. Interestingly, we detected a correlation between the older adults' performance in the DIGI and their performance in using novel tools of the traditional DILA-S. In study 2, we demonstrated in a small sample that the DIGI can be applied in patients suffering from stroke or traumatic brain injury.

Discussion: The current project presents a new approach to diagnose digital tool competencies, which appears applicable in healthy older adults and neurologic populations. Its feasibility for moderately to severely affected neurological patients and its psychometric properties need further evaluation.

Conclusions: The DIGI provides an important first step in the advancement of the assessment and rehabilitation of digital competencies.

Keywords: apraxia, digital tool use, assessment

OC32. Reliability and validity of indirect structural disconnection measures

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Aims: White matter connections enable the interaction within and between brain networks. Brain lesions can cause structural disconnections that disrupt networks and thereby cognitive functions supported by them. Recent years, novel methods have been developed that quantify the extent of structural disconnection after focal lesions using tractography data from healthy controls. These methods, however, are indirect and their reliability and validity have yet to be fully established.

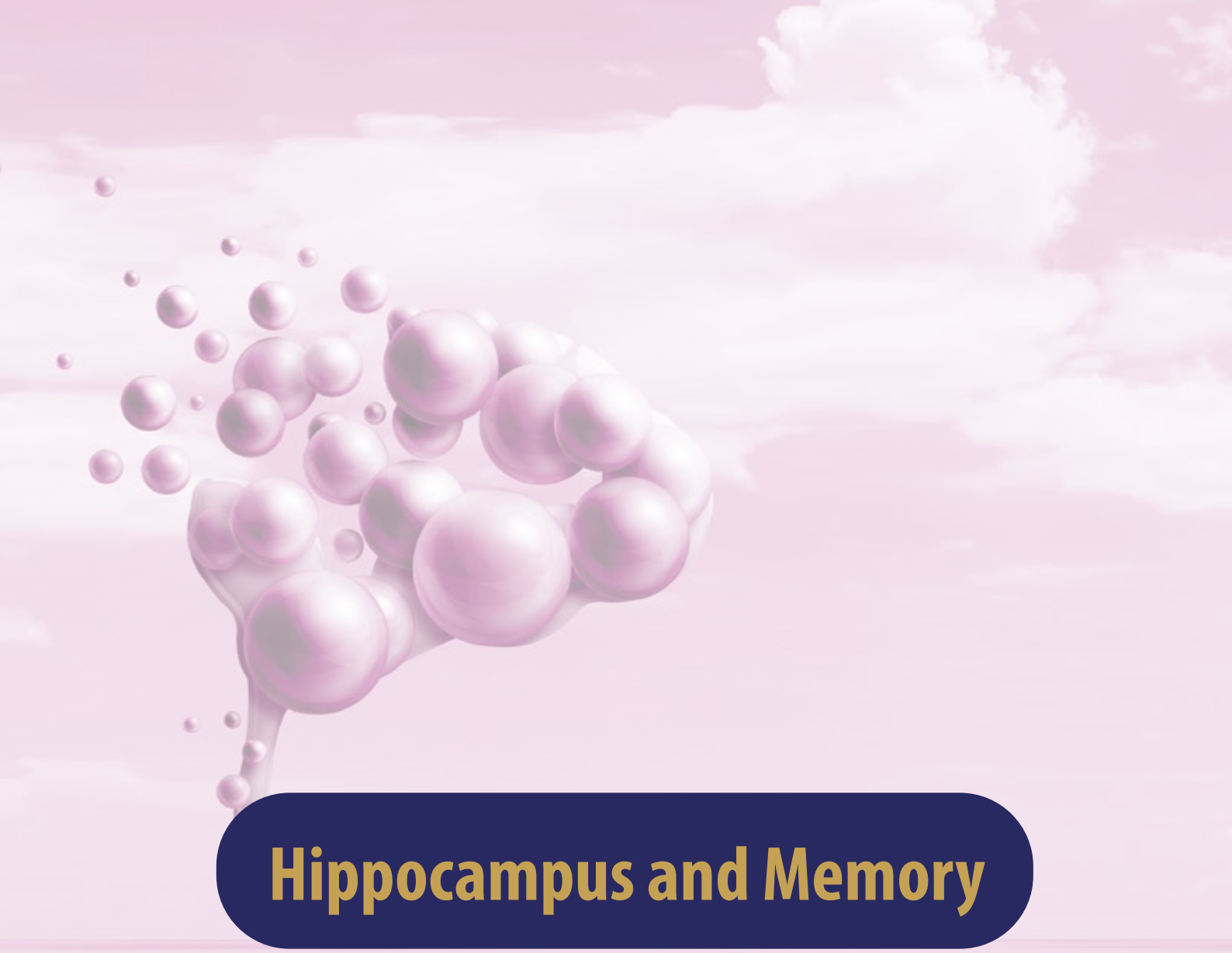
Method: We developed a toolkit for structural disconnection prediction that is supplemented by uncertainty metrics for the predictions overall and at voxel-level. These metrics give an indication of the reliability and are used to validate the method. A subset of 95 adult patients with a first-ever symptomatic ischemic stroke was included. Toolkit predictions were compared to diffusion tensor imaging (DTI) measures derived directly from patient's diffusion MRI data. Clinical utility of the method was demonstrated by a lesion-symptom mapping analysis of visual field defects with lesion location, toolkit predictions or patient's tractography as input.

Results: Our toolkit can predict fiber loss with high reliability and is highly comparable to direct patient DTI estimates, except for small lesions. Both tract-based measures outperformed lesion location in mapping visual field defects and showed a network consistent with the known anatomy of the visual system.

Discussion: This study conveys an important step in the validation of structural disconnection mapping. Based on our results, we argue that indirect structural disconnection measures may even be preferable to lower-quality single subject diffusion MRI when using high-quality healthy control datasets.

Conclusions: Indirect measures of structural disconnection are a reliable and valid substitute for direct estimations of fiber loss after focal lesions.

Keywords: stroke, diffusion tensor imaging, disconnection



Hippocampus and Memory

OC33. Shift in hippocampal medial position and increased fissure volumes in individuals affected by Developmental Topographical Disorientation

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Developmental topographical disorientation (DTD) refers to the lifelong inability of individuals to orient in familiar surroundings despite the absence of any neurological disorder. Despite reporting no gross volumetric or structural brain abnormalities, studies have reported reduced functional connectivity between the hippocampus and other brain regions in DTDs(1).

Aims: Here, we aim at investigating differences in morphological and morphometric hippocampal features between DTDs and healthy controls(HC).

Method: We measured incomplete hippocampal inversion (IHI) (i.e., a developmental atypical anatomical pattern characterized by the incomplete infolding of the hippocampal subfields(2)) in T1 acquired from DTDs(N=20) and HC(N=390). We rated criterion C1 (roundness and verticality of the hippocampal body), C2 (verticality and depth of the collateral sulcus), C3 (medial positioning of the hippocampus), and C5 (depth of the collateral and the occipitotemporal sulcus), and calculated a total IHI score for each hemisphere. We conducted Mann-Whitney tests between groups for all criteria independently and for the global IHI score. We used FreeSurfer7 to run the automatic segmentation for hippocampal subfields. We compared volumes from (1)CA1, (2)CA2,3,4+DG, (3) fissure, (4)subiculum, (5)tail, (6)head, (7)body, and (8) the whole hippocampus between DTD and HC and used Bonferroni for multiple comparison correction.

Results: IHI prevalence in both DTD and HC was similar to those previously reported in the healthy population. A significant difference was found only for criteria 3 ($p=0.026$). We also found a difference between DTD and HC for the hippocampal fissure bilaterally(both $p<0.001$).

Discussion: Although no differences were found in IHI total score between DTD and HC, in DTDs the hippocampus was more medially positioned with larger hippocampal fissures. These findings are foundational to further investigate their relationship with functional and behavioral characteristics of DTD.

Conclusions: The hippocampus of individuals affected by DTD is more medially positioned with larger hippocampal fissure volumes as compared to healthy individuals.

Keywords: developmental topographical disorientation, hippocampus, incomplete hippocampal inversion

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OC34. Correlation of hippocampal connectivity changes with memory performance in patients with neuropsychiatric Lupus: A resting-state functional MRI study

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Aims: To determine functional connectivity (FC) changes of neuropsychiatric SLE (NPSLE) and correlate them with cognitive function status in NPSLE patients.

Method: Resting-state functional MRI (rs-fMRI) was performed in 44 NPSLE patients and 35 -age and sex matched- healthy controls (HC). Cognitive performance of NPSLE patients was examined by dedicated neuropsychological (NP) tests i) Digits Forward and Digits Backwards subtests from the Greek Memory Scale; ii) Rey Auditory Verbal Learning Memory Test (AVLT), iii) Trail Making Test (TMT), iv) the Stroop Colour-Word Test (SCWT) and v) Semantic and Phonetic Verbal Fluency tests. Group comparisons on nodal FC and global network metrics and, also, regional volumetrics were conducted and associations with NP tests scores were estimated.

Results: There is hypoconnectivity in the left hippocampus ($p = .02$) and right amygdala ($p = .01$) and hyperconnectivity in the left angular gyrus ($p = .01$) right Superior Parietal Lobule (SPL) ($p<0.02$) and left SPL ($p<0.05$) in NPSLE patients compared to HC. Connectivity of the left hippocampus and the left angular gyrus were significantly correlated with verbal episodic memory scores (AVLT trials, $r=.47$, $p=.005$ and $r=-.49$, $p=.003$, respectively).

Discussion: The present results indicate a complex mechanism of functional adaptation of the brain to NPSLE, which may account for individual patterns of cognitive performance. In particular, NPSLE patients displayed aberrant FC disturbances in medial temporal and parietal structures, compared to HC. Moreover, connectivity changes in the left hippocampus and left angular gyrus were significantly correlated with verbal episodic memory disturbances of NPSLE patients. These results offer new insights on the pathophysiological substrate of cognitive disturbances in NPSLE patients, that may assist their clinical management.

Conclusions : By using rs-fMRI distorted functional connectivity was found in medial temporal and parietal brain regions in NPSLE patients, that correlate significantly and adversely with their cognitive capacity.

Keywords: neuropsychiatric lupus, resting state fMRI, recurrence quantification analysis

OC35. Touchscreen Cognitive Tools for the early detection of Mild Cognitive Impairment and Dementia used in Primary Care: A Systematic Review

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Aims: Digital cognitive tools opened new promising opportunities for the early detection of cognitive impairment; however, most research studies are conducted in English-speaking populations and high-income countries, with a gap in knowledge about their use in populations with cultural, linguistic, and educational diversity. This study aims to review the touchscreen tools used in primary care settings for the cognitive assessment of Mild Cognitive Impairment (MCI) and dementia, with a focus on populations of different cultures, languages, and literacy.

Method: This systematic review was conducted following the PRISMA guidelines. Studies were identified by searching across MEDLINE, EMBASE, EBSCO, OVID, SCOPUS, SCIELO, LILACS, and by cross-referencing. All studies that provide a first-level cognitive assessment for MCI and dementia with any touchscreen tools suitable to be used in the context of primary care were included.

Results: Forty-two studies reporting on 29 tools and batteries were identified. Substantial differences among tools emerged, in terms of theoretical framework, clinical validity, and features related to the application in clinical practice. Few tools are available in multiple languages. Only 7 out of the 30 tools have a multiple languages validation. Only two tools are validated in low-educated samples, e.g., IDEA and mSTS-MCI.

Discussion: General practitioners can benefit from touchscreen cognitive tools. However, easy requirements of the device, low dependence on the examiner, fast administration, and adaptation to different cultures and languages are some of the main features that we need to take into consideration when implementing touchscreen cognitive tools in the culture and language of underrepresented populations.

Conclusions: The development of easily accessible, well-validated, and low-cost digital cognitive tools would represent a powerful driver of health policies pointing to the promotion of cognitive well-being, and early detection of cognitive impairment and would also address health inequalities linked to different access and treatment possibilities in the various populations/countries.

Keywords: dementia, early detection, digital tools

OC36. Neurocognitive dysfunction in patients with brain metastases prior to radiotherapy

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Aims: Brain metastases (BMs) occur in ten to thirty percent of the adult population and thereby are the most common complication of cancer. Before starting treatment, approximately one out of every two patients experiences cognitive impairment. In order to fully understand and predict changes in cognitive performance after treatment, pre-treatment cognitive functioning and the factors determining pre-treatment cognitive functioning should be established first.

Method: The study population consists of adult patients (≥18 years) with either radiographic and/or histologic proof of metastatic brain disease that were referred to the radiotherapy department of the UMC Utrecht for cranial radiation therapy for BMs. An elaborate battery of neuropsychological tests was used to assess cognitive performance prior to radiotherapy. Cognitive impairment was defined as a z-score ≤-1.5.

Results: 58 BMs patients were included for the current analysis. On the group-level, one-sample t-tests indicated the BMs patients scored lower than the normative population for tests on memory, processing speed, psychomotor speed, executive functioning and emotion recognition. On the individual level, 20.7% of patients did not have any cognitive deficits while 55.1% had deficits in at least two cognitive domains. Most patients (25-35%) had deficits regarding memory, processing speed and emotion recognition. Cluster analysis based on cognitive performance identified three groups: (1) patients with no or limited cognitive deficits, (2) patients with memory deficits and (3) patients with mainly speed deficits. The memory group had most cognitive deficits. No patient or treatment-related differences were found between the groups.

Discussion: To further understand the differences between cognitive clusters, future analysis will include self-reported cognitive deficits and multivariate analysis will be performed to identify risk factors for worse cognitive performance.

Conclusions: Prior to radiotherapy patients with BMs already pose a vulnerable population with cognitive deficits spanning multiple cognitive domains, from memory and processing speed to emotion recognition.

Keywords: Brain metastases, cognition, cluster analysis

Dementia

OC37. Smelling Alzheimer's disease: functional and structural investigation of predictive markers in olfaction

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Aims: Reduced smell capacities in Mild Cognitive Impairment (MCI) represent a marker of progression into Alzheimer's disease (AD)(1). Structural and functional cerebral basis of this effect were explored in the present longitudinal study.

Method: MCI patients (n=41, mean age 69.8) and healthy controls (HC; n=36; mean age 60.3) took part in the study. Patients were evaluated twice: T0 - MCI diagnosis; T1 - AD and non-progressive(np-) MCI diagnosis two years later. Threshold (TT), Discrimination (DT) and Identification (IT) of Burgarth Sniffing Sticks Tests assessed olfactory abilities. Functional (resting state-fMRI volumes) and structural (high-resolution T1-weighted images) were acquired on a 3T MRI scanner. Seed-based functional connectivity analyses using bilateral olfactory cortex (OF) as regions of interest and VBM analyses(2) were conducted.

Results: T0: olfactory performance was defective in MCI compared to HC, especially in patients who developed AD. In AD versus np-MCI, fMRI results showed increased FC between OF and posterior regions of the Default Mode Network(3), and reduced FC between OF and the supplementary motor area and the bilateral precentral gyrus. A negative correlation was found between the % of signal change of the right angular gyrus and IT scores in patients. VBM results showed grey matter (GM) volume reduction in medial temporal lobes (MTL) in patients as compared to HC, but no difference within patients. GM volume of MTL positively correlated with the DT and IT performances in MCI patients.
T1: longitudinal VBM results showed an augmented atrophy in AD patients in MTL.

Discussion: Patients' defective olfaction correlated with atrophy in the temporo-mesial structures that distinguished patients from HC. Functional connectivity of OF was altered before AD diagnosis.

Conclusions: Our results suggest that olfactory assessment and functional connectivity discriminate normal ageing from cognitive decline, also predicting MCI to AD progression. Only in full-blown disease structural differences emerge within patients.

Keywords: olfaction, neurodegenerative disease, neuroimaging

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OC38. Challenges in the development of normative data for the neuropsychological assessment of older adults based on the Hellenic Longitudinal Investigation of Aging and Diet (HELIAD)

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Aims: Normative data collected from older adults may be tainted by the inadvertent inclusion of undiagnosed individuals at the very early stage of a neurodegenerative process. To avoid this pitfall, we developed normative data for an older cohort who remained cognitively intact at long-term follow-up.

Method: 1041 community-dwelling individuals (age≥65) received a full neurological and neuropsychological examination on two occasions, [mean interval=3.1 (SD=0.8) years]. A CDR=0 or 0.5 and a MMSE≥26 were used as clinical diagnostic criteria. Thus, 645 participants were cognitively intact on both evaluations; data from their first assessment were used for norms development, including tests of memory, language, attention/ processing speed, executive functioning, and visuospatial perception. Multiple linear regression models were performed, with age at baseline (years), education (years), and sex as predictors for regression-based normative formulae and raw test scores as dependent variables. We explored age, education, and sex effects for each test variable separately. Standardized scaled scores and discrete norms stratified by four age and three education strata were derived.

Results: Education was associated with all test scores, whereas age was an important predictor of all but a few visuoperceptual, executive functioning, and memory variables. We found a female advantage on verbal memory, attention/processing speed, and subtests of executive functioning, but a male advantage on visual memory recall and visuospatial perception.

Discussion: The current study provides sound normative data for widely used neuropsychological tests among older adults, untainted by potential early and undiagnosed cognitive impairment. We report regression-based (continuous), scaled and discrete norms for use in clinical settings to identify cognitive decline in older adults and demonstrate their use and utility in differentiating case examples with known dementia or MCI (Mild Cognitive Impairment).

Conclusions: The present work addresses the challenge of developing appropriate normative data for a range of neuropsychological tests in older adults.

Keywords: neuropsychological assessment, normative data, older individuals

OC39. Behavioral variant Frontotemporal dementia: Tracking longitudinal progression in sporadic and genetic forms

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Aims: The behavioral variant of frontotemporal dementia (bvFTD) is a devastating and eventually genetically-determined neurodegenerative disease. Reliable predictors of disease progression comparing sporadic and genetic forms have not been sufficiently identified. We investigated baseline and longitudinal neuropsychological profiles of sporadic-bvFTD, GRN-bvFTD and C9orf72-bvFTD for their ability to distinguish between groups and track disease progression.

Method: Patients were consecutively recruited between December 2019 and December 2021 and longitudinally assessed. Clinical, genetic, neuropsychological and behavioural data were analysed to characterize them.

Results: Twenty-nine patients, 11 females, mean age was 62.38years (SD=5.88) were included. Of these, 8 carried a C9orf72 expansion and 6 have a GRN-associated mutation. At baseline there were no differences between groups in FTLD-CDR global score and Sum-of-Boxes (SB) score, but GRN-bvFTD patients were more impaired on verbal comprehension (than C9orf72-bvFTD; p=.016) and visuoconstructive abilities (compared to both groups; p=.023). After 12-months there were no significant differences between sporadic and genetic forms, but GRN-bvFTD compared to C9orf72-bvFTD patients showed worse results in learning (p=.021), facial emotion recognition (p=.014) and FBI negative behavior (p=.037). We then explored which tests could track progression between baseline and 12-months. Repeated measures analysis showed that MMSE, verbal initiative and orientation (all $p<.05$) could detect disease progression in sporadic-bvFTD. In genetic groups, the digit span was able to track progression ($p<.05$). Only the FTLD-CDR SB achieved statistical significance for the three groups.

Discussion: Our results are in agreement with previous studies where measures of attention, executive function and language showed significant differences between groups at baseline and follow-up, confirming the value of neuropsychological assessment in tracking progression.

Conclusions: We found measurable group differences at baseline and follow-up, highlighting different phenotypes in bvFTD among genetic and sporadic forms. Despite the small sample size, particular neuropsychological tests as well as FTLD-CDR SB were able to track disease progression.

Keywords: sporadic bvFTD, GRN-bvFTD, C9orf72-bvFTD

OC40. Neuropsychological Profiles in Genetic Frontotemporal Dementia: a Meta-Analysis

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Aims: To comprehensively characterize and compare neuropsychological profiles across different frontotemporal dementia (FTD) gene mutations (GRN, MAPT, C9orf72) and clinical disease stages (presymptomatic, symptomatic).

Method: We performed a meta-analysis covering the period January 1806 to July 2022 on cognition in C9orf72 (19 studies, n=764), GRN (14 studies, n=522) and MAPT (13 studies, n=315) mutation carriers compared to 1296 controls. Differences between language, executive function, attention, memory, social cognition and visuoconstruction were examined. For each psychometric test reported in the studies, Hedges' g (the magnitude of the difference between mutation carriers and controls) was calculated. Multilevel meta-analyses were performed to deal with interdependency of effect sizes due to studies reporting multiple independent outcomes. Log-likelihood ratio tests were performed to determine within- and between-study variance. In case of significance, moderator analyses were performed to test the effect of age, education, sex ratio and cognitive sub-processes (e.g. fluency vs naming).

Results: Presymptomatic C9orf72 mutation carriers performed worse than controls on language, executive function, and attention, and presymptomatic GRN mutation carriers performed worse than controls on executive function. All symptomatic mutation carriers performed worse than controls on language, executive function, attention, and memory, with an additional impairment in visuoconstruction in MAPT mutation carriers. We found different patterns of impairment within each cognitive domain between the mutation carrier groups.

Discussion: This study presents a large cohort of genetic FTD mutation carriers, with neuropsychological data covering a wide variety of tests in six cognitive domains. Results confirm the value of neuropsychological assessment in tracking clinical onset and could inform upcoming clinical trials in selecting sensitive endpoints for measuring treatment effects.

Conclusions: There are gene-specific cognitive profiles in the presymptomatic and symptomatic stage of genetic FTD. Specific neuropsychological tests for language, executive function, attention, and visuoconstruction appear promising candidates as endpoint in clinical trials targeting gene-specific pathologies.

Keywords: Cognition, Frontotemporal dementia, presymptomatic

High Level Visual and Attentional Deficits

OC41. High level visual deficits and lesions in posterior cerebral artery stroke – Results from the Back of the Brain (BoB)-project

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Aims: Single case studies of patients with specific syndromes are the key source of knowledge about the consequences of stroke on high level vision. In the BoB-project, we instead recruited patients based on lesion location. The aim of this study is to establish whether there are distinct regions within the posterior cerebral artery (PCA) territory that underpin the visual processing of words, faces, and objects.

Method: 64 patients with PCA-stroke and 45 controls were included. All patients underwent structural MRI, and sensitive testing of face, object, and word processing. Behavioural performance was related to lesion data by: (1) a multivariate multiple regression analysis; and, (2) a VBCM-analysis.

Results: Behaviourally, most patients showed more general deficits in high level vision (n=22) or no deficits at all (n=21). Category-selective deficits were rare (n=6), and were only found for words. Total lesion volume was most strongly related to performance across domains. Specific regions were also correlated with performance: For words, a left hemisphere cluster extending from the occipital pole along the fusiform and lingual gyri; for objects, bilateral clusters overlapping with the word cluster in the left occipital lobe; for faces a right hemisphere cluster within the white matter, partly overlapping with the object cluster.

Discussion: The findings provide partial support for the relative laterality of posterior brain regions supporting reading and face processing, and the regions most strongly related to performance mainly confirmed the pattern reported in more selective cases. However, behavioural impairment in all domains was observed following unilateral left and right as well as bilateral lesions.

Conclusions: In an unbiased sample recruited based on lesion location, we find that deficits in word, object, and face processing may be caused by lesions to either hemisphere. Yet, the regions most strongly related to performance show the expected pattern of lateralisation.

Keywords: visual perception, reading, face recognition

OC42. Using multitasking to detect contralesional spatial deficits six years after stroke

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Aims: Hemispatial neglect and extinction, i.e. contralesional spatial processing deficits, are common consequences of stroke. Neuropsychological assessment based on classic paper-and-pencil tests usually shows the rapid recovery of these deficits in few months after stroke. However, subtle symptoms might persist for longer in everyday situations, when multiple sources of information are processed simultaneously. Our aim was to determine the presence and features of contralesional deficits in ultra-chronic phases when deficits of contralesional spatial processing are no longer easily detected.

Method: We investigated load-induced contralesional spatial processing deficits in a patient with a right-hemisphere stroke that occurred six years before testing. He showed a good compensation of cognitive symptoms at the time of testing. On top of standard paper-and pencil-tests (Behavioural Inattentional Test, BIT) we employed a computerized dual-task [1,2]. It combined a primary spatial processing task, in which was required to detect lateralized visual targets (appearing for 100ms on the left, right or both sides of space) and a concurrent secondary visual or auditory categorization task to vary attentional load levels.

Results: Errorless performance emerged for contralesional hemispace in the BIT. In the computer-based task spatial processing was accurate when it was performed as a single-task. However, when the secondary concurrent task required the processing of visual stimuli, a significant number of omissions emerged selectively for contralesional targets. Interestingly, when the primary task was made perceptually very challenging by decreasing visual target dimension contralesional omissions emerged also in single task and no longer increases under dual-tasking.

Discussion: Multitasking-based tools have high sensitivity even several years after stroke, and their nature and difficulty dramatically concur in influencing symptoms presence and severity.

Conclusions: Multitasking-based tools might play an important role for a more sensitive neuropsychological assessment, taking into account the interaction between the deficit suffered and task difficulty.

Keywords: Visuospatial attention, Multitasking, Assessment

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OC43. Brain Rhythms in Altered Vision after Stroke

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Aims: In healthy adults, specific oscillatory frequencies, such as alpha (8-12Hz), are strongly associated with vision and attention. Here we investigated how these rhythms are affected in patients with impaired vision and attention, and if they can be altered to improve behaviour.

Method: We recorded 64 channel EEG during a phasic alerting task (Robertson et al., 1998): Twenty-four stroke patients with either hemianopia and/ or spatial neglect and thirty-three healthy controls indicated if one of four (two each in left/right space) targets turned red. There were 40 trials per target location, half with an alerting tone and half without, plus 100 trials with no visual target/ tone presented.

Results: For the patient group, unlike Roberston et al. (1998), although we found a main effect of target side with reduced detection accuracy and increased reaction times for contralesional targets, there was no main effect of tone nor an interaction with tone. The control participants on the other hand, as expected, were at ceiling for detection accuracy and showed no effect for target side, but a main effect of tone with shorter reaction times for alerting trials.

Discussion: At present it is unclear why the alerting effect was present in the control group only. We are thus currently investigating whether, for the alerting trials, there is a more specific relationship between pre-stimulus alpha power and subsequent detection accuracy and reaction time measures, and whether this differs between the two groups but also between patients.

Conclusions: Overall surprisingly, we failed to find alerting effects in patients with hemianopia and/or spatial neglect and were thus unable to alter their brain rhythms.

Keywords: alpha oscillations, impaired vision, stroke

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OC44. Head orientation biases in immersive virtual reality: a diagnostic marker for hemispatial neglect?

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Aims: Cancellation and line bisection tests remain popular to assess neglect, despite criticism for lacking sensitivity and reliability. Immersive head-mounted virtual reality (VR) may improve diagnostic sensitivity, as it can capture spatial attention in both the central and peripheral visual field and monitor patients' head orientation. In this study, we aimed to assess whether head orientation biases in VR can contribute to the diagnosis of hemispatial neglect.

Method: Stroke patients admitted to the rehabilitation wards of the University Hospitals Leuven were consecutively recruited. Patients completed an extensive battery of neglect tests and a visual discrimination task in VR (HEMIRehApp).

Results: 54 stroke patients (46% right hemispheric) were recruited of which 36 completed the VR assessment. 27% of the 54 patients had neglect on the hearts cancellation (|R-L|>3), 19% on the BIT star cancellation (|R-L|>2) and 37% on the McIntosh Line Bisection (bias > .125 or bias < .075). Only 10% of patients had neglect on all three tests, 14% on two tests, and 24% on only one test. Absolute head orientation biases were more pronounced in patients who showed neglect on three tests (M = 38°, SD = 12.14°, 28° - 52°), than patients who showed neglect on one or two tests (M = 10.3°, SD = 10°, 1.9° – 37°), and patients not showing neglect on any test (M = 4.0°, SD = 3.8°, 0.4° – 14.7°).

Discussion: Our results indicate that head orientation is more biased in patients with neglect on paper-and-pencil tests for neglect. The diagnostic disagreement between conventional tests poses challenges for examining the sensitivity and specificity of new tests. We will therefore treat diagnosis as a latent variable (using latent class analysis) in further analysis.

Conclusions: VR head orientation biases are associated with neglect on conventional tests and may be an easy-to-capture diagnostic marker of neglect.

Keywords: hemispatial neglect, Virtual Reality, head orientation

Face Perception

OC45. Unconscious self-face advantage in a subtype of Developmental Prosopagnosia: evidence from breaking-Continuous Flash Suppression

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Aims: Recent evidence suggest that face identity processing might rely on different brain mechanisms when stimuli are consciously or unconsciously perceived (1,2). An open question is whether these two levels are dissociable. To test this, we recruited 4 patients with developmental prosopagnosia (DP), divided in two subtypes accordingly to their score at the Cambridge Face Perception Test (3) (N=2 below cut-off group, mean=119; N=2 above cut-off group, mean=177). We measured the timing for visual awareness of self-vs-other face stimuli with the breaking-Continuous Flash Suppression (bCFS), hypothesizing a faster access to consciousness of the self-face, and measured prioritization on conscious visual awareness with Binocular Rivalry (BR).

Method: In the 4 patients (F=4; Age=57.8 ± 17.3), DP was assessed by 4 tests (CFPT, CFMT, UMFT, BTWA). In bCFS paradigm, self/other faces were presented to one eye, competing for visual awareness with a dynamic-mask presented to the other eye, and participants were instructed to respond as fast as they see appearing the target in their visual awareness. In BR, stimuli competed with a static-mask for perceptual dominance. Participants were told to report their percept (target or mask).

Results: At the group level, we found no effect of face identity on both the experiments. However, CFPT score clusterization revealed, in bCFS, a self-face unconscious prioritization in the below cut-off group ($p < .05$), whereas no prioritization was observed in the other group. In BR, both groups revealed no conscious prioritization for the self-face.

Discussion: Our results suggest that unconscious face identity discrimination is preserved only in the prosopagnosics subtype without face-perception deficits, suggesting that unconscious face perception might be independent from memory-based face perception. This is not the case when stimuli are consciously perceived.

Conclusions: Data seems to suggest a dissociation between memory-based prosopagnosics and memory-and-perception based prosopagnosics on unconscious face processing.

Keywords: face identity processing, developmental prosopagnosia, unconscious processing

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OC46. Is consciousness singular? A neuropsychological approach

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In common sense experience, based on introspection, consciousness is singular. There is only one "me" and that is the one that is conscious. Philosophers such as Descartes have often stipulated that "singularity" is a defining aspect of "consciousness", and the three main theories of consciousness, Integrated Information, Global Workspace and Recurrent Processing theory also assume that it is indivisible. In this review, I will re-examine the theoretical implications of neuropsychological impairments in conscious awareness, such as covert recognition, neglect, split-brain and anosognosia, and propose a new way to conceptualise consciousness of the singularity. I will argue that the subjective feeling of singularity can co-exist with several disunified conscious experiences. That is, perceptual, language, memory and attentional processes may proceed unintegrated and in parallel. Conscious awareness is achieved in all of these mental systems separately at the highest level of processing. The level of awareness may differ depending on the priority position of the mental system or the specific content. The sense of unity only arises when organisms need to respond coherently constrained by a single body and the affordances of the environment. The sense of singularity, the experience of a "Me-ness", thus emerges in the interaction between the world and (motor) planning of a singular person. The first testable hypothesis that follows is that one could lose the sense of "Me-ness" while remaining consciously aware. At first sight, such a condition has not been described in the neuropsychological literature, but further afield, there are clear examples of this experiential state of "ego dissolution", for instance in psychiatric patients and under the influence of psychedelic drugs, such as psilocybin and mescaline. A suggestion that goes back to great Greek philosopher Plotines. This – somewhat controversial - proposal opens new venues for studies of conscious awareness.

OC47. Impairments in facial emotion recognition; profiles across six neurological disorders (TBI, stroke, subarachnoid hemorrhage, Parkinson's disease, brain tumors, bvFTD)

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Aims: Impairments in social cognition (SC) are increasingly recognized as serious consequences of brain disorders, negatively impacting patients' everyday life functioning, social relationships and wellbeing. A crucial element of SC is the ability to recognize facial expressions of emotions. We investigated impairments and differences in profiles of emotion recognition in six neurological patient groups: 1. Moderate-severe Traumatic Brain Injury (TBI) 2. Moderate-severe ischemic stroke 3. Aneurysmal Subarachnoid Hemorrhage (SAH) 4. Frontal Low Grade Gliomas (LGG) 5. Advanced Parkinson's disease (PD) 6. Behavioral variant Frontotemporal Dementia (bvFTD).

Method: The Ekman Faces Tests of the Facial Expressions-Emotions and Test Stimuli (FEEST; Voncken, 2016) was administered, yielding a total score and 5 separate emotion scores (Anger, Sadness, Surprise, Fear and Disgust). All scores were transformed into standard norm scores correcting for age, sex and educational level.

Results: 710 patients with neurological disorders were included in four Dutch (Academic) Medical Centers (TBI n=118, Stroke n=93, SAH n=121, LGG n=100, PD=147, bvFTD=131). For each patient group, mean FEEST total scores were significantly lower than normative groups. In addition, bvFTD patients scored lower than all other groups, TBI patients scored lower than PD and SAH, and stroke patients scored lower than PD patients. Also, groups differed significantly regarding recognition of individual emotions, with bvFTD patients scoring lower on all separate emotions than all other groups, TBI patients scoring significantly lower on anger and fear than PD patients and on sadness than SAH patients.

Discussion: These findings show that emotion recognition is impaired in different neurological patient groups, with patients with bvFTD performing poorer than the other groups, but also differences across groups regarding impairments of separate emotions.

Conclusions: For clinical practice, this warrants the importance of including measurement of emotion recognition in standard neuropsychological assessment, and to take patient's specific profiles into account for tailored advice.

Keywords: social cognition, emotion recognition, neurological disorders

OC48. Development of wartime neuropsychology in Ukraine: an opportunity born out of tragedy

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Aims: We are a team of Ukrainian neuropsychologists striving for effectiveness in the diagnosis and treatment of wartime traumatic brain injury in the military and civilians. Our aim is to describe and characterize in some detail wartime traumatic brain injury in Ukraine and develop appropriate neurorehabilitation methods.

Method: We use neuropsychological assessment tests and questionnaires (Neurobehavioral Symptom Inventory, Hopkins Verbal Learning Test – Revised, Brief Visual Memory Test-Revised, Stroop test, Raven's ProgressiveMatrices, Rey-Osterrieth Complex Figure; Finger Tapping Test, Symbol Digit Coding, Shifting-Attention and Continuous Performance tests from CNS online platform; andthe original neuropsychological battery by Alexander Luria).

Results: We have created a digital database that makes it possible to store, assess and compare each patient's physiological symptoms, psychological condition, history, assessment of cognitive functions, medical assessment of traumatic brain injury. This automated tool helps us to analyze individual cases, create individual cognitive rehabilitation programs adapted to the Ukrainian linguistic and cultural context, and provide psychiatrists and neurologists with integrated neuropsychological assessment of our patients.Our program is one of the very few such programs in Ukraine and we are also training other clinicians to replicate it in multiple locations.

Discussion: Through the tragedy of the ongoing war and war crimes committed by the russian occupants in Ukraine, where the consequences of the blast injuries caused by the modern weapons on the human brain and cognitive functions are novel, at times unprecedented and often severe, we are able to study unique clinical material. We hope this will help further advance clinical neuropsychology and help many people suffering from the consequences of TBI.

Conclusions: We are in the process of developing an international network of collaboration. We welcome your interest and participation in our work and hope that it will become part of the global support for our country.

Keywords: Ukraine, war, TBI


Aging

OC49. Effects of scene context on object memory in younger and older adults: the role of predictive processing

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Aims: Knowledge about typical scene configurations is essential to make predictions about our environment and shapes gaze control. It has been suggested that older adults tend to rely more on prior knowledge. This overreliance might affect memory performance in case our expectations are violated. While younger adults' memory performance benefits from schema violations, the effects on older adults' memory remain controversial.

Method: We studied age effects on this memory advantage in a sample of 30 younger and 30 older adults. Participants viewed 60 images of natural scenes taken from the SCEGRAM database. These scenes contained target objects that were either semantically congruent or incongruent with the scene context (e.g. shampoo in the shower versus in the fridge). Recognition performance for target objects was determined. In addition, we recorded gaze patterns during encoding.

Results: We found that recognition of congruent targets was not affected by age. Schema violations were beneficial for memory performance in both age groups, but this advantage was significantly less pronounced in older adults. We were able to link performance differences to dwell times on the target objects. Additionally, recognized objects had to be matched to the scene context in which they were previously presented. Older adults' memory representations were biased more towards congruent information.

Discussion: Contextual information shapes memory for objects in natural scenes. Schema violations are beneficial for memory performance across the adult lifespan, but this advantage deteriorates with age. These age-related differences in memory for objects embedded in real-world scenes are closely linked to gaze patterns during encoding.

Conclusions: Our findings support a critical role of predictive processes for age-related memory differences and indicate enhanced weighting of predictions with age. We suggest that recent predictive processing theories provide a particularly useful framework to elaborate on age-related functional vulnerabilities as well as stability.

Keywords: aging, prior knowledge, object memory

OC50. Differential Role of Neural Integrity, Physical Activity and Depression In Frailty: Sex-Related Differences

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Aims: To evaluate the presence of different mechanisms underlying the frailty phenotype between men and women1, the differential predictive role of clinical, behavioral, and neural indices was investigated.

Method: Ninety-six community-dwelling older adults (58 F) were enrolled and evaluated to derive: the five Fried's frailty indicators (unintentional weight loss, grip weakness, exhaustion, slowness in walking, and low physical activity); the Comoborbidity Index, depression (CES-D), global cognitive level (MoCA), physical activity in daily life (PASE), and physical and mental wellbeing (SF12). The neural integrity index (Total gray volume + total cerebral white matter volume normalized to the estimated intracranial volume) was derived by a high-resolution T1-weighted brain MRI (3T Siemens Prisma) analyzed with Freesurfer software (v.6.0, https://surfer.nmr.mgh.harvard.edu/). SPSS v.28 was used for ANCOVA, and multiple regression analyses.

Results: Females showed higher frailty score than males ($p=0.007$, Cohen's $d=0.548$) representing 82.35% of Frail and 60% of pre-Frail subjects. Moreover, a significant interaction between Frailty phenotype and sex was observed for the CES-D ($p=0.014$, partial $\eta2=0.091$) and the PASE ($p=0.042$, partial $\eta2=0.069$). Specifically, the worsening of the fragility was associated with an increment of depressive symptomatology only in females, while a decrement in physical activity was observed already in the pre-Frail stage only in males. Finally, different predictor risk factors were observed in the two groups: neural index, and PASE score were significant predictors of frailty ($R2=0.356$) in males, while age and CES-D score were the only predictors of frailty ($R2=0.723$) in females.

Discussion: In our cohort, the relation between neural integrity and frailty phenotype in men plausibly indicates that neural decay is tightly linked to physical fragility in this group while depressive symptoms are important risk factors in females.

Conclusions: These data support the starting hypothesis of at least partially different mechanisms involved in the frailty phenotype between men and women.

Keywords: Frailty, Sex Differences, Neural Integrity

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OC51. A comparison of different multitasking methods across lifespan

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Aims: Multitasking is a ubiquitous necessity that is becoming more and more important in the daily routines of both young and old persons. It seems unclear whether multitasking has to be considered a domain-general cognitive function and whether the individual impact of cognitive-cognitive multitasking can provide clinically relevant information in old vs young persons. Finding a correlation among costs from different domains would index a domain-general cognitive function. On the other hand, a higher cost in those tasks more impaired by ageing would index that multitasking abilities are domain-specific.

Method: Here we investigated online different types of cognitive-cognitive dual-task interference (DTi) in 300 healthy adults (20-80 y/o) by using TMT-B, the divided attention subtest from TAP and a pictures memorization task "MEMO" performed with or without concurrent Auditory Continuous Performance task (ACPT). For individual tasks, the analysis focused on the relationship between age, performance, and cost. To test the hypothesis of a specific underlying cognitive function, we investigated the different correlations between costs.

Results: As expected, we found age-related decrease in performance across all tasks. Moreover, delta-TMT showed age-related increase in DTi/cost, but surprisingly, there was no such effect in the MEMO plus ACPT. Finally, no significant correlations emerged across tasks neither in terms of costs nor in terms of overall performance.

Discussion: Our data suggest that multitasking is not a domain general ability but rather each specific task has different requirements when performed under divided attention conditions, possibly depending on the specific manipulation at hand.

Conclusions: In conclusion, while maintaining the rigour of the lab, dual-task paradigms mimicking everyday demands are promising tools for cognitive assessment. They have several advantages including high sensitivity and the possibility to measure performance at different levels of attentional load avoiding compensation. Their nature and difficulty concur in influencing performance.

Keywords: Aging, Multitasking, Assessment

OC52. Metabolic syndrome and cognitive deficits: a cross-sectional analysis in the Greek cohort of Epirus Health Study

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Aims: Metabolic syndrome is a constellation of four cardiometabolic disorders - elevated blood pressure, }glucose intolerance, dyslipidemia and abdominal obesity - that increases an individual's risk for cardiovascular disease. However, the evidence for middle-aged individuals is still conflicting. We aimed to explore the relationship between metabolic syndrome and its individual components with cognitive function in a mostly middle-aged Greek cohort.

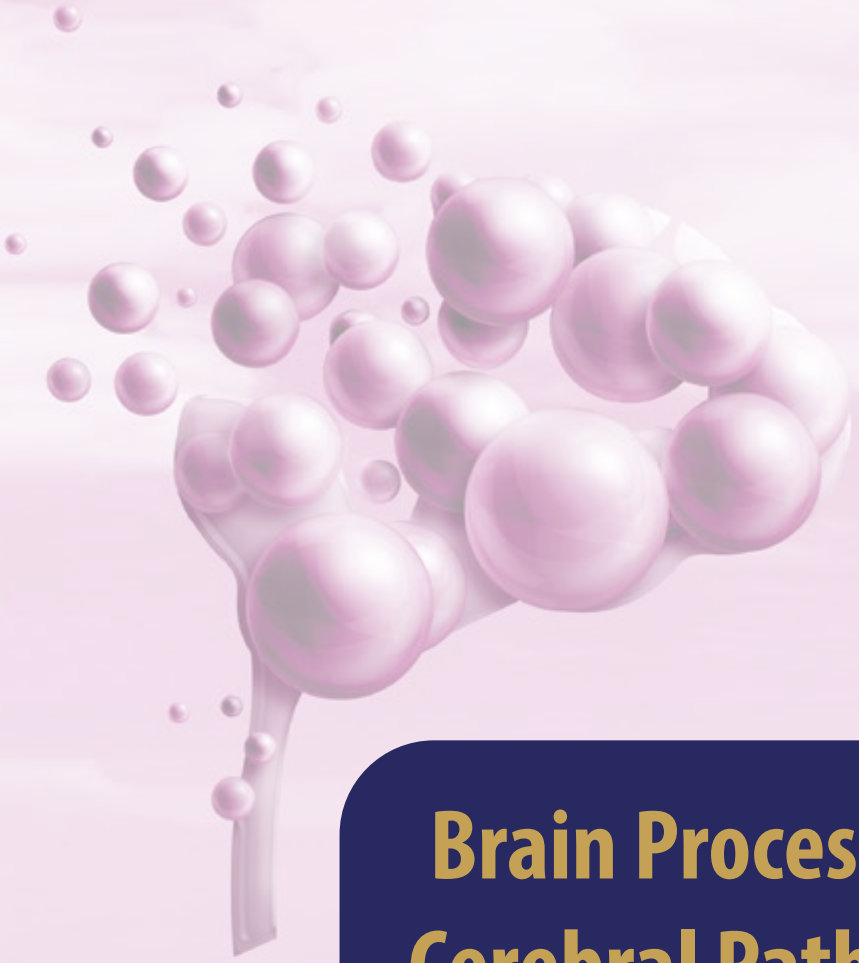
Method: A total of 2,077 healthy adults (mean age: 46.7 years) were included in the primary analyses and 305 of them participated in secondary prospective analyses. Cognitive function was measured primarily with Trail Making test, Verbal fluency test and Logical Memory test, and in secondary prospective analyses with online versions of Posner cueing task, an emotional recognition task, Corsi block-tapping task and Stroop task. Metabolic syndrome was defined both by revised National Education Program Adult Treatment Panel III and by International Diabetes Federation criteria, to allow comparisons for metabolic syndrome validity according to different criteria. Also, we investigated the possible interaction of metabolic syndrome with sex, age and genetic risk for Alzheimer's disease to test whether the associations could be modified by these factors.

Results: Multivariable linear regressions showed an association of metabolic syndrome with lower performance in attention and memory in primary and secondary analyses that could be driven by associations with elevated fasting glucose and abdominal obesity. Significant interaction was found only for participants younger than 60 years old in the delayed recall of Logical Memory test.

Discussion: Brain changes associated with metabolic syndrome, including microvascular damage, could explain the findings of the present study.

Conclusions: In summary, metabolic syndrome was associated with cognitive deficits in domains related with the cognitive profile of vascular cognitive impairment. Future research is needed with neuroimaging data and more extensive cognitive testing.

Keywords: metabolic syndrome, cognition, Greek



Brain Processes in Cerebral Pathology

OC57. Can refractory early-onset childhood focal epilepsy in right hemisphere cause social develop mental difficulties?

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Aims: Autism Spectrum Disorder (ASD) is a common comorbidity in early-onset epilepsies. Some studies reported that epilepsy involving predominantly the right temporal lobe could be related to autistic semiology, but publications are relatively scarce. The aim of this study is to demonstrate that early-onset right hemisphere epilepsy is a predisposing factor for the development of ASD-associated symptoms.

Method: Descriptive and analytical observational study of a cohort of patients with focal structural epilepsy, followed at a tertiary paediatric centre. ASD symptomatology was assessed using the Social Communication Questionnaire (SCQ) combined to the global clinical evaluation performed by qualified specialists in paediatric neuropsychology.

Results: We included 52 patients, aged from 4 to 21 years old, all having electro-clinical evaluation for their epilepsy. Thirty presented with a right hemisphere onset of the seizures and 22 with a left hemisphere epilepsy onset. A logistic regression analysis was performed to determine whether right or left hemispheric location of epilepsy during the first two years of life may lead to an increased incidence of ASD symptoms.
Based on clinical criteria, we found an increased incidence of ASD features among the right hemisphere epilepsy onset group ($p = .01$). SCQ scores and clinical evaluation results were highly concordant, but the clinical criteria proved to be more sensitive in individuals who could remain unrecognized with only the SCQ.

Discussion: According to neuropsychological developmental milestones, early-onset focal epilepsy of right hemispheric origin is associated with an increased risk of developing ASD symptoms.

Conclusions: Early referral to specialized epilepsy units and an early comprehensive evaluation by neuropsychologists qualified in epilepsy care is essential. A better control of seizures and an adapted, individualized, neuropsychological care, also implemented early in the course of the disease could modify social development.

Keywords: refractory epilepsy, childhood, social cognition development

OC58. Cortical activity of resting-state EEG rhythms is abnormal in people with Multiple Sclerosis

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Aims: Multiple sclerosis (MS) is a potentially disabling brain and spinal cord disease, causing a wide range of symptoms, including motor deficits and cognitive decline. We investigated whether changes in oscillatory activity may reliably index disease burden and cognitive impairment in people with MS (PwMS).

Method: Resting-state (eyes-closed), EEG recordings were acquired from 21 healthy controls (HC) (5 males, 33±7 years) and 33 PwMS with preserved cognitive capacity (2 males, 38±12 years old, 26 RRMS, 6 SPMS, 1 PPMS; EDSS 2.68±1.24) to test between-group differences in cortical activity. Spectral power in the delta, theta, alpha, beta1, beta2, and beta3 frequency bands was estimated using the exact LORETA, 3D linear inverse solution. Participants' cognitive and physical capacity was assessed via a battery of tests.

Results: PwMS scored significantly ($p<0.05$) lower than HC in the Mini-Mental State Examination (MMSE) and in a test of processing speed, the Symbol Digit Modalities Test (SDMT),. PwMS performed significantly worse in all examined domains of physical capacity (Timed 25-Foot Walk test: walking speed; 3m backwards walk test: mobility and balance; Four Square Step test: dynamic stability; Hole peg test: upper extremity function; Single leg stance: static postural and balance control; Hand grip strength test: endurance of upper limbs). PwMS exhibited significantly increased ($p<0.001$) cortical power in the delta band (frontal, parietal, and temporal lobe) and the alpha band (temporo-occipital areas).

Discussion: The impaired motor and cognitive status of PwMS compared to HC, at group level, is accompanied by abnormally increased cortical activity in resting-state EEG rhythms.

Conclusions: The potential use of our findings as indexes of cognitive impairment and disease burden can be tested through the implementation of cognitive interventions on PwMS. The research project was supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) (Project Number: 314).

Keywords: Multiple Sclerosis, Resting-State EEG, Cognition

OC59. Acquired crowding dyslexia

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Aims: Crowding refers to a phenomenon affecting both peripheral and foveal vision, where small visual objects above the acuity threshold are detected but unrecognizable because surrounded by nearby stimuli. It affects reading in healthy individuals and can be enhanced in congenital and acquired reading impairments. By increasing inter-letter space, crowding decreases. Previous evidence on patients with unilateral spatial neglect and peripheral dyslexia revealed a dissociation in sensitivity to spacing manipulation between those who mainly did omission errors and those characterized by substitution errors. Moreover, a correlation between neglect cancellation tasks and omission errors, but not substitutions, in reading was observed. Here we wanted to verify the hypothesis that the reading impairment due to enhanced crowding is dissociated from unilateral spatial neglect, while the one characterized by omission errors, is not.

Method: In a retrospective study, we selected those patients who underwent a reading task of words and pseudo-words, spaced and unspaced. 16 out of 38 patients showed USN. We analysed the number and types of reading errors, using a letter-by-letter correction, and compared patients with and without USN.

Results: Omissions were significantly more in the USN patients than in non-USN patients and greatly increased with the spacing manipulation in the USN group only. Substitutions were the most frequent errors in some patients with USN as much as in some patients without USN and were reduced by the spacing manipulation in both groups.

Discussion: We interpreted the results as evidence that what has long been classified as neglect dyslexia could be the merging of two different reading disorders (involving two different mechanisms): proper neglect dyslexia, characterized by omission errors and in which neglect is necessary, even if not sufficient, and another reading deficit, characterized by an enhanced crowding phenomenon and independent from neglect.

Conclusions: We called it acquired crowding dyslexia.

Keywords: peripheral dyslexia, crowding phenomenon, unilateral spatial neglect

OC60. A new clinical test of attention aimed to assess the effect of layout and crowding on visual search: the Broken Ring enVision Search test (BReViS)

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Aims: Visual search tests can be easily employed to assess attention in brain-damaged patients. The Broken Rings enVision Search test (i.e., BReViS) here proposed is a novel open-access paper-and-pencil tool in which layout and crowding are varied among four cards. These manipulations allow the assessment of different components of attention: a selective component, driven by target-similar distractors, the visuo-spatial orientation of attention, driven by different strategies of exploratory behaviour, and the focal attention, involved in the crowding phenomenon. We described the characteristics of BReViS, provided specific normative data, and assessed these components across the lifespan.

Method: The test was administered to a sample of 550 healthy Italian volunteers aged between 20 and 79 years old and to a group of patients. Brevis's test consisted of four cards. Combining execution times and accuracy, three indexes targeting different components of visuo-spatial attention (selective attention, strategic orientation of visual attention, focal attention) were obtained together with overall accuracy.

Results: Age, education, and gender had a different impact on the four indexes. Regression-based norms were provided in percentiles and equivalent scores. All patients showed pathological scores and specific attentional deficits when compared to healthy individuals.

Conclusions: The BReViS test is a free, easy-to-use tool that can be used in the clinical environment to evaluate deficits in specific components of attention.

Keywords: Visual Search, Attention, Neuropsychological Tests

Mild Cognitive Impairment

OC61. Can sleep predict conversion to MCI and dementia? Results from the Hellenic Longitudinal Investigation of Aging and Diet (HELIAD)

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Aims: Sleep disturbance is a common occurrence in the elderly and can influence many aspects of their lives, including cognition. Recent evidence suggests sleep problems as a risk factor for subsequent cognitive decline in healthy elderly individuals. Our aim in undertaking the current study was to investigate whether sleep parameters (sleep disturbance, daytime sleepiness, sleep duration, sleep adequacy, and napping) at baseline can predict the conversion from normal cognition to MCI/dementia at follow-up.

Method: A total of 955 cognitively normal (CN) older adults (aged ≥ 65) were drawn from the HELIAD study. A comprehensive neurological and neuropsychological assessment was conducted at baseline and at 3.1 years later, resulting in 160 individuals diagnosed with MCI and 34 with dementia, whereas 761 remained CN.

Results: Using Cox regression analyses, no sleep parameter increased the risk of conversion status adjusting for demographics and clinical factors. Napping, however, was found to decrease this risk by 19.3% ($p < .001$). Additional analyses (cross-sectional) revealed significant associations between sleep problems, sleep adequacy, and sleepiness on the one hand, and subjective cognitive decline (SCD) on the other, in older adults who remained CN at follow-up. Finally, SCD regarding memory at baseline was found to increase the risk of conversion to MCI/dementia by 71% ($p < .001$).

Discussion: Napping was found to be a protective factor for cognitive decline, independent of demographic and clinical factors, while subjective memory complaints were a risk factor, a finding in accordance with several studies of healthy elderly individuals. Other sleep parameters were linked to these complaints, but not objective cognitive status at follow-up. Conclusions: These findings have clinical implications for supporting elderly with SCD and sleep problems before they develop objective cognitive decline.

Keywords: sleep, MCI, longitudinal

OC62. A new diagnostic procedure for navigation impairment in Acquired Brain Injury patients

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Aims: Adequate navigation ability is a vital prerequisite for living an independent life. Previous research has shown that more than a third of Acquired Brain Injury (ABI) patients report a decline in navigation ability. The aims of this study were to determine the prevalence of subjective and objective navigation impairment in ABI patients as well as to identify their overlap. Based on the two instruments investigated here, a three-step procedure to assess navigation impairment in ABI patients is proposed.

Method: Data of subjective navigation ability on the Wayfinding Questionnaire (WQ) and objective navigation ability on the Leiden Navigation Test (LNT) of 435 ABI patients was obtained in a large-scale online study1,2. The WQ is a self-report questionnaire consisting of 22 items related to three subscales: Navigation & Orientation, Distance Estimation, and Spatial Anxiety. For the LNT, patients watched a 69-s video of a route through a virtual environment after which they completed five short tests related to various aspects of navigation ability.

Results: 39% of patients reported significant navigation ability complaints, given an impaired score on at least one of the WQ subscales. As a group they scored significantly lower on three out of five LNT subtests. Twelve out of fifteen correlations between the WQ subscales and the LNT subtasks were significant indicating overlap between subjective and objective scores.

Discussion: Previous findings on the prevalence of navigation ability complaints were replicated in this study. Also, the LNT was shown to be a valid objective measure of navigation ability.
Conclusions: Navigation impairment is relatively common in ABI patients and therefore deserves more attention in clinical settings. To facilitate standardized assessment of navigation ability in this patient group, a three-step clinical guideline based on the WQ and LNT is provided. Both instruments are available online free of charge.

Keywords: Visuospatial functions, Assessment, Acquired Brain Injury

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OC63. Experience and needs on the use of Social Cognition Measures in Memory Clinics: The joint effort of the Signature Consortium

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Background: Harmonisation of evidence-based neuropsychological protocols among different countries represents a priority for the benefit of researchers, clinicians and most importantly patients. Currently, no consensus on a uniform operationalization of socio-cognitive measures for neurocognitive disorders (NCDs) in memory clinics exists. The international SIGNATURE consortium has been established to evaluate the use of socio-cognitive measures in memory clinics and define best practices and priorities for their implementation in clinical settings. We report Phase-1 data on state-of-the-art and clinicians' needs in the use of socio-cognitive measures in the international scenario of memory clinics.

Method: An ad-hoc survey was developed and launched through the SIGNATURE mailing list (122 members, 90 institutions, 18 countries).

Results: 407 survey responses were collected from clinicians working in memory clinics. Respondents were balanced in professional (physicians=49%; psychologists=51%) including both academic and non-academic centres. Forty-four percent of respondents do not routinely assess all cognitive domains, among them 96% reported social cognition as "never routinely assessed" in major and 95% in minor NCDs. Two third of respondents use socio-cognitive measures only in selected cases (63% in major and 67% in minor NCDs). Limited availability of standardised clinical tools emerged as the main obstacle. Ekman and Faux-Pas tasks were the most known and used tasks in different countries. Experiences and needs did not significantly differ among countries.

Conclusions: At odds with DSM-5 recommendations, social cognition is still considered a domain to be assessed only in limited cases and expendable in case of lack of time. Despite the well-known inhomogeneity in the use of neuropsychological assessment between countries, there is a strong need for greater knowledge on tools, best practices, and appropriate context of use in the assessment of social cognition toward harmonization of clinical protocols.

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OC64. Late positive potential in the occipital area not associated with cognitive functioning of Mild Cognitive Impairment

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Aims: It has been suggested that the late positive potential (LPP) component is related to cognitive functioning including sustained attention and reaction time in people with Mild Cognitive Impairment (MCI) (Waninger et al., 2018). We investigated the relationship between LPP in the occipital area and cognitive functioning.

Method: 50 participants with MCI (mean age 72.44±7.96; education: 5.52±1.07) were recruited. EEG was done by using a 20-channel system while participants performed the simple vigilance task (SVT). Sustained attention was measured by their reaction time (ms). Vienna Reaction Time Task (VRTT) (Schuhfried GmbH, Moedling, Austria) was used to measure processing speed and inhibition while separating motor action (measured as a motor time) and cognitive processing (measured as a reaction time). Correlation analysis was used to analyze the liner relationship between the average LPP amplitude in the occipital areas (Oz, O1, and O2; time window: 400-800 ms after stimulus presentation) and cognitive functioning.

Results: We found significant correlations between reaction time on the SVT and motor time on VRTT (S1: $p = 0.015$; S2: $p = 0.075$; S3: $p = 0.021$;), but we found no significant correlations between reaction time on the SVT and VRTT (ps > 0.193), no significant correlations between LPP amplitude in the occipital areas and reaction time on any of the tasks (SVT: $p > 0.056$, VRTT: ps > 0.288) or between LPP amplitude and motor time on any version of the VRTT (ps > 0.500).

Discussion: We reason that our outcome could be because the tasks we use, SVT and VRTT, measure different domains of cognitive functioning. Indeed, SVT is considered as a measure of complex attention (Kainulainen, 2020), while VRTT measures executive function (Kiss, 2019).

Conclusions: Our preliminary results indicate that LPP amplitude in the occipital area was not significantly associated with sustained attention or inhibition.

Keywords: Mild Cognitive Impairment, LPP, Cognitive functioning

Cognition across the Life Span

OC65. Associations of Bilateral Vestibulopathy With Cognition in Older Adults Matched With Healthy Controls for Hearing Status

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Aims: Recent literature suggests a significant impact of the vestibular system on cognition and visuospatial processing. Given the increasing prevalence of dementia and individuals at risk for it, exploring possible modifiable risk factors, including vestibular dysfunction, is vital. We aim to explore the association of bilateral vestibulopathy (BV) with cognitive function in older adults, taking hearing status into account, and to explore multiple vestibular characteristics and their potential associations with cognition in participants with BV.

Method: This cross-sectional study assessed older adults (age 55-84 years) with diagnosed BV from a single center using baseline measurements from the Gehoor, Evenwicht en Cognitie (GECkO) study, an ongoing prospective longitudinal cohort study. Each participant was individually matched with a healthy control based on age, sex, and hearing performance. The primary outcome measure was cognition, measured by the Repeatable Battery for the Assessment of Neuropsychological Status for Hearing-impaired individuals (RBANS-H).

Results: A total of 68 patients were assessed, including 34 patients with BV matched with 34 control individuals. Overall, participants with BV had a clinically meaningful lower score on the RBANS-H total scale compared with those without BV. This decline was most pronounced in the subdomains of immediate memory, visuospatial cognition, and attention. There were no differences in language or delayed memory subdomains. Within the BV population, 1 clinical balance assessment (the Performance-Oriented Mobility Assessment, balance subscale) was associated with lower cognitive scores. Other vestibular parameters, including measurements of the peripheral vestibular end organ and questionnaires, showed no association.

Discussion and Conclusions: These findings suggest there was an association between vestibular loss and cognitive impairment, supporting the recent theory of vestibular dysfunction being a risk factor for dementia. Further research on the causal mechanisms underlying this association and the possible impact of vestibular rehabilitation on cognition is needed.

Keywords: Cognition, dementia, vestibular function

OC66. Cognitive development across the life-span in children and adults with Down´s Syndrome and age-matched typically developing controls

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Aims: Studies regarding cognitive development in Down's Syndrome (DS) are almost inexistent and so far, no previous studies compared performance of people with DS with age-matched, typically developing (TD) controls across the life-span; partly due to difficulties finding tasks suitable for both groups. We aimed to investigate for the first time cross-sectional cognitive development of children and adults with DS and age-matched controls with various neuropsychological tasks across the life-span.

Method: 143 participants between 8 and 60 years (61 DS, 82 TD, 4 age groups) were assessed with the Cambridge Cognitive Examination (CAMCOG-DS) consisting of 7 sub-scales (orientation, language, memory, attention, praxia, abstract thinking and perception). Different cognitive functions were assessed in more detail with the Cancellation Test (Selective Attention), the Boston Naming Test, a single-word comprehension task, and the Stick Design Test (visuo-construction).

Results: Overall, age-related effects resemble an inverted u-shaped pattern in DS and are less pronounced in TD; with TD performing significantly better than DS, and older children and young adults performing best. Regarding CAMCOG-DS total score, a two-way univariate ANOVA showed main effects of age, diagnostic group and an interaction effect, with larger age differences in DS than in TD ($p < .001$). A two-way MANOVA showed the same pattern in all sub-scales ($p < .05$), however, regarding abstract thinking and perception, no interaction between age and diagnostic group was found. Another MANOVA showed similar results for the additional tests ($p < .05$).

Discussion: Results show significantly more pronounced cross-sectional developmental effects in DS compared to age-matched controls regarding most cognitive functions, as well as significantly lower performance as expected by their intellectual disability.

Conclusions: It is possible to identify tasks to study developmental effects in DS and age-matched controls and we show for the first time that age-related effects differ in both groups across the life-span.

Keywords: Development, Down´s Syndrome, Life-Span

OC67. Automated MRI quantification of brain and ventricular volume with cNeuro following subarachnoid hemorrhage: associations with cognitive functioning

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Aims: To investigate whether cerebral volumes are reduced in several brain regions (i.e. cerebral gray matter, frontal, (medial) temporal, parietal, occipital lobe) after mild subarachnoid hemorrhage (SAH), using a new automatic clinical quantification tool (cNeuro). Second, to investigate whether decreased cerebral volumes are related to impaired cognitive functioning.

Method: SAH patients with mild initial clinical conditions, small SAH volumes, and endovascular treatment were included, as cNeuro can only be applied in patients without substantial visual brain damage. We used 3D T1-weighted images of 12 aneurysmal SAH (aSAH) and 19 angiographically negative SAH (anSAH) patients. Cerebral volumes were automatically compared to normative reference data adjusted for age, sex, and intracranial volume. Volume values below the 10th percentile were considered pathological. Cognitive functioning was measured with tests for information processing speed, attentional control, memory, and executive functioning. All measurements took place 5 months post-SAH.

Results: Most patients had a volume reduction in the frontal lobe (aSAH: n = 5 [42%], anSAH n = 6, [32%]). No significant differences were found in volumes for all brain regions between the two SAH groups. Significant lower scores for processing speed ($t = -2.11$, $p = 0.02$) and attentional control ($t = -2.01$, $p = 0.03$) were found in SAH patients with reduced frontal lobe brain volumetric measurements as compared to patients with no reduced volumes in this region.

Discussion: SAH patients with significant volume reductions in the frontal lobe are slower and have worse attentional control than patients without volume reductions in this region. This may be an explanation for the persistent cognitive and fatigue complaints SAH patients, even in good clinical condition, experience in the long-term.

Conclusions: In a mild subgroup of SAH patients reduced frontal lobe volumes can be quantified, affecting cognitive functioning. Neuropsychological examination is therefore strongly recommended, even after mild SAH.

OC68. Testing the role of the hippocampus in memory-based attention: preliminary results from patients with refractory temporal lobe epilepsy

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Aims: Long-term memory (LTM) proactively guides spatial attention (LTM-based attention). It is not clear whether this function relies on hippocampal activity. fMRI studies on healthy individuals diverge as they have shown either the role of the left1, left and right2 hippocampus or no direct involvement of this structure3. The study on patients with drug-resistant temporal lobe epilepsy (drTLE) may shed light on the role of the hippocampus in LTM-based attention as they often present with left or right hippocampal sclerosis (HS).

Method: Thirty-three patients with Hippocampal Sclerosis (HS) (left-HS n=21; right-HS n=12) and 27 Healthy Controls (HC) executed a task evaluating LTM-based attention. Participants first completed a learning session in which they searched for target stimuli within naturalistic scenes. Then, they performed an orienting task detecting the target object on the scenes from the learning session. Lastly, participants were tested on explicit memory for the learnt object-scene association and the location of the object. We tested group differences for the orienting effect and explicit memory scores and calculated correlations to explore the link between explicit and implicit memory indexes.

Results: The LTM-based attention was preserved in both left and right HS patient groups. In HC, the LTM-based attention was supported by the explicit memory recall with a significant correlation between the orienting effect and target object recall. Intriguingly, left and right HS in drTLE breaks down this association. Discussion: The preserved LTM-based attention in patients with HS suggests at least two possible scenarios. The first concerns the role of the hippocampus in LTM-based attention, which may be less crucial than previously thought. The second scenario involves the role of a potential reorganization mechanism in drTLE.

Conclusions: LTM-based attention could be preserved in patients with HS and drTLE.

Keywords: "Temporal lobe epilepsy", "Long term memory", "Attention"

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Poster Presentations

ADHD/Attentional Functions

P001. Investigating the link between counterfactual thinking and deception in attention deficit hyperactive disorder (ADHD)

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Aims: Counterfactual thoughts (CFTs) are imagined outcomes of events that have already occurred, whereas deception is people's ability to make someone accept as true what is false. Past studies have implied a positive association between these cognitive processes, primarily based on the fact that they both rely on executive functions. Here, we investigated CFT and lying in attention deficit hyperactive disorder (ADHD), a condition considered to involve executive function impairments. In doing so, our aim was to provide further support for the relationship between CFT and lies and establish whether executive functions are an underlying mechanism for this relationship.

Method: The study was conducted online and consisted of 39 controls and 48 participants with ADHD. We used scenario tasks that required the spontaneous and cued generation of counterfactuals and lies, along with self-report measures that requested participants' self-reflection on their ability to engage in these processes. Additionally, we used standardised scales to evaluate participants' working memory and inhibitory control.

Results: Our findings indicated that CFT and deception are positively related, but only for some measures, and that group differences exist in cued lies and the self-report measures of CFT and deception. Executive functions separately correlated with some of the CFT and lying measures. Finally, mediation analyses showed that impulsivity was a mediator of the relationship between self-reported measures of CFT and lying.

Discussion: The results support the existing literature proposing a link between CFT and deception and suggest that this relationship might be mediated by executive functions, particularly impulsive control. However, the findings were only applicable in some measures of CFT and lying, probably due to methodological limitations.

Conclusions: Overall, the study endorses the idea of ADHD being a neurocognitive disorder with a developmental impairment of executive functions, while also suggesting possible deficits in CFT and deception for this population.

Keywords: counterfactual thinking, deception, attention deficit hyperactive disorder (ADHD)


Aging

P002. Affordance-based judgments (appear more extreme) in the elderly

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Aims: Is an opening passable, an obstacle conquerable or an object reachable? In order to move safely in everyday life it is crucial to appropriately evaluate one's own bodily capabilities within the specific environmental context. Judgement performance appears to change with age and it is unclear how this may relate to the type of task to be judged. Here we would like to investigate within subjects whether healthy older adults do rely on similar judgement tendencies across different tasks.

Method: 40 elderly subjects decided whether their hand would fit into a presented opening (aperture task), whether they could stand upright under a rod (fit under task), whether they could step over a rod (hurdle) or whether they could reach an object (reach task). Judgment tendency and perceptual sensitivity were compared between tasks. In post-hoc analyses, a subsample of 24 elderly and 24 matched young subjects were compared with a focus on judgment tendencies.

Results: Perceptual sensitivity and judgement tendency differed between tasks, with performance being best but most conservative in the aperture task and worse and more liberal in the reach task. Post-hoc age group comparisons with a sample of healthy young subjects revealed more extreme judgement tendencies in older adults.

Discussion: Both differences in perceptual sensitivity and judgment tendency between tasks might be associated with different degrees of freedom concerning perceived movement possibilities.

Conclusions: The application of different tasks offers the opportunity to take a more differentiated look at affordance-based judgment performance in elderly subjects. The reason for more extreme judgment tendencies in older adults needs further clarification.

Keywords: aging, affordance-based judgments, judgment tendency

P003. The Role of Creativity in Risk Management and Decision Making

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Aims: The following research aims to present data from two studies conducted to investigate the relationship between risk management as a style and during a task in a risky situation and creativity in ageing. Risk management is a crucial aspect at all stages of life, as it is linked to the ability to make decisions functionally. This aspect becomes more critical in adulthood and old age when one is often faced with situations requiring risk-taking.

Method: The first study, conducted on 185 healthy Italian adults (18-81 years; M=39.9; SD=17.8), aims to investigate the relationship between risk propensity (Domain-Specific Risk-Taking), decision-making styles (General Decision-Making Style), and creativity. The second study, in which 138 healthy Italian adults (18-80 years; M=47.7; SD=20.4) were involved, investigated the constructs employing a decision-making task under risk conditions (IOWA Gambling task), the Melbourne Decision Making Questionnaire, and a creativity task.

Results: The first study revealed, with advancing age, a decrease in risk propensity across domains and creativity scores, although no differences in decision-making styles were observed. Creativity was correlated with risk scale scores. The data from the second study confirmed the results obtained in the previous study, but with an additional interesting aspect: only under certain conditions can creativity be supported in this process.

Discussion: It can be hypothesized that creativity enhancement makes people more inclined to take risks when the context demands it. A cluster analysis outlined profiles in which low or high creativity is linked to low-functional risk management modes, while medium creativity corresponds to a more functional and strategic risk management mode.

Conclusions : Since creativity is a recognized proxy for cognitive reserve and an essential aspect of active ageing, it is crucial to investigate how and to what extent its enhancement is functional in the processes underlying autonomy in everyday life.

Keywords: decision-making, risk-management, creativity

P004. The Potential Role of Creativity in the Psychological Well-Being of the Elderly: a New On-line Divergent Thinking Training to Promote Active Aging

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Aims: A greater ability to think divergently seems to bring benefits both in the psychological and in the cognitive domain throughout the lifespan. In particular, studies on older adults confirm the role of creativity as a valid support in active aging. The aim of the study is to investigate the possible role of creativity in promoting active aging through a new training that stimulates divergent thinking skills.

Method: An online assessment of psychological well-being and cognitive functioning was performed through Inquisit and Qualtrics on a sample of 30 elderly subjects, before and after the training. Subjects were over 60 and the training consisted of 10 online group sessions twice a week. At the end, an online follow up assessment was conducted.

Results: Data showed an increase of psychological well-being in the post-training assessment. As concerned cognitive measures, an improvement in some of the attentional-executive tests was highlighted and maintained significantly over time.

Discussion: Results support the evidence that creative thinking, favoring the ability of the elderly to find new and effective strategies to face constant daily challenges, can positively influence both psychological well-being and cognition. Enhancing creativity, therefore, can have beneficial effects in the aging process favoring an active and successful aging.

Conclusions: These findings suggest that stimulating creative thinking might have beneficial effects in the life of elderly people. By improving their ability to adapt to changes related to aging and their flexibility in the use of new and functional strategies, it is possible to induce them to maintain higher cognitive functioning, autonomy and psychological well-being.

Keywords: creativity, active aging, psychological well-being

P005. Understanding and processing of ratio concepts in older age

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Aims: Information about risk is often conveyed through complex numerical concepts (e.g., 20%, 1 out of 100, double that much...). There is evidence that this information is difficult to understand, sometimes even for highly qualified health-care professionals. The term "numeracy" refers to the ability to understand numbers, perform computations, and compare numerical magnitudes. It also includes the ability to deal with ratio concepts such as proportions and percentages. In comparison to highly numerate people, low numerate persons show poorer risk understanding and often make less advantageous decisions. Here, we aim to investigate the understanding and processing of ratio concepts in healthy older adults.

Method: Ninety participants (age range 50-90) performed a comprehensive test battery assessing memory, executive functions, complex calculation, and ratio processing. To this regard, we used the Health Numeracy Scale (HNS)[1,2], which requires the comparison or computation of proportions and percentages, and a self-developed "Every Day Decision Making" (EDDM) task. In this task, participants had to decide between two alternatives, embedded in a common context (e.g., diet program). Both alternatives entailed numerical information, which was conveyed through proportions (e.g., 880 von 1000) or percentages (e.g., 85%).

Results: There was a highly positive correlation between EDDM and HNS. Performance in both tasks negatively correlated with age but positively correlated with education, complex calculation, memory, and different executive functions. Complex calculation emerged as significant predictor of performance in both tasks.

Discussion: Calculation skills, more than age, education, memory, and executive functions, can influence how good healthy older people can understand and process ratio concepts, even in a decision-making context.

Conclusions: High basic calculation competence may help dealing with complex numerical concepts such as ratios. Improvement of basic calculation skills is warranted for different populations and age groups. Acknowledgements: The authors are supported by EVTZ/Austrian Science Fund (FWF) IPN 135-B.

Keywords: Aging, Numeracy, Cognition

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P006. Forecasting the onset of neurocognitive disorders by monitoring cognitive aging in healthy individuals: results of a longitudinal study.

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Aims: Degenerative pathologies underling neurocognitive disorders (ND) start even 15 years before the first clinical signs and before cognitive performance become defective. We hypothesized that in this pre-clinical stage an accelerated rate of cognitive aging (CA) is present, and that an individual who is affected by a neurodegenerative pathology will show a progressive worsening of performances that will be greater than expected. For this reason, we developed a neuropsychological battery to monitor CA in healthy individuals allowing to detect signs of accelerated CA in still well-within normal range performance.

Method: Five parallel versions of a battery testing verbal and visuo-spatial memory, selective and divided attention, and executive functions was developed and administered to 148 healthy individuals (40-69 yrs old) 5 times at 6 month-intervals.

Results: Trends of performance over time were computed, establishing average and limits (1 SD below the mean) of normal CA in different cognitive domains. Abnormal aging was detected in 1 individual that is under investigation for possible onset of Alzheimer Disease.

Discussio : Present results support initial hypothesis that pathological CA shows an accelerated rate of decay in still within normal range performance.

Conclusions: Monitoring cognitive aging in healthy individuals will be an effective mean to detect the onset of neurocognitive disorders in preclinical stages, allowing establishing treatments that effectively contrast ND onset and progression.

Keywords: Neurocognitive disorders, early diagnosis, aging slopes

P007. Overestimation is associated with reduced driving safety in older adults

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Aims: Older drivers often show less precise self-ratings with a tendency to overestimate themselves. It is unclear, however, how overestimators differ from underestimators or drivers with adequate self-ratings regarding driving safety.

Method: In an on-road study, 59 older drivers completed a 50-minute practical driving assessment being supervised by a driving instructor and a traffic expert. Driving competence and fitness to drive were rated by the traffic expert using the TRIP protocol. In addition, neuropsychological measures, driving-related questionnaires, and different self-assessment scales were used. Statistical analyses involved correlation analyses between subjective (driver) and objective (traffic expert) ratings of on-road driving performance. In addition, drivers were classified into overestimators, underestimators, and valid estimators based on subjective and objective difference scores. The groups in turn were compared in terms of practical driving behavior and accident frequency.

Results: Despite positive correlations between subjective and objective ratings, results showed that 25% of drivers overestimated their on-road driving performance, while there were no drivers who underestimated their performance. Compared with valid estimators (75%), overestimators showed lower annual mileage, poorer traffic comprehension, poorer cognitive performance, poorer practical driving skills, and more near-misses and minor at-fault accidents within the 12 months after study participation.

Discussion: The results of the study show that the majority of healthy older drivers is able to validly assess their practical driving skills. However, a quarter of drivers appears to overestimate their skills. Compared to drivers with a valid self-assessment, overestimators show poorer practical driving skills and an increased risk of accidents.

Conclusions : Overestimators appear to represent a risk group for driving safety.

Keywords: overestimation, driving safety, older adults

P008. Cognitive functioning in patients with cardiovascular disease

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Aims: Aim of this study was to determine the cognitive functioning in patients with CVD.

Method: The study included 118 (90 men) CVD patients treated at the Abromiskes Rehabilitation Center, aged between 41 and 70 years old (M = 57.49, SD = 7.408). Intellectual abilities were assessed by the short version of the Intelligence Structure Test I-S-T 2000 R. Results: The verbal ($p<0.01$), mathematical ($p<0.01$), visual ($p<0.001$) and general intelligence ($p<0.001$) of the CVD patients were lower than those of their peers in the Lithuanian standardized sample. When age was taken into account, these differences only persisted in the older sample (over 51 years). Younger patients (41-50 years old) do not differ in intelligence level from their healthy peers ($p>0.05$). Analysis of the number of correct answers in the subscales of the intelligence test items confirmed that younger participants correctly answered the same number of intelligence test subscales (except Cubes) as their healthy peers ($p>0.05$), while older participants correctly answered statistically fewer ($p<0.05$) intelligence test subscales (except Comparison) than their healthy peers.

Discussion - Conclusions: The difference is found to be more pronounced in the group aged 51 years and over, while the intellectual ability of those aged 50 years and younger do not differ from that of the standardized sample. Because younger individuals have a shorter disease duration, it is likely that the impact of the disease on intellectual functioning is also lower. On the other hand, methodological limitations of the study may also have prevented to detect the differences.

Keywords: cardiovascular diseases, intellectual ability, older age.

P009. Predicting daily functioning with cognitive functions among community-dwelling older adults using a structural equation modeling approach

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Aims: As evidence of the relationship between cognition and daily functioning has been inconsistent (e.g., Putcha & Tremont, 2016; Teng et al., 2010), we investigated the former as a predictor of the latter among older adults.

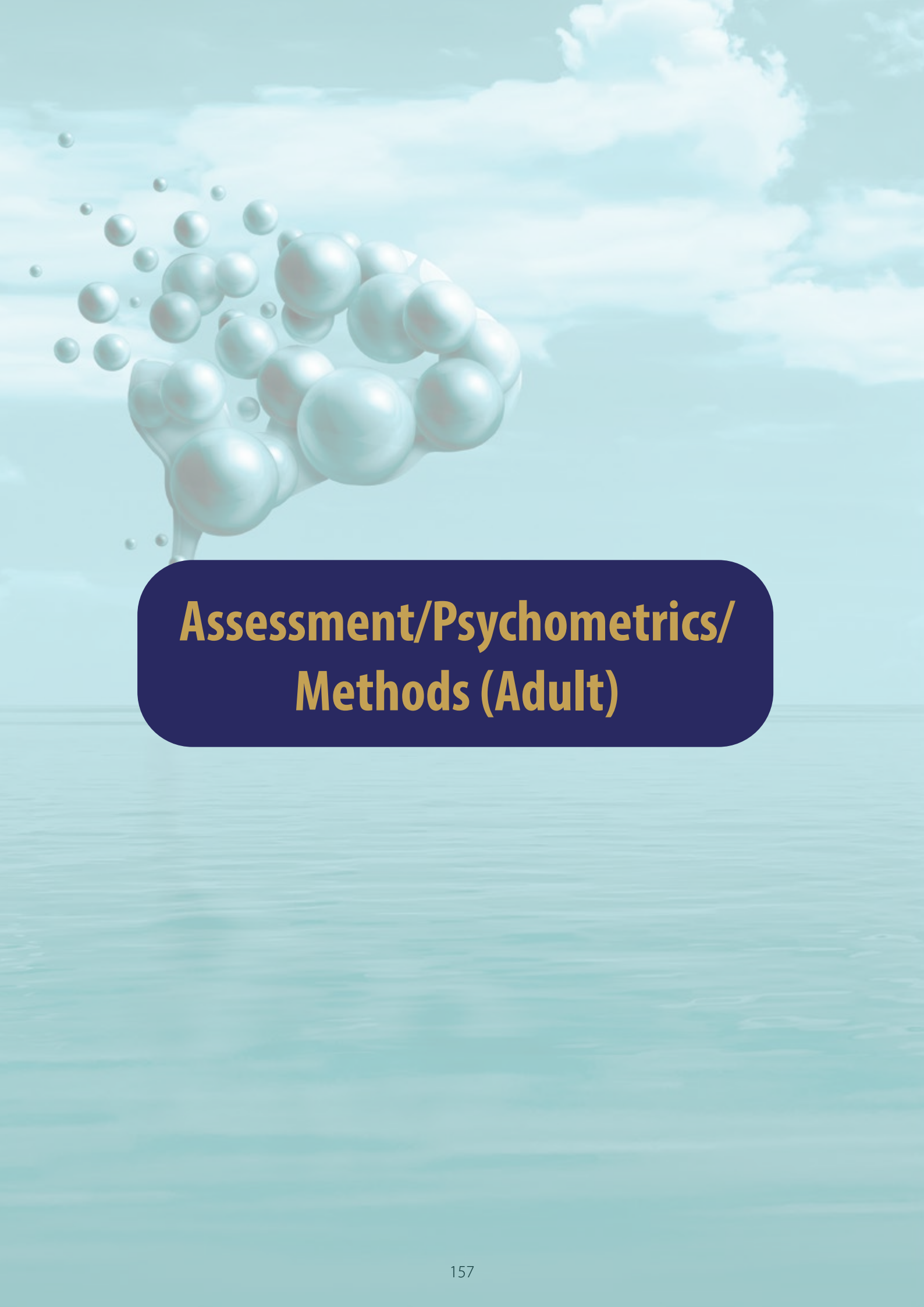
Method: Cognitive functioning was assessed in 182 community-dwelling participants (60.2% male, mean age = 71.4 years) using various neuropsychological tests (e.g., trail-making test, WAIS digit span, verbal fluency). The Functional Activity Questionnaire (FAQ) and the Instrumental Activities of Daily Living (IADL) were used to measure daily functioning. A measure of depression (i.e., the Geriatric Depression Scale (GDS)) was also included as a possible moderator. Data were analyzed using Partial Least Squares Structural Equation Modelling in R with the "seminr" package.

Results: The three-factor model (i.e., memory, attention/executive function, language) was found to have the best fit to the data, explaining 16.7% of the total variance. However, among the three factors, only memory was significantly associated with daily functioning (b = -0.367, 95% CI [-0.53 -0.18]). Good validity was evident for all constructs (AVE > 0.5 and HTMT < 0.9), except for attention/executive function which demonstrated poor convergent validity (AVE = 0.43). This latter domain only had two out of seven indicators showing loading larger than 0.708. Further, depression did not significantly predict daily functioning nor did it moderate the role of cognitive domains.

Discussion: Indeed, memory and executive function have been repeatedly mentioned as crucial in the maintenance of daily functioning (Pérès et al., 2008; Royall et al., 2007). However, the poor convergence among the "attention/executive function" indicators in the model might explain the lack of evidence for the role of executive function in this study.

Conclusions: This preliminary result suggests that cognitive function explains a small portion of the daily functioning variance with memory being the sole and best predictor.

Keywords: cognition, daily functioning, older adults



Assessment/Psychometrics/ Methods (Adult)

P010. Working memory among community-dwelling adults in Turkey: impact of age, education, and gender on test performance

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Aims: The field of clinical neuropsychology in Turkey will benefit greatly from the collection of neurocognitive test data from individuals with diverse educational backgrounds and varying in age. The objective of the present study was to investigate the influence of age, education, and gender on working memory test performance among community-dwelling adults in Turkey.

Method: Three extensively-employed tests of verbal (Letter-Number Sequencing and Digit Span) and non-verbal (Spatial Span) working memory were administered to 781 participants (female n=450, male n=331) ranging in age from 18 to 69 years (mean = 37.4, SD = 15.7). All participants were free of mental illness as determined by the Mini International Neuropsychiatric Interview. Current medication use, history of traumatic head injury with loss of consciousness, and Beck Depression Inventory score equal to or greater than 17 were exclusion criteria. Participants were categorized according to educational level: primary (n=144), secondary (n=96), high school (n=187), and university (n=354).

Results: Education group differences on Letter-Number Sequencing, Digit Span, and Spatial Span tests were highly significant (ps < .001) with effect size values in the large range. Education group differences remained significant after controlling for age (ps < .001). Further analysis revealed that age and education level were significant independent predictors of task performance, with education exerting a much stronger influence. For all three measures of working memory, age was inversely associated with test scores, while education was positively related to task performance. Gender differences for Letter-Number Sequencing and Digit Span did not approach statistical significance. Males obtained significantly higher scores on Spatial Span relative to females; however, the effect size value was negligible.

Discussion - Conclusions: As expected, age and level of formal education influenced task performance. For education group comparisons, effect size values were consistently in the large range across three tests of working memory.

P011. Neurocognitive testing and fear of negative evaluation: a comparison of remote and in-person assessment protocols

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Aims: We investigated the influence of heightened sensitivity to criticism on neurocognitive test performance among university students evaluated in two settings: 1) remote computer administration; and 2) traditional in-person assessment.

Method: Participants completed a Turkish version of the Brief Fear of Negative Evaluation Scale (BFNES) and a battery of neuropsychological tests assessing verbal memory/executive control, attention, perceptual reasoning, and verbal fluency. Hypothesis that intensified "fear of negative evaluation" is associated with performance deficits was evaluated. We also tested the hypothesis that elevated BFNES scores will be associated with poorer task performance when tests are administered in-person relative to measures remotely administered.

Results: Students were randomly assigned to remote (n = 158) or in-person (n = 166) test administration groups. Subjects assigned to remote administration group were then classified according to BFNES scores and low-, moderate-, and high-scoring BFNES groups were compared. Fear of negative evaluation had a very weak negative influence on test performance during remote administration. Participants assigned to in-person condition were also classified according to BFNES scores. Fear of negative evaluation did not adversely affect performance during in-person assessment. In-person and remote testing groups were directly compared. On most test outcomes, groups did not significantly differ; however, participants assigned to in-person condition outperformed subjects in remote testing group during an auditory continuous performance test (CPT) (making significantly greater number of correct responses and committing fewer errors of omission, but not commission errors). Group differences on BFNES were not significant.

Discussion: Fear of negative evaluation had a very weak influence on test performance among students undergoing remote testing and did not adversely affect performance during in-person assessment.

Conclusions: In-person and remote testing groups did not demonstrate noteworthy differences in test outcomes (with exception of auditory CPT) suggesting that remote testing may be a viable alternative to traditional face-to-face assessment.

Keywords: neurocognitive, testing, fear

P012. Standard and preliminary data of lexical-semantic impairment screening in Alzheimer's disease and primary progressive aphasia: presentation of the relevance of a multimodal semantic knowledge assessment

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Aims: Lexical-semantic disorders are one of the major manifestations in semantic variant primary progressive aphasia (svPPA) and Alzheimer's disease (AD). In clinical practice, these disorders are mainly assessed by verbal tests, while, according to literature, the deficit must be observed in several modalities. The aim of this study was to create a French multimodal semantic assessment battery called EMCS (Évaluation Multimodale des Connaissances Sémantiques), which investigates semantic memory efficiency through several tasks of different input modality. multimodal

Method: One hundred native French-speakers control participants (60 women and 40 men, age=69.1+/-7.8) were recruited. They underwent the 10 tasks from the EMCS battery which explore pictorial (picture-naming, designation, semantic knowledge about celebrities), written words (semantic association, semantic questionnaire, semantic odd word) and sensory (auditory, tactile, olfactory, taste) modalities. To study the sensibility and specificity of the battery, four svPPA and eight AD patients at the onset of the disease underwent the EMCS battery.

Results: Statistical analyses led to establish normative data, with percentile scores, and highlighted, for controls, an effect of education level for all the tasks, an age effect for several tasks, but no gender effect. For every patient, results were discriminatory compared to the reference control group for picture-naming ($U=2.5$; $p=.001$), semantic knowledge about celebrities ($U = 4.5$; $p = .001$), semantic questionnaire ($U=4.5$; $p<.001$) and semantic odd word ($U=6.5$; $p=.001$). Qualitative analyses revealed that svPPA patients produced more semantic paraphasias than AD patients, but also more constant errors, indicating a central impairment of semantic knowledge for svPPA participants.

Discussion: This tool can contribute to identify, with quantitative and qualitative analyses, the semantic disorder (unimodal/multimodal, access/central) for patients suffering from svPPA and AD.

Conclusions: Evaluating semantic memory across all modalities may help for clinical diagnosis and to determine, at early stages, a semantic impairment to better define the therapeutic project.

Keywords: primary progressive aphasia, Alzheimer's disease, multimodal semantic knowledge assessment

P013. Assessing attention skills in fighting sports via ecological tasks: behavioural and EEG evidence

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Aims: Performance data may help to profile athletes' strengths/weaknesses, to monitor progress, to adapt training protocols to the athletes' needs, and to identify talent or to predict the athletes' potential (1). Yet, implementation of skills assessment in practice is still quite controversial due to outdated methodology and undefined performance and skills measures (2,3). This study aimed at testing an ecological neuroassessment protocol devised for evaluating attention orientation skills in fighting sports athletes by complementing behavioural measures with non-invasive electrophysiological markers.

Method: 19 non-professional fighting sports practicers (FS; boxing and kick-boxing) plus 19 non-professional athletes practicing other sports (OS; basketball, tennis, body building, hiking and orienteering) took part in the study. Participants underwent a neuroassessment protocol focused on attention skills (interoceptive attention, exteroceptive focused attention, cognitive control and inhibition of distracters, spatial attention), where computerized tasks were complemented with electrophysiological recordings (EEG, ERP). Specifically, spatial attention and attention orientation were explored via an ecological digitalized cueing task, where participants are asked to block hand and foot strokes coming from different locations and preceded by valid or invalid endogenous cues.

Results: Data analysis highlighted reduced response times paired with reduced amplitude of the parietal P3 ERP component for valid vs. invalid trials in FS. In addition, increased peak-to-peak latency for central P3 component was observed in FS vs. OS for invalid trials.

Discussion: In agreement with the neural efficiency hypothesis, findings highlight optimized responses in athletes when they face discipline-specific predictable scenarios. Notably, electrophysiological measures consistently pointed out optimised allocation of neural resources. Data suggests internally consistent profiles across the multi-dimensional metrics of attention regulation performance, hinting at the potential of the protocol for in-depth assessment of athletes' main characteristics.

Conclusions: Ecological tasks can provide valuable and discipline-specific multilevel markers of attention skills proficiency in athletes.

Keywords: Neuroassessment, sport, neural efficiency, attention skills

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P014. The Clock Rotation Neuropsychological Test (CRNT): Greek normative data, convergent validity and clinical utility

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Aims: The Clock Rotation Neuropsychological Test (CRNT) is a new, brief, non-verbal test, developed to assess attention and mental flexibility. We present Greek normative data, convergent validity data and its utility in clinical practice.

Method: The test was administered as part of a battery to 445 healthy individuals (202 men; mean age 42.07±18.87; mean education 13.10±3.07). Pearson correlation analyses and multiple-linear regressions were performed to examine CRNT relationship with tests and demographic variables. Thirty-seven patients with Alzheimer's disease (AD), 61 with Mild Cognitive Impairment (MCI), 18 with Parkinson's disease (PD), 12 with Huntington's disease (HD), 10 with Relapsing-Remitting Multiple Sclerosis (RRMS) and 10 with Secondary-Progressive Multiple Sclerosis (SPMS) were included. The Mann-Whitney U-test was used to compare the groups in terms of age, education and sex whilst the discriminant competence was further examined by Wilks' lambda.

Results: The CRNT was moderately correlated with Trail Making Test-part A (rp=.410 to .616), Trail Making Test-part B (rp=.492 to .673) and Tower of London (rp=.318 to .520). Regression analyses revealed an age and education effect for all variables ($p<.05$). Finally, performance comparisons between the majority of patient groups and healthy groups revealed significant differences in all scores. The Wilks' lambda further confirmed that CRNT differentiates between healthy individuals and patients with AD, HD and RRMS (Wilks' lambda .654, p=.027; .405, $p<.001$ and .696, p=.046).

Discussion: Results revealed an age and education effect on performance. Older-age and lower-level education correlated positively with more initiation, execution and completion time. Normative data are presented and stratified by age and education.

Conclusions: The CRNT is presented as a useful tool in clinical practice to detect deficits on attention and on a core component of the executive functions. Moreover, our findings indicate it may be used for the cognitive assessment of a variety of clinical entities.

Keywords: attention, mental flexibility, neuropsychological assessment

P015. Greek normative data for the Visual Search and Attention Test

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Aims: The Visual Search and Attention Test (VSAT) was developed in the 1990s in the United States of America as a visual cancellation task to measure sustained attention. We aimed to develop normative data of the VSAT for the Greek population.

Method: The VSAT was administered as part of a broad neuropsychological battery to 359 healthy participants (162 males; minimum-maximum age: 16-86 years old; mean age: 43.20 years (SD=19.99); mean educational level: 13.01 years (SD=3.20); handedness right: 92.8%). All scores of VSAT (Left, Right, Total) were calculated. Descriptive analyses were performed to explore distribution of age and education within the sample. Multiple regression analyses were performed to explore the relationship between VSAT performance and demographic variables. The sample was divided into eight age groups: 16-22, 23-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-86 years and was further classified into three educational levels: 0-9, 10-12 and 13+ years.

Results: Analyses of demographic variables revealed that age and education have a significant relationship to VSAT scores (Total Score: Age F(1,357)=261,890; p<.001; B=-1.378; R2=.423; Educational level F(1,357)=71,455; p<.001; B= 5,335; R2= .167; Sex F(1,357)= ,103; p=.749; B=-1,440; R2= .000. Comparison of performance among age groups revealed significant differences in all VSAT scores.

Discussion: Sustained attention has gained interest among researchers as a critical compound of attentional processes and searching tasks such as visual cancellation tasks are among the most common methods to measure it. Our results revealed a significant effect of age and education on VSAT performance and further confirm those of the original normative study providing evidence on the significant relationship of demographic variables to the VSAT optimal performance.

Conclusions: We present norms for the VSAT stratified by age and education to be used in everyday neuropsychology professional practices for the Greek population.

Keywords: sustained attention, normative data, neuropsychological assessment

P016. Normative Data of the Brief Visuospatial Memory Test – Revised for the Greek Population

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Aims: The Brief Visuospatial Memory Test-Revised (BVMT-R) is a test that evaluates visuospatial memory and learning. The aim of our study was the development of norms and the investigation of the effect of certain demographic factors on the test performance for the Greek population.

Method: This study pulled data from a research project on normative data for popular neuropsychological tests in Greece. Three hundred and eighty-one participants (171 men; mean age 44.7±18.6; mean education 13.1±3.2) were administered the BVMT-R as part of a neuropsychological battery and were subdivided to form groups regarding gender, age, and education. Descriptive analyses were performed to explore distribution of age, education, sex and handedness within the sample. Multiple linear regression analyses were performed to explore the effect of demographic variables on BVMT-R performance.

Results: Regression analyses revealed an age and education effect on scores indicating that the model explained 48.9% and 48.0% of the variance of the Total and the Delayed Recall scores of the BVMT-R respectively. Older participants (60+) had lower scores than younger participants and the higher the educational level the better was the performance. Finally, although the regression model showed a statistically significant effect for gender as well, this was not confirmed as a 2-sample t-test did not reveal any statistically significant differences between male and female participants.

Discussion: In line with similar studies our results point to the significance of age and education for the performance of BVMT-R and further support the impact of demographic variables for the optimal performance on visuospatial memory and learning tasks.

Conclusions: Our study yielded norms for the BVMT-R stratified by age and education to be applied in the neuropsychology professional practices for the Greek population.

Keywords: visuospatial memory, normative data, neuropsychological assessment

P059. A brief questionnaire to evaluate the semantic disorder in Alzheimer's disease: the "Mini SKQ" (Semantic Knowledge Questionnaire)

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Aims: It is now well-accepted that semantic memory disturbance is one of the first symptom in Alzheimer'disease (AD). However, this ability is not always investigated in the traditional neuropsychological assessment and is rather evaluated through non-specific semantic measurements. The objective of the Semantic Knowledge Questionnaire (SKQ) was to explore semantic impairment in AD patients. Proposed by Laiacona et al.[1], revised in a French version by Simoes Loureiro and Lefebvre[2], SKQ assesses some levels of hierarchy and attributes in semantic memory by the mean of 120 questions about 30 objects. The score for each question is 1 (expected answer) or 0 (error). The objective of this work is to create a brief version of our SKQ, with the most discriminant questions to AD, in order to be easily used in clinical environment.

Method and results: We administered SKQ to 39 healthy senior (MMSE > or = 28) and 35 mild AD (MMSE>20). An item by item analysis were conducted to compare our groups in order to pick up the most differentiated items. 12 items discriminating both group at a level of significance of p=.001 (by a khi-square analysis) were selected (4 questions about intracategorical aspects; 4 questions about perceptual attributes and 4 questions about thematical/functional attributes). We also performed correlational analyses for non-parametric data (Kendall's Tau correlation) to ensure that the failure to these 12 items are well correlated with AD (p=.001). Finally, a Bravais-Pearson correlation analysis confirms the correlation between the score at mini-SKQ and the full version of SKQ (r=.992; p=.001).

Conclusions: The Mini-SKQ is a fast and easily administered questionnaire, adapted for screening semantic knowledge. The failure to the items of the mini-SKQ is highly correlated to AD. These first observations underline that mini-SKQ could potentially be attractive for screening semantic memory deterioration in a clinical use.

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P060. The importance of response times measures in three verbal fluency tasks

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Aims: Verbal fluency is a commonly used task in clinical and experimental neuropsychology. It refers to a person's ability to generate relevant words, according to phonemic or semantic criteria within a limited amount of time (usually 1 minute). The traditional measure of verbal fluency tasks is the number of correct responses, but recent research has provided additional quantitative and qualitative measures, which are more informative about the underlying cognitive processes that are employed. This research aimed to study the response times (first response latency) of the most common tasks and their possible correlation with educational level.

Method: Three common verbal fluency tasks (phonemic, semantic, excluded letter fluency) were administered to 44 healthy participants (aged 18 to 39 years old), divided in 2 groups, according to their educational level.

Results: The comparison of the 3 tasks indicated that semantic fluency had the shortest response time and excluded letter the longest ($Z = -5.35$, $p < 0.0005$). Furthermore, education appeared to have a statistically significant positive influence ($p < 0,05$) on the mean response times of the participants.

Discussion: These results constitute an underexamined way to investigate lexical organization and access in verbal fluency. Moreover, they indicate that education contributes not only in the overall performance, but also in response times.

Conclusions: Our findings highlighted firstly the fact that word retrieval according to initial letter differs significantly from word retrieval according to a semantic criterion and secondly the education's strong influence in an additional feature of verbal fluency tasks.

Keywords: verbal fluency, response times, lexical access

P061. Mini Linguistic State Examination: Preliminary Data of a Screening Tool for Primary Progressive Aphasia

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Aims: Preliminary data concerning the diagnostic potential of Mini Linguistic State Examination (MLSE) regarding the three variants of Primary Progressive Aphasia (PPA) - semantic, logopenic and agrammatic/non fluent- are to be presented. MLSE is a 15-minute screening tool for the categorization and monitoring of PPA, providing differential scoring profiles of the affected language domains.

Method: MLSE was translated and adapted to reflect the Greek linguistic and cultural characteristics. A small group (n=9) of already diagnosed patients (6 lvPPA, 2 nfPPA, 1 svPPA) with average symptoms duration of 3,67 years was blindly tested by trained psychologists to obtain preliminary data on the efficacy of MLSE in the PPA assessment.

Results: MLSE measures five key language domains. Motor Speech consists of 30 items (α=.95), Phonology of 28 (α=.84) following the exclusion of two items, Semantics consists of 20 items (α=.61), Syntax of 10 items (α=.82) and Working Memory of three items (α=.57) after removing one item. Kruskal-Wallis analyses were performed to detect differences in subjects' performance per domain in relation to diagnosis. No statistically significant differences were found between the three PPA subtypes (Motor Speech: H(2)=4.99, p=.08; Phonology: H(2)=1.50, p=.47; Semantics: H(2)=.97, p=.61; Syntax: H(2)=2.46, p=.29; Working Memory: H(2)=.31, p=.86).

Discussion: The five MLSE domains exhibit moderate to highly acceptable reliability. Despite the statistically insignificant results, MLSE succeeded in providing a comprehensive overview of the patients' language profile to the blinded clinicians, an outcome that emphasizes the clinical utility of the tool and allows the forecasting of encouraging results in the subsequent stages of the study.

Conclusions: The preliminary data, although not quantitatively confirming the ability of the test to differentiate between PPA variants, indicate patterns in their performance. Limitations include the small and improperly distributed number of patients across subtypes, along with the long interval between disease onset and study enrollment.

Keyword: PPA, Screening, MLSE

P062. EnVision - CP: Creating a test battery to assess visual perceptual functions in adults with cerebral palsy

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Aims: About 40-50% of children with cerebral palsy (CP) are estimated to have visual perceptual impairments. To date, no studies have focused on adults with CP. The aim of the current project was to develop a test battery suitable for assessing visual perceptual functions in adults with CP.

Method: We reviewed the child CP literature to identify visual perceptual functions that could be relevant to assess in an adult CP population. Suitable tests were identified for each function. Tests that are used in a clinical context and tests for which the response mode can be adapted for individuals with communicative challenges were prioritized. In addition, short screening tests were prioritized over in-depth tests to limit testing time.

Results: The process resulted in the pilot test battery for the EnVision-CP project. The battery includes assessment of sensory vision, oculomotor functions, and low- to high-level visual perception using published tests from e.g., Leuven Perceptual Organization Test and the Visual Object and Space Perception battery.

Discussion: The CP population is very heterogeneous with varying degrees of deficits within the motor, communication and cognitive areas. It is therefore difficult to find tests that are well suited for all participants. Very few tests are designed and validated to assess visual perceptual functions in adults with CP, so most tests identified for the project are designed for other populations.

Conclusions: The test battery can potentially be used to assess visual perception in adults with CP. A thorough pilot study is required to determine if it is suitable for an adult CP population.

Keywords: Cerebral palsy, visual perception, adults

P063. The Multi-Modal Evaluation of Sensory Sensitivity (MESSY): assessing sensory hypersensitivity after acquired brain injury

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Aims: Increased sensory sensitivity (sensory hypersensitivity) is a common symptom after acquired brain injury. Due to a lack of appropriate diagnostic tools these complaints are often missed by clinicians. In addition, to date, available scientific literature is limited to light and noise hypersensitivity after mild traumatic brain injury. This study aimed to investigate how prevalent sensory hypersensitivity is in other modalities and after other types of brain injury using a patient-friendly sensory sensitivity assessment.

Method: We developed the Multi-Modal Evaluation of Sensory Sensitivity (MESSY), a questionnaire that assesses sensory sensitivity across multiple sensory modalities (visual, auditory, tactile, olfactory, gustatory, temperature, and motion sensitivity). 818 neurotypical adults and 341 adults with a chronic acquired brain injury (including stroke, traumatic brain injury, and brain tumour) completed the MESSY online.

Results: The MESSY had a high convergent validity (spearman rho correlation coefficient: .71), internal consistency (Cronbach alpha: .94), and test-retest reliability (spearman rho correlation coefficient: .84) in neurotypical adults. 76% of the stroke patients, 89% of the traumatic brain injury patients, and 82% of the brain tumour patients reported a post-injury increase in their sensory sensitivity (judged using open-ended questions). These complaints occurred across all modalities with multisensory, visual, and auditory hypersensitivity being the most prevalent. Patients with post-injury sensory hypersensitivity scored significantly higher on the multiple-choice items of the MESSY as compared to neurotypical adults and acquired brain injury patients without post-injury sensory hypersensitivity (across all sensory modalities).

Discussion: Sensory hypersensitivity is prevalent after different types of acquired brain injury as well as across several sensory modalities.

Conclusions: The MESSY provides a valid and reliable assessment of sensory sensitivity and can improve recognition of post-injury sensory hypersensitivity by clinicians as well as inspire further research.

Keywords: sensory hypersensitivity, acquired brain injury, assessment

P177. Assessing awareness of cognitive functioning in younger and older adults

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Aims: The aim of the present study was to compare the awareness of younger and older adults regarding their cognitive functioning, and to investigate the role of individual differences in their self-reports.

Method: Therefore, we administered the Cognitive Functioning Scale (the adapted form for the Greek-speaking population) to a sample of 223 participants (N=128 women, mean age=54.31years, SD age=9.4years, age range 41-87years, separated into three age groups (group1=41-50years, group2=51-60years and group3=61-80years). Participants were asked to rate the frequency with which they experience difficulties with daily activities that involve their cognitive functions (from 1=rare to 5=very often) and scores were calculated for each of the three factors of the scale (memory, attention/executive function, and motor coordination).

Results: Results from the one-way ANOVA analysis have shown no significant group differences on the memory and the attention/executive factor. Only in the motor coordination factor, age groups 1 and 2 reported higher functioning as compared to the older age group. Finally, gender and education did not affect their ratings as well.

Discussion: Even though our normative sample yielded awareness of the different aspects of cognitive functioning, in the present study different age groups seemed not to be aware of age-related changes in cognitive functioning except for motor coordination. One possible explanation for this finding would be that difficulties with motor coordination might be more apparent and can be easily detected compared to failures in memory and attention. In addition, it is widely known that awareness skills presuppose a well-preserved self-monitoring function, which is commonly affected in older adults.

Conclusions: Taking all the above into account, it is of utmost importance that the assessment of cognitive functioning should be performed through a variety of subjective and objective assessment methods.

Keywords: cognitive functioning, awareness, assessment

P178. Adaptation of the Cognitive Functioning Scale for the Greek-speaking population

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Aims: The Cognitive Functioning Scale (CFS) is a self-report questionnaire used to explore individuals' beliefs about their own cognitive functioning (e.g., memory, attention, motor coordination) over the past 12 months. The aim of the current study was to investigate the factorial structure of the scale and its reliability in the Greek population.

Method: The initial scale consisted of 18 items and individuals were asked to report (on a 5-point Likert-type scale) the frequency with which they experience difficulties or failure in daily life activities involving cognitive functions. Higher scores on the scale are interpreted as poor cognitive functioning. The research sample consisted of 223 participants (N = 128 women, mean age = 54.31 years, SD age = 9.4 years, age range 40-87 years).

Results: To explore the structural validity of the CFS, Principal Component Analysis with Varimax Rotation was performed. A three-factor model was extracted displaying acceptable internal consistency: memory (α = .82), attention/executive functions (α = .70) and motor coordination (α = .71).

Discussion: Previous studies with Italian population supported the extraction of one general factor of cognitive functioning for the CFS. The findings of the present study demonstrated that our Greek-speaking sample clearly differentiated their self-report ratings with respect to each of the three cognitive domains.

Conclusions: In conclusion, individual's perception of his or her own well-being plays a role in the concept of quality of life (QoL) along with cognitive functioning. This questionnaire could be useful in differential diagnoses and in clinical practice because it provides the point of view of the patient, in addition to objective neuropsychological testing.

Keywords: adaptation, cognitive functioning, assessment

Cognitive Intervention/ Rehabilitation

P017. Trainability of affordance-based judgments in an aperture task in patients with right or left hemisphere stroke

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Aims: Is an opening passable or an obstacle conquerable? For appropriate decisions in such situations, an adequate comparison of a certain environmental condition and one's own bodily capabilities is required. Studies have shown that these so-called affordance-based judgments can be impaired after stroke. We aimed at examining whether right or left hemisphere stroke patients can improve in affordance-based judgments by a short training session in an aperture task. Furthermore, the role of neuropsychological deficits in trainability was explored.

Method: In the applied aperture task 30 right brain damage (RBD) and 30 left brain damage (LBD) stroke patients firstly completed two diagnostic blocks in which they indicated via a yes or no button whether their hand would fit through presented openings. In the following feedback training block, patients checked each of their decisions by actually trying to fit their ipsilesional hand through the respective opening. In case of a fit, they touched a sensor activating a confirmation sound. After the feedback training block, another diagnostic block was administered. Perceptual sensitivity was measured before training, during feedback training and after training.

Results: There was no improvement in perceptual sensitivity due to mere repetition. During and after training perceptual sensitivity improved in both patient groups. However, training effects vanished in the post training testing for patients suffering from visuo-spatial or motor-cognitive deficits.

Discussion: Neuropsychological deficits go along with a diminished stability of training effects. Patients with visuo-spatial or motor-cognitive deficits seem to profit considerably from the target-driven action phase during training but appear not to consolidate what has been learned.

Conclusions: Even a short feedback training can ameliorate affordance-based judgments in stroke patients. Future studies investigating neural correlates may contribute to understanding the dissociation between patients for whom training effects in affordance-based judgments appear stable and independent from online guidance and vice versa.

Keywords: stroke, trainability, affordance-based judgments

P018. Temporal awareness rehabilitation of a patient with confabulations

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Aims: Confabulation is "the production of statements and actions that are unintentionally incongruous to the subject's history" (1) after brain injury. Patients produce false memories or temporally displace real events without awareness. Different interventions for reducing confabulation have been proposed but are rare and understudied (2). We present a case of confabulation after tumour resection and propose a rehabilitation programme through a new method with a table of confabulations.

Method: LN, a 54-year-old, right-handed woman, had a right fronto-temporal insular tumour. After the surgery, she presented with disorientation in space and time, memory impairment, dysexecutive syndrome and confabulations. Confabulations were assessed by the confabulation battery (CB) (3) and limited to episodic domains with plausible content. We proposed a method of rehabilitation based on developing temporal awareness of confabulation. The patient completed a table identifying the context of the confabulations and ideas for solutions.

Results: The CB highlighted confabulations for episodic memory (3/15) and episodic plans (0/15) with habits, confabulations or misplacements. A month after the rehabilitation, the number of confabulations decreased (episodic memory = 13/15, episodic plans = 14/15). Although confabulations were no longer present on the CB, the patient still reported and anticipated them.

Discussion: The right fronto-temporal lesion with relatively preserved hippocampus structure could explain a temporal consciousness dysfunction (1). The rehabilitation programme based on awareness of the present moment in comparison with personal thoughts (i.e., confabulations) helped the patient recover temporal consciousness and therefore decrease confabulations.

Conclusions: Confabulations in a patient were documented after a right tumour resection. Based on previous work, we formalised a rehabilitation programme focused on developing temporal awareness of confabulation. After 3 months, the patient became aware of the confabulations and controlled them.

Keywords: confabulation, rehabilitation, temporal consciousness

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P019.Resting state brain networks activity and association with transfer of cognitive training gains

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Aims: Age-related cognitive decline increases the need for cognitive interventions to maintain cognitive function. Cognitive training is considered an effective non-pharmacological intervention. Transfer of training gains to untrained tasks is a key indicator for the effectiveness of cognitive training. However, the underlying brain mechanisms need to be further investigated. We implemented a cognitive training study to assess functional connectivity determinants of transfer of training gains.

Method: A sample of 181 healthy older adults (mean age: 68 years) underwent a 4-week cognitive training across three sites. The control group consisted of 54 older adults. To evaluate transfer and training effects, participants underwent a neuropsychological assessment before and after the training. A second follow-up assessment was applied 12 weeks after the training. The training group was divided in subjects who had and who did not have successful transfer, which was defined as higher improvement in cognitive tasks than the control group. We used composite scores representing working memory, memory and executive functions to assess transfer and training effects. Baseline resting-state functional magnetic resonance imaging was used to investigate the functional connectivity of brain networks associated with cognitive functions. We extracted brain resting state networks using the Independent Component Analysis (ICA) approach.

Results: We observed successful transfer of cognitive training gains in most of the participants. Our results demonstrated spatially restricted effects ($p<.01$ uncorrected) for the association of transfer of gains with the resting-state connectivity of brain networks, such as the Default Mode Network and Central Executive Network.

Discussion: Transfer of gains to untrained tasks and maintenance for 3 months was possible for healthy older adults. The ICA approach might be not sensitive enough in comparison to seed-based approach.

Conclusions: Transfer of training gains in aging is possible. A strong association between transfer of gains and resting-state functional connectivity was not identified.

Keywords: cognition, functional connectivity

P020. Ideas of reference and baseline cognitive flexibility predict the far-transfer gains of executive working memory training

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Aims: Executive working memory (EWM) training has been reported to improve cognitive flexibility (CF) due to far-transfer effects; this improvement is linearly related to the intensity of training and total schizotypy scores. The aim of the study was to explore which types of schizotypal traits are associated with the improvement of cognitive flexibility following EWM training and whether baseline cognitive flexibility plays a role in this association.

Method: One hundred and forty-three participants were administered the Schizotypal Personality Questionnaire and either received EWM training for six consecutive days [a fully-trained group was administered a complete EWM task; a partially-trained group was administered a certain number of trials of the task] or were allocated into a passive control group. Following training, all groups were assessed for cognitive flexibility. Associations between aspects of schizotypy and CF were examined with a series of stepwise regressions for each group.

Results: Baseline CF was negatively associated with errors in the trials requiring set-shifting only in the partially-trained group ($p<0.05$). In the fully-trained group, ideas of reference were positively associated with errors in the successfully completed trials, number of trials required in order to successfully complete a stage of the task, errors made in the trials requiring set-shifting and total trials required for the completion of the task (all p values <0.05).

Discussion: The study revealed that a core aspect of paranoid schizotypy is negatively associated with the far-transfer effects of EWM training on cognitive flexibility. Paranoid schizotypy is mediated by an overlapping brain circuitry with both EWM and cognitive flexibility, possibly accounting for the finding. Baseline CF is important, only when cognitive training is not demanding; schizotypy does not affect this association.

Conclusions: The findings contribute to the development of customized early cognitive intervention schemes, which is a prominent requirement of modern clinical practice.

Keywords: cognitive training, cognitive flexibility, schizotypal traits

P021.A review of cognitive intervention programs related to autobiographical memory in patients with schizophrenia

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Aims: Patients suffering from schizophrenia show various cognitive impairments and autobiographical memory (AM) deficit is one of the most prominent. This paper aimed to review cognitive intervention programs on AM rehabilitation in patients with schizophrenia.

Method: This work was conducted in the period from September 2021 to April 2022 according to the Narrative Review Checklist and flow diagram. Research Gate, PubMed and Science Direct databases were searched for articles following the relevant protocol. Searching terms were: "autobiographical memory", "schizophrenia", "cognitive", "and", "or", "intervention", and "training". Six studies were included. The methods used were a) cueing method to evoke AM (word/picture or event cues that included pictures, positive and negative emotion words, and events), b) life stages method (memory recall in three or four life stages, c) combination.

Results: Studies based on the cueing method confirmed that cognitive intervention can successfully generate past and future events related to AM in patient with schizophrenia. As a cueing training result, the number of specific memories increased as well as the richness of internal and external details of the recalled events. Studies using life stages methods showed similar findings, providing though greater retrieval in AM details. The combination of these two methods despite showing positive results makes it difficult to ascertain which method contributed more to which function.

Discussion: It is demonstrated that different cognitive interventions produce significant improvements in the recall of memory details and overall AM deficits. The improved AM seem to contribute to defining the sense of identity and it is related to social functioning and quality of life.

Conclusions: The above findings suggest that cognitive interventions programs related to AM are effective and they should be mandatory part of therapy in patients with schizophrenia.

Keywords: Autobiographical memory; Schizophrenia; Cognitive Training

P067. Is the trainability of affordance-based decisions dependent on the task?

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Aims: Wrong decisions about action opportunities (e.g. reaching something at the top of a shelf, overcoming hurdles, etc.) can lead to falls and injuries, especially in older adults and neurological patients. While young and healthy adults are able to make quick and adequate so-called affordance-based decisions, decreased performance was observed in older age and after stroke. With the long-term goal to provide older and neurologic patients with a comprehensive training, the present study evaluated whether these decisions can be trained for different tasks.

Method: Four groups of healthy young adults decided whether a given action is doable pre- versus post-training and after solving other judgment tasks serving as distractors. Each group judged a different action: fitting under a horizontal barrier (N=13), fitting one hand into an aperture (N=14), stepping over a hurdle (N=13), and reaching for an object (N=12). Accuracy, judgment tendency, and perceptual sensitivity served as dependent variables.

Results: Results revealed a significant training effect for accuracy and perceptual sensitivity across all four tasks. The judgment tendency was significantly improved in the reaching task, the hurdle task, and the fit-under task, while in the aperture task, the improvement did not reach significance. In addition, it was shown that the training effect in the three tasks (but not in the aperture task) was maintained even after the other tasks were introduced as distractors.

Discussion: The current study raises hopes that different types of affordance judgments can be trained effectively, and that improvements remain stable even when solving other affordance judgment tasks in between.

Conclusions: Affordance-based judgments can be trained in different tasks and improvements last even after distractor tasks were solved. The next step would be to evaluate the developed paradigm in healthy elderly.

Keywords: affordance judgments, feedback training, stroke

P068. From virtual to physical environments: transfer effects of virtual reality training on judging action opportunities

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Aims: The proper assessment of environmental conditions and our own physical abilities in order to make decisions about action capabilities is essential in our daily life. It was shown that this ability can be impaired in older age or after stroke, but also, that training can be effective. Since Virtual Reality (VR) can provide a safe and simple way of training, the goal of the present study was to evaluate a virtual setting and training.

Method: In study 1, 24 healthy participants judged whether their hand fits into a given opening that varied in width in virtual environments (VEs) and physical environments (PEs). We investigated the equivalence of such affordance judgments between the two environments. In study 2, we applied and evaluated a VE feedback training in the same 24 healthy young adults. Accuracy, judgment tendency, and perceptual sensitivity were analysed.

Results: Study 1 revealed accuracy levels between the VE and the PE to be equivalent, for perceptual sensitivity equivalence appeared uncertain and judgment tendency was non-equivalent. Study 2 demonstrated an improvement in judgment accuracy after VE training within the VE condition. Only on a descriptive level the training did show transfer effects to the PE. Promisingly, equivalence testing post-training revealed that perceptual sensitivity performance in VE approached the PE level.

Discussion: Implications for therapy in rehabilitation facilities are manifold and range from replacing large and expensive apparatuses to creating new ways to motivate patients for training (e.g. gamification). The current results suggest that it is worth to develop diagnostics and trainings within VE to measure and train affordance judgment performance.

Conclusions: With the current work steps are made towards effective affordance judgment trainings in VEs. Further research is needed to specify conditions that might establish enhanced equivalence in behavioural variables between VE and PE when judging action opportunities.

Keywords: affordance judgments, feedback training, virtual environments

P069. The effect of remotely implemented phonological awareness and rapid naming intervention on the reading skills of Finnish-speaking school-aged children

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Aims: We investigated the effects of phonological awareness intervention and rapid naming intervention on eading skills of Finnish-speaking school-aged children, who had had difficulties in reading and/or writing. We also determined what kind of children benefit from the phonological awareness intervention the most. Both interventions were conducted remotely, one of the aims of the current study being to determine whether children's reading difficulties can be assessed and rehabilitated remotely.

Method: 34 Finnish-speaking school-aged children with reading and/or writing difficulties participated in the study. Twenty of them participated in a phonological awareness intervention and fourteen in a rapid naming intervention. The phonological awareness intervention included phonological tasks with varying levels of difficulty, adapted to the skills of each child. The rapid naming intervention included several types of rapid naming tasks. The interventions were administered for four weeks, 3 days a week, 15 minutes a day. Before and after intervention, phonological skills, reading and writing and and other cognitive skills were assessed.

Results: Both groups progressed in phonological processing and reading skills during the intervention. Groups did not significantly differ from each other in the development of phonological processing skills, reading and writing. Neither age nor prior reading skills predicted the magnitude of benefit from phonological awareness intervention.

Discussion: This study indicates that literacy skills can be assessed and rehabilitated remotely in school-aged children. Both phonological awareness intervention and rapid naming intervention improve reading and phonological skills in school-aged children with problems in reading and/ or writing.

Conclusions: The results suggest that both phonological and naming intervention may be helpful in the rehabilitation of children with reading/writing difficulties. Furthermore, this study indicates that rehabilitation and assessment can be successfully administered remotely.

Keywords: reading difficulties, phonological intervention, teleneuropsychology

P070. What is the potential of immersive virtual reality-based cognitive rehabilitation in stroke patients?

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Aims: The aim of this pilot study was to test the effect of immersive virtual reality-based cognitive rehabilitation tasks on cognitive function and emotional state in stroke patients.

Method: 27 stroke survivors were allocated to one of the two groups (Immersive virtual reality – iVR, and Control) and pre-assessment was completed. Both groups participated in the conventional rehabilitation program. Additionally, the iVR group underwent 10 sessions of cognitive function training in the iVR environment. After the intervention (or after 2 weeks for the control group) post-assessment was completed. Cognitive functions were tested by Addenbrooke's Cognitive Examination-III and Trail Making Test A and B. Emotional state was evaluated by Patient Health Questionnaire-9 and General Anxiety Disorder-7. The final data analysis included 20 participants (mean age – 62,15±7,8) because 7 did not complete the post-assessment.

Results: Our results reveal that the iVR group (N=13) improved attention, verbal fluency, spatial abilities, and cognitive flexibility, while the control group (N=7) did not significantly improve cognitive functions. Moreover, the iVR group had smaller rates of anxiety and depression after the intervention, while the control group did not show significant results. Immersive virtual reality-based cognitive rehabilitation had a small effect on attention (Hedges'g=0.1 and Hedges' g =0.2), memory (Hedges' g=0.2), verbal fluency (Hedges' g=0.17), smaller anxiety (Hedges' g=0.02) and depression (Hedges' g=0.1) rates. However, we found a big effect on spatial abilities (Hedges'g=0.86), and cognitive flexibility (Hedges' g=0.82).

Discussion: These findings may be explained by the idea that iVR's features, such as constant feedback, and multisensory stimulation, optimize the neuroplasticity so improvement appears not only on targeted functions but as well on other functions.

Conclusions: In stroke patients, immersive virtual reality-based cognitive rehabilitation is a promising way to improve cognitive functions, especially spatial abilities and cognitive flexibility, and emotional state.

Keywords: virtual reality, cognition, stroke

P071. Chronic pain relief after receiving affective touch; a single case study

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Aims: Affective touch (AT) is gentle slow stroking of the skin, which can elicit a pleasant sensation. In addition, it seems that AT can reduce experimentally induced pain. However, there are only limit studies on the pain-relieving effect of AT in chronic pain conditions. The aim of the current study is therefore to investigate whether AT can reduce chronic pain in a clinical population and if it can be implemented as a new treatment to reduce chronic pain.

Method: We describe a participant from a larger study which reports direct and enduring pain relief after receiving affective touch. Before the start of the study, the participant suffering from Parkinson's Disease and chronic pain reported a burning painful sensation in both of his hands. There was no clear trigger for this pain which was on and off present during the day and sometimes more prominent in one hand compared to the other. During the study the participant first received one week of non-AT, fast stroking similar to rubbing, and then one week of AT. Touch was applied by his partner, two times a day for 15 minutes.

Results: The Nonoverlap of All Pairs (NAP) method was used. This is a single case analysis method which can be computed by the non-parametric Mann-Whitney U test. This showed a significant difference between AT and non-AT. Furthermore, this pain-relieving effect persisted even after the administration of AT stopped.

Discussion: These results are in line with previous studies into the effect of AT on pain. In addition, this is the first study reporting that AT can not only relieve pain immediately but that this effect persists even after AT application has stopped.

Conclusions: this case report shows that AT may be a promising new method to reduce chronic pain in clinical populations.

Keywords: Affective touch, Chronic pain, Parkinson's Disease

P072. Effects of a new structured multidomain cognitive training headed by executive functions in healthy elders

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Aims: Functional neuroimaging and electrophysiological studies have demonstrated the existence of various brain networks (i.e., spatially distributed regions in the brain that may be functionally interconnected and continuously exchange information). A high degree of functional connectivity is observed between anatomically distinct networks related to different cognitive domains. The frontal network is connected to numerous networks, and ageing leads to decreased functioning and integration between networks, contributing to cognitive decline. Plasticity mechanisms, cognitive reserve, and multi-domain cognitive training can slow decline. The study aims to implement a new structured cognitive training focused on executive functions to improve cognitive functions and ensure the stimulation program's essential benefit.

Method: Thirty-four healthy adults and older adults (aged 62-84) were divided into three groups: the first group performed a new training (ExeDO) following the structured exercise protocol (multi-domain) of increasing difficulty. In each session, participants performed exercises to enhance executive skills and exercises to stimulate other cognitive functions (in an alternate order). The second group completed the same training, performing exercises of increasing difficulty in random order; the third group participated in a previously validated training that improved global skills. Bi-weekly sessions of one hour each were held for six months. Neuropsychological assessment (pre, post, and follow-up) was performed to evaluate the effectiveness of the training.

Results: Training improved cognitive performance in all three groups. In particular, ExeDO improved global performance, planning, inhibition, shifting, and use of strategies.

Discussion: A structured multi-domain cognitive training focused on executive functions ensures global benefits.

Conclusions: Structured cognitive training can slow down cognitive decline in healthy individuals in ageing and prevent dementia.

Keywords: Training, Executive Function, Ageing

P073. Effectiveness of a play-based training program in improving children's everyday executive functioning in early childhood education

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Aims: Executive functions (EFs) are recognized as key skills in life, predicting many important outcomes from mental health to academic success. Therefore, early interventions are needed to support their development. The aim of this study was to investigate the effectiveness of a play-based EF-training, executed in the early childhood education (ECE) setting.

Method: The study was a cluster randomized controlled trial. 12 ECE centers and 186 3-5-year-old children were randomized to the intervention group or waitlist control group. The main component of the intervention was children playing EF-demanding games with and under the guidance of ECE staff members who supported their skill use and development. First, play sessions were offered to all children of the participating ECE groups (stage I). In stage II, play sessions were organized in smaller groups for the children that showed difficulties after stage I. Data concerning children's self-regulation and everyday EFs was gathered using questionnaires filled by ECE staff and parents. Measurements occurred before and after each stage of the intervention.

Results: Stage I of the intervention was effective in reducing problems of everyday EFs among the children only participating in stage I as well as among those chosen to continue to phase II. Continuing to play in smaller groups was found to bring added benefits to the children participating in stage II. Significant intervention effects concerned only ECE teacher reports and no significant effects were found for parent reports.

Discussion: The play-based training program is effective in reducing children's problems related to everyday EFs. The two-phased intervention yields benefits to children with differing levels of problems and need for support.

Conclusions: The training program studied here offers a promising way to support the everyday EF skills of children with varying needs as part of ECE.

Keywords: executive functions, early childhood education, intervention

P074. Clinical Neuropsychological Aspects Interventions for ASD, ADHD and Gaming Addiction: Case Study

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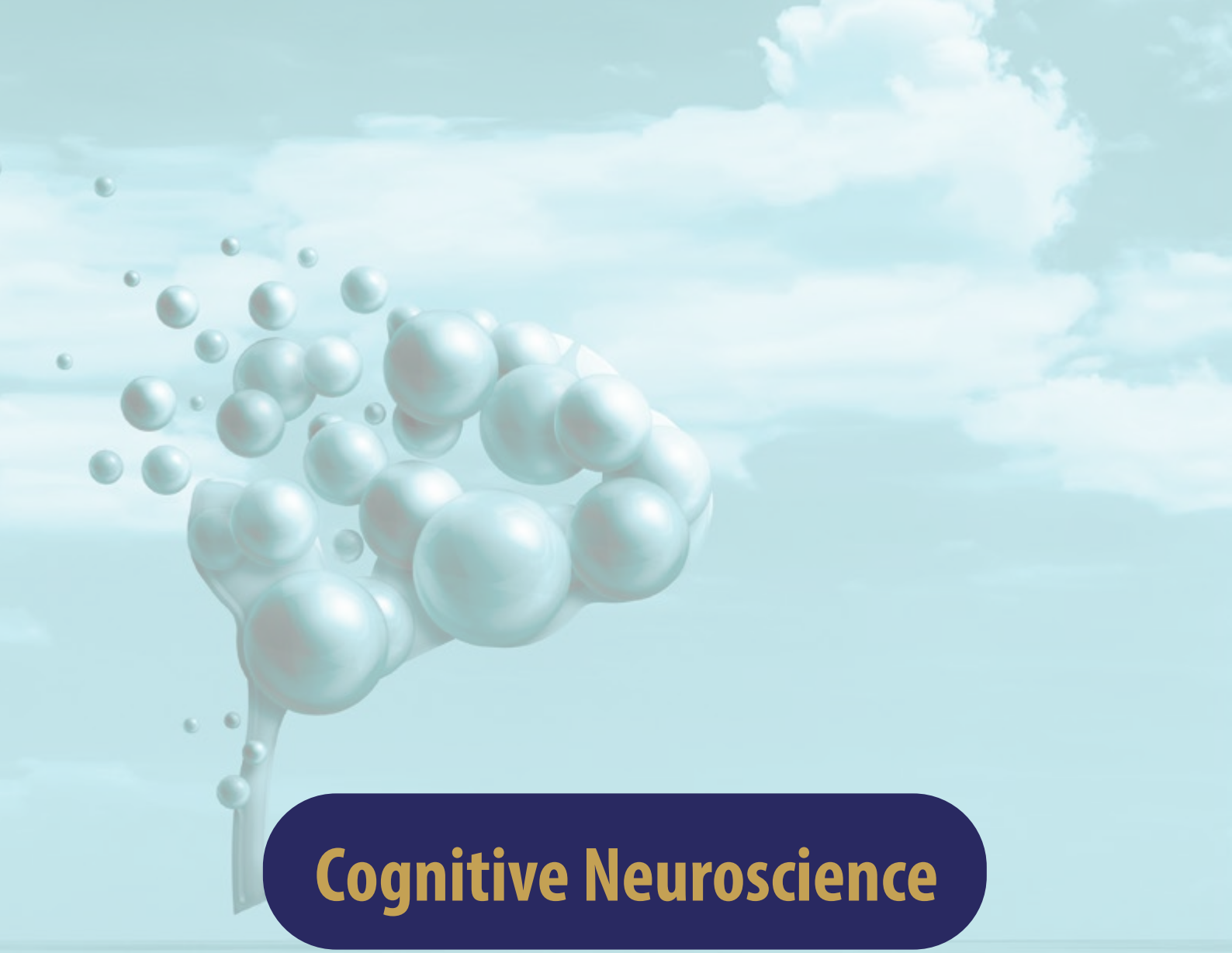
Aims: The present case study aimed to investigate the impact of video gaming addiction on cognitive and social functioning in an adolescent male diagnosed with Autism Spectrum Disorder (ASD) and Attention Deficit Disorder (A.D.D.). The participant was a 17-year-old high school student who reported spending up to 6 hours per day playing video games on weekdays and up to 10 hours per day on weekends. The participant exhibited symptoms of video gaming addiction, including difficulty controlling the amount of time spent playing video games, continued use despite negative consequences, and preoccupation with video games to the detriment of other activities.

Method: Neuropsychological assessments were conducted before and after an initial 6-week intervention designed to reduce video gaming behavior and improve cognitive and social functioning. The intervention included psychoeducation on video gaming addiction, mindfulness training, and parent-child communication strategies.

Results: Results showed that video gaming addiction was associated with impairments in attention, executive function, and social skills. However, following the initial intervention, the participant reported a reduction in video gaming behavior, although some symptoms of video gaming addiction persisted. The participant also demonstrated improvements in attention, executive function, and social skills, although these changes were still in an initial phase and required further follow-up and reinforcement.

Discussion: These findings suggest that interventions targeting video gaming addiction may be effective in improving cognitive and social functioning in adolescents with ASD and A.D.D. who are struggling with excessive video gaming behavior. Besides, these findings have important implications for clinicians and researchers working with individuals diagnosed with ASD and A.D.D. who are also struggling with video gaming addiction.

Conclusions: Clinical, neuropsychological and psychoeducational interventions had beneficial effects on this adolescent's symptoms, and he should continue to establish more positive outcomes. However, further research is needed to better understand the relationship between video gaming addiction and cognitive and social functioning in this population.



Cognitive Neuroscience

P022. Set your goals! Gender differences and decision-making process: a psychophysiological study in the managerial field

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Aims: Autonomic measures were formerly adopted in the organizational context to explore the physiological correlates of decision-making (DM) in the professional domain (1). In this domain, gender was shown to impact behavioural patterns and neurophysiological activity related to DM (2). However, less is known about the impact of gender on the psychophysiological correlates associated with DM dynamics in everyday work contexts. Thus, this research aims at investigating possible gender differences in the psychophysiological correlates underlying the process of DM while listing and organizing personal and professional goals.

Method: Autonomic responses (heart rate – HR; heart rate variability – HRV; skin conductance level – SCL; skin conductance response – SCR) of 35 managers, divided equally by gender, were collected while performing a basic DM task that involved listing (in one minute), all the goals set in the last workday, and then sorting them for three criteria: priority, temporal order, and effectiveness in achieving them.

Results: Findings showed a significant increase in HR values in the women compared to men at the beginning of the task, during which participants were asked to list all their goals. No other significant results were found for the other phases and indices SCL, SCR, and HRV.

Discussion: According to the literature in the neuromanagerial field, an increase in HR values can be interpreted as an indicator of greater emotional arousal as well as a coping mechanism for stress. However, in the context of couple interaction greater HR values in women were previously correlated to negative and stressful situations, such as the request to recall past goals in a reduced time window (3).

Conclusions: To conclude, HR can be considered an index of greater emotional engagement for women while listing their personal and professional goals. Future studies should better clarify the valence of this cardiovascular response.

Keywords: cardiovascular indices, decision-making, psychophysiology

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P023. Hemodynamic and electrophysiological biomarkers of interpersonal tuning during interoceptive synchronization

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Aims: The present research investigated the impact of interoception and social frame on the coherence of inter-brain electrophysiological (EEG) and hemodynamic (collected through functional Near Infrared Spectroscopy, fNIRS) functional connectivity during a motor synchronization task.

Method: 14 dyads (28 participants, matched for gender and age) performed a motor synchronization task during two different conditions of presence and absence of interoceptive focus (that is, when participants' attention was focused on the breath versus the no focus condition). Moreover, the motor task was socially or not-socially framed by stressing the shared intentionality [1]. During the experiment, delta, theta, alpha, and beta frequency bands, and oxygenated and de-oxygenated hemoglobin (O2Hb and HHb) were collected through an EEG-fNIRS hyperscanning paradigm. Inter-brain coherence indices were computed for the two neurophysiological signals and then correlated to explore the coherence of the functional connectivity in the dyads.

Results: Findings showed significant higher correlational values between delta and O2Hb, theta and O2Hb, alpha and O2Hb for the left hemisphere in the focus compared to the no focus condition and to the right hemisphere (both during focus and no focus condition). Also, greater correlational values between delta and O2Hb, theta and O2Hb were found in the left hemisphere for the focus condition when the task was socially compared to non-socially framed.

Discussion: In term of coherence between the EEG and fNIRS inter-brain indices, it was observed and confirmed a lateralization effect, with a left compared to right hemispheric activation predominance for the positive emotions [2], derived from the interoceptive focus and the social frame during the motor synchronization task.

Conclusions: This study showed that the focus on the breath and shared intentionality activate coherently the same left frontal areas in dyads performing a joint motor task.

Keywords: interoception, functional connectivity, EEG-fNIRS

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P024. A biofeedback (BFB) study to investigate social interoception in dyads performing synchronization tasks

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Aims: Within the "social interoception" field (i.e., the body of research investigating the influence of interoception on social processes [1]), little is known about the impact of interoceptive and social manipulation on the psychophysiological correlates. Therefore, this study explored the effect of the Interoceptive Attentiveness (IA) (operationalized as the focused attention on the breath for a given time interval) and social framing manipulation on the autonomic responses during interpersonal synchronization.

Method: 32 healthy participants performed linguistic and motor synchronization tasks during two experimental conditions: the focus and no focus on the breath condition. Also, to manipulate the social frame, the shared intentionality was stressed by telling the participants that they had to perform the tasks in synchrony to develop more teamwork skills [2]. During the tasks, biofeedback was used to measure autonomic responses. Significant results were found for pulse volume amplitude (PVA) and heart rate variability (HRV).

Results: Significant lower PVA values emerged in the focus compared to no focus condition when both synchronization tasks were not socially framed. For HRV index, higher values were detected in the focus condition compared to the no focus condition in the motor task.

Discussion: These findings showed that, in a less complex social condition, that is when there is not an explicit request for shared intentionality with the partner, and the person is focusing on his/her breath while performing the synchronization tasks, PVA decreases suggesting lower level of stress and cognitive demand [3]. Moreover, regardless the social frame, during the motor task, an increased ability to cope with environmental and synchronization demands, as suggested by the increase in HRV, is observed when the person focuses on his/her breath.

Conclusions: In the context of social interoception, these two cardiovascular indices (PVA and HRV) mark sensitively the interoceptive manipulation rather than the social framing.

Keywords: social interoception, biofeedback, synchronization

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P025. Neuropsychological study of the premembering phenomenon in refractory temporal lobe epilepsy patients with hippocampal sclerosis.

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Aims: This study aims at exploring the cognitive processes associated with long-term memory-based attention (premembering) (1), in patients with drug-resistant temporal epilepsy (drTLE) and Hippocampal Sclerosis (HS).

Method: Thirty-seven drTLE patients (age range = 17-62) with HS (left-HS n=24; right-HS n=13) underwent a neuropsychological assessment for memory, attention, and executive functions. Moreover, patients and 33 healthy controls (age range=20-59) underwent an experimental paradigm for the Orienting Effect (OE, i.e., that is a behavioural index of premembering (2)). The patients' cognitive data were entered into a Principal Component Analysis (PCA) to explore their distribution into coherent neuropsychological dimensions. We further investigated the relationship between the constituents of the OE (i.e., Reaction Times in Valid and Invalid trials) and the PCA components using Mixed Effect Models.

Results: No significant differences emerged between the groups in OE. Three main neuropsychological components were extracted from the PCA: visuo-spatial memory, working memory, and executive functions. These dimensions were used as predictors of OE within a Generalized Linear Model. In patients with drTLE, the OE was predicted by visuo-spatial memory regardless of the laterality of hippocampal sclerosis. We further explored this relationship using Mixed Effect Models (to account for repeated measures). Interestingly, the higher the visuo-spatial memory skills, the lower the reaction times, particularly in the Invalid trials.

Discussion: Data suggest that patients with drTLE rely on visuo-spatial long-term memory in OE, not with standing hippocampal sclerosis.

Conclusions: We hypothesize that in patients with drTLE premembering is preserved through a compensatory anatomical-functional reorganization (3). Further studies should better address this issue by also considering clinical variables such as seizures' frequency and the disease duration.

Keyword: Premembering, Temporal lobe epilepsy, Neuropsychology

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P026. Memory deficits in patients with major depression: yes, they are trying hard enough!

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Aims: Cognitive impairment is a common symptom in patients with Major Depression (MDD) and results in negative clinical and social effects. Due to the assumption that MDD patients typically suffer from motivational problems, the reduced willingness to exert effort is a plausible explanation for MDD patients memory impairment. The aim of the current study is to investigate whether MDD patients´ indeed invest less effort in memorizing items and whether this reduction is related to patients´ memory performance.

Method: 22 MDD-patients and 28 healthy controls participated in the study. Both groups did not differ with regard to age, gender und basic school education. Mini Diagnostic Interview for Mental Disorders (Mini-DIPS) was applied to check the diagnostic criteria of MDD. The willingness to exert effort was assessed by the Amsterdam Short-Term Memory Test (ASTM). Verbal memory was assessed by the subtest "Logical Memory" from the Wechsler Memory Scale (WMS-IV).

Results: First, MDD patients showed reduced verbal memory performance in particular with respect to the recall of the items as opposed to recognition. With regard to the willingness to make an effort, all MDD patients were above the cut-off value of the ASTM and did not obtain worse than healthy control participants.

Discussion - Conclusions: The findings of this study confirm memory impairment in patients with MDD but no motivational deficits during standardized neuropsychological testing. Consequently, these results did not support the assumption that motivational deficits in MDD-patients cause cognitive deficits.

P027. From affective states to inhibitory control: A novel affective-cognitive intervention in younger and older adults

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Aims: Inhibitory control (IC) is a core executive function, which suppresses automatic behaviours, thoughts, or emotions to select more appropriate behaviours. Affective states may impact on IC capacity, including attention allocation and self-control (i.e., adherence to a short-term goal in the face of interference and errors). However, the underlying mechanisms of IC remain unclear. Similarly, training for the modulation of affective states to promote IC has not been thoroughly investigated. This study aimed to investigate whether touch-induced affective states (emotions and physiological arousal) improved IC.

Method: Forty younger (Mean age= 25, SD= 4.71) and thirty-six older (Mean age= 67, SD= 4.99) adults were allocated to two groups: experimental and control. All participants performed two computerised Stroop tasks (classic and emotional versions). Before performing each task, participants in the experimental condition received caress-like strokes on the forearm while participants in the control condition did not receive any touch stimulation. To estimate changes in the affective state we assessed self-reports of emotions (PANAS) and physiological arousal (Heart Rate variability; HRV). To estimate cognitive performance, we analysed response time (RT) and Stroop interference performance in both tasks.

Results: Individuals in the touch condition showed reduced RT and better Stroop performance in the classic Stroop task, as compared to controls. Greater HRV also was recorded in the touch group compared to controls.

Conclusions: To the best of our knowledge, this is the first study showing that affective touch enhances the cognitive process underlying the suppression of goal-irrelevant stimuli, possibly via emotional regulation. Overall, current data seem to suggest that a multi-modal affective-cognitive intervention based on the combined tactile-cognitive stimulation may be a promising tool for emotional regulation, a key process in IC.

Keywords: heart rate variability, affective touch, inhibitory control

P028. The role of focused and distracted attention in PTSD - an fMRI study from the perspective of mindfulness

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Aims: This pilot study addresses the question of whether posttraumatic stress disorder (PTSD) is associated with memory and attention performance beyond specific dysfunction in the processing of trauma stimuli. The goal of our study was to adopt an emotional directed forgetting paradigm in a sample of PTSD patients PTSD-P) compared to healthy controls (HC). We aimed to examine the underlying neural networks of different attentional states during deliberate encoding or forgetting of trauma-related and neutral words.

Method: 14 PTSD-P and 13 HC participated in the "directed forgetting" paradigm, while fMRI brain activity was simultaneously registered. Trauma-related and neutral words were presented half of the words of each category were instructed to "remember", the other half pf words to "forget" . This task was in two conditions: a "full attention" condition with focused attention and a "divided attention" condition with distracted attention by a second task.

Results: A general effect of directed forgetting compared to encoding could be shown for both groups. When dividing attention, a memory effect was only found for the encoding condition, PTSD-P recalled fewer trauma-related and neutral words, whereas HC display this effect only for neutral words. PTSD-P showed increased activity in a bilateral fronto-cingular-temporal network when encoding trauma-related words under full attention. Under divided attention, additional activity was detected in left amygdale/insula, uncus, orbitofrontal, parahippocampal, middle and superior temporal, precentral and postcentral regions.

Discussion - Conclusions: Group differences for encoding trauma-related words supports a PTSD-specific memory processing mechanism when attention is divided, reflected by brain activity of limbic and orbitofrontal regions in this condition, pointing to a state that could be similar to dissociation, which also impedes the deliberate control of trauma-related stimuli during encoding in PTSD. This characteristic neuro-psycho-functional pattern could be a factor contributing to the maintenance of PTSD - or treated by mindfulness techniques?

P029. Use of transcranial magnetic stimulation (TMS) for studying cognitive control in depressed patients: A Systematic Review

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Aims: Major depressive disorder (MDD) is a debilitating mental disorder. MDD is associated with emotional impairment and cognitive deficit. Cognitive control, which is the ability to use perceptions, knowledge, and information about goals and motivations to shape the selection of goal-directed actions or thoughts, is a primary function of the prefrontal cortex (PFC). Studies have shown that an imbalance in the activity of the left and right dorsolateral prefrontal cortex is associated with cognitive deficits in people with MDD. The main treatment for MDD is pharmacological drugs, but they are not effective for all patients. An alternative technique is Transcranial Magnetic Stimulation (TMS). Prior studies have provided mixed results on the cognitive-enhancing effects of TMS treatment in MDD. Some studies have found significant improvement, while others have not. There is a lack of understanding of the specific effects of different TMS protocols and stimulation parameters on cognitive control in depression. Thus, this review aims to synthesize the effectiveness of the TMS methods and a qualitative assessment of their potential benefits in improving cognitive functioning in patients with depression.

Method: We reviewed 20 studies in which participants underwent a treatment of any transcranial magnetic stimulation protocol, such as repetitive TMS or theta-burst stimulation. One of the primary outcome measures was any change in the cognitive control process.

Results: The main findings suggest that Transcranial Magnetic Stimulation may improve cognitive function in patients with depression, although some studies have also reported negative results. However, most studies were limited by small sample size or a lack of control groups.

Discussion - Conclusions: This review found evidence supporting the use of TMS as a treatment for cognitive deficits in patients with Major Depression. The results are promising, but further research is needed to clarify the specific TMS protocol and stimulation locations that are most effective.

Keywords: Transcranial magnetic stimulation, Non-invasive brain stimulation techniques, Cognitive control, Major depressive disorder.

P075. Flemish normative data for social cognition

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Introduction: Theory of mind (ToM) is a cognitive ability allowing to comprehend the behavior of others through mental states such as beliefs, intentions and emotions. This is a fundamental competency allowing people to interact within social environments. Recent studies have examined this topic due to its implications in the clinical practice. In this study we aim to collect reference data for the Flemish population.

Method: This study included 29 and 35 healthy Flemish men and women between 18 and 73 years with a mean age of 39 years. Firstly, ToM was investigated by the 'Reading the Mind in the Eyes' test (RMET) where several images of eyes are displayed. The participant has to select the word that best matches the emotion associated with the gaze out of four possible alternatives. Secondly, the 'Faux Pas' test (FPT) was used where nine stories are presented, some describing an infringement of social rules. A score is based on the participants' capability of detecting these.

Results: The mean score for RMET was 24,7 on a total of 36. No statistically significant differences were found for gender ($p=0.282$), age ($p=0.540$), schooling degree ($p=0.062$) or living area ($p=0.092$). However, significant differences were found on the dimension of practicing religion or not ($p<0.001$). A similar outcome was found when analyzing the FPT where only regarding religion a significant difference appeared ($p= 0.027$). The mean score for the FPT was 46,91 whereas the total score was 57.

Conclusions: This data provides normative data in a healthy Flemish population which can be used to examine ToM deficits in a neurological population. Based on a cutoff at the 5th percentile, a score for RMET lower than 16 and for the FPT of 24 could be regarded as abnormal.

Keywords: Theory of mind, Faux pas test, Reading the mind in the eyes

P076. Rubber hand illusion: the role of the physical appearance of the plastic hand

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Aims: It was observed that in the Rubber Hand Illusion individuals can embody fake hands that are bigger, but not smaller. The rubber hands used in these studies were modified in both height and width. However, adult hands may change in width and thickness (e.g., weight gain or weight loss), but not in height. Thus, our aim was to investigate, being more ecological, the role of the physical appearance of the fake hand, which relies an overweight and an underweight hand, in modulating the illusion of embodiment.

Method: Fifteen women with a normal weight were recruited. Three plastic hands differing in appearance (i.e., normal weight, overweight, and underweight) were used in a traditional Rubber Hand Illusion paradigm: fake hands were stimulated synchronously and asynchronously with the participant's real hidden hand. The outcome of the illusion was evaluated through the traditional embodiment questionnaire (i.e., subjective component) and the proprioceptive judgment (i.e., objective component).

Results: As expected, after the synchronous (but not the asynchronous) stimulation, the normal weight hand elicited the illusory subjective experience and the recalibration of the perceived hand position towards the fake hand in the proprioceptive judgement. Crucially, the overweight and underweight hands elicited the illusion in both the subjective and objective components.

Discussion: Thus, the embodiment towards hands which physically differ from the one's own hand appearance can be induced, not only for larger dimensions (in lines with previous evidence) but also for the smaller ones (in disagreement with previous works).

Conclusions: The role of psychological factors (i.e., susceptibility to eating disorders symptoms, social desirability, or fatphobia) in modulating the embodiment of a hand that is physically different from one's own should be explored in future studies.

Keywords: body representation, rubber hand illusion, physical appearance

P077. Virtual embodiment of other-race body affects implicit racial bias and its neurophysiological correlates

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Aims: The study aimed at investigating how embodying (temporarily owning) a virtual body of a different race influenced the neurophysiological correlates of implicit racial bias.

Method: Participants (n = 8; 4 F, 4 M, age = 24.8±2.4 years) embodied a virtual avatar of their own race (Control group; n = 4), or another race (Experimental group; n = 4) in a standard virtual embodiment paradigm (observing the avatar from the first-person perspective and controlling its movements). The implicit racial bias was measured by racial Implicit associations test (IAT), administered before and after embodiment. A well-known neurophysiological index of racial bias (N400 component of event-related potentials recorded for stimuli that violate, do not violate, or are neutral towards negative racial stereotypes) was registered after embodiment during a sentence-reading task. Embodiment was evaluated with an ad hoc questionnaire.

Results: Subjective embodiment was comparable between the groups, i.e., participants had the feeling of owning the avatar and controlling its movements independently from the avatar's race. However, the racial bias decreased after embodiment of an out-group (Experimental), but not of an in-group (Control), avatar. It was represented by a decrease in racial IAT after embodiment and a reduced N400 for stereotype-violating stimuli.

Discussion: Decrease of implicit racial bias (IAT) after embodiment of a racially out-group virtual avatar is consistent with previous studies (1, 2). For the first time, the present study demonstrated that the effects of virtual embodiment occur also at the neurophysiological level, which is in line with the existing literature (3) that showed a reduction of N400 after non-immersive exposure to information that violated the negative racial stereotypes.

Conclusions: Virtual embodiment can affect social biases and attitudes, including their implicit and neurophysiological level. This further suggests the crucial role of body ownership and body-related information in human consciousness.

Keywords: virtual body ownership, racial bias, EEG.

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P078. Thalamocortical disconnection involved in pusher syndrome

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Aims: The presence of both, isolated thalamic and isolated cortical lesions have been reported in context with pusher syndrome – a disorder characterized by a disturbed perception of one's own upright body posture, following unilateral left- or right-sided stroke. Our goal was to investigate brain network alterations in pusher syndrome.

Method: Indirect quantification of functional and structural disconnection increases the knowledge derived from focal brain lesions by inferring subsequent brain network damage from the respective lesion. We applied both measures to a sample of 124 stroke patients to investigate brain disconnection in pusher syndrome.

Results: Our results suggest a hub-like function of the posterior and lateral portions of the thalamus in the perception of one's own postural upright. Lesion network-symptom-mapping investigating functional disconnection indicated cortical diaschisis in cerebellar, parietal, and temporal areas in patients with thalamic lesions suffering from pusher syndrome, but there was no evidence for functional diaschisis in pusher patients with cortical stroke and no evidence for the convergence of thalamic and cortical lesions onto a common functional network. Structural disconnection mapping identified posterior thalamic disconnection to temporal, pre-, post- and paracentral regions. Fibre tracking between the thalamic and cortical pusher lesion hotspots indicated that also in cortical lesions of patients with pusher syndrome it is disconnection to the posterior thalamus caused by accompanying white matter damage, rather than the direct cortical lesions themselves that lead to the emergence of pusher syndrome.

Conclusions: Our analyses offer the first evidence for a direct thalamo-cortical (or cortico-thalamic) interconnection and, more importantly, shed light on the location of the respective thalamo-cortical disconnections. Pusher syndrome seems to be a consequence of direct damage or disconnection of the posterior thalamus.

Keywords: Lateropulsion, Diaschisis, Thalamus

P079. Exploring the neurophysiological correlates of face-to-face vs. remote learning during lecture and group discussions: a hyperscanning paradigm

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Aims: In recent years, also due to the introduction of Emergency Remote Learning (ERL) for the Covid-19 pandemic, the learning environment in higher education and university settings has undergone profound transformations. This study aims to explore the neurophysiological (electroencephalographic, EEG) and autonomic correlates during teachers and students interaction in two distinct experimental conditions: face-to-face vs. remote learning, in order to explore levels of synchrony in student-teacher dyads. Each condition was divided into two didactic approaches (each lasting 20 minutes): lecture and group discussions.

Method: During the experimental sessions, the sample, composed of 12 students and a professor, was continuously monitored using an EEG and autonomic cardiovascular measures. In addition, self-report measures have been applied to investigate empathic responsiveness, and levels of satisfaction, attention, interest, and closeness.

Results: The findings showed a greater engagement and synchrony of the participants in the face-to-face than in the remote learning condition. In addition, neurophysiological differences were observed between the frontal teaching and group discussion approach, with greater involvement during the latter.

Discussion: these results underlined that the neurophysiological synchrony between student and teacher was more significant in face-to-face contexts than in the remote learning condition (1). In addition, the results of ERL studies can be confirmed, showing that learning and engagement experiences are limited in remote conditions due to low interactivity, technical circumstances, and unstructured and methods (2).

Conclusions: In conclusion, these results confirm evidence on the advantages of the face-to-face learning condition (3) and encourage the application of the hyperscanning paradigm to investigate factors that promote brain-to-brain synchrony and might facilitate learning process under different contextual conditions.

Keywords: learning, engagement, brain-to-brain synchrony

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P080. Affective Touch: Who Touch You Does It Matter? An Investigation in Anorexia Nervosa

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Aims: An altered perception of affective-like tactile stimuli was observed in anorexia nervosa (AN). However, affective interactions typically involve body-to-body (not tool-to-body) contact with intimate people. In two studies, we probed the role 1) of the kind of touch and 2) the identity of the person delivering stimulations.

Method: 1) The pleasantness of the touch of the experimenter's hand, as well as of the brush (i.e., likewise in previous studies) and a stick (i.e., as a control condition) were measured in 14 women with AN compared with 14 healthy women. Slow stimuli were delivered as affective touch and faster stimuli as non-affective. Both real and imagined tactile stimuli were considered to disentangle between the sensory and hedonic components of affective touch perception. **2)** We took advantage of imagery to compare the experience of affective touch in 14 women with AN and 14 healthy women when imaging the touch of a female caregiver.

Results: 1) The pleasantness of affective touch was preserved in AN, in both the imagery and real task. **2)** The imagined touch of the hand was rated as significantly more pleasant than the touch of the stick (i.e., our control condition) but only when it was delivered by the caregiver and especially when the touch was slow (then affective).

Discussion: Both the sensory and hedonic experience of affective touch may be preserved in AN. our results support the use of imagery to effectively investigate affective touch.

Conclusions: We suggest that future investigations should introduce more ecological scenarios since the affective touch of a meaningful person seems, not surprisingly, the most pleasant.

Keywords: anorexia nervosa, affective touch, caregiver

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P081. Using 7T-fMRI to investigate cortical motor representations in response to intermittent theta burst stimulation

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Aims: Functional representations are stable over time, yet susceptible to input. Rapid long-term functional changes can be seen in response to removal or introduction of input (e.g. sensory stimulation, cortical lesions). High-frequency repetitive TMS (hf-rTMS) has recently been found to alter functional cortical maps. Specifically, hf-rTMS to the visual cortex of cats induced brief destabilisation of functional cortical representations, enhanced cortical excitability and increased spontaneous activity (1). Moreover, weakened intracortical inhibitory mechanisms were demonstrated in response hf-rTMS, resulting in increased cortical excitability and early plasticity processes. These functional maps became sensitive to visual input, indicating hf-rTMS can prime the cortex ready for plasticity and learning (1,2). However, it is unclear if hf-rTMS can alter or induce destabilisation of human functional cortical maps.
This study aims to assess human functional cortical motor representations of the digits with fMRI and to determine whether these can be altered with hf-rTMS.

Method: 21 healthy participants were instructed to complete a travelling-wave finger tapping task during 7T-fMRI to examine the fine-grained human cortical motor representations of digits. This travelling-wave paradigm was conducted before and after intermittent theta burst stimulation (a form of hf-rTMS) to the motor cortex or to the vertex control site.

Results: We predict that hf-rTMS to the motor cortex will show changes in the specificity of mapping and a greater overlap of digit representations, whereas control stimulation will show no change in cortical digit representations.

Discussion and Conclusions: This hf-rTMS induced enhanced excitability may reflect a weakening of cortical inhibitory mechanisms. If hf-rTMS can disrupt cortical representations and induce plasticity mechanisms in the human cortex, this may offer therapeutic promise for conditions that show disrupted functional mapping, such as focal hand dystonia.

Keywords: rTMS, fMRI, cognitive neuroscience

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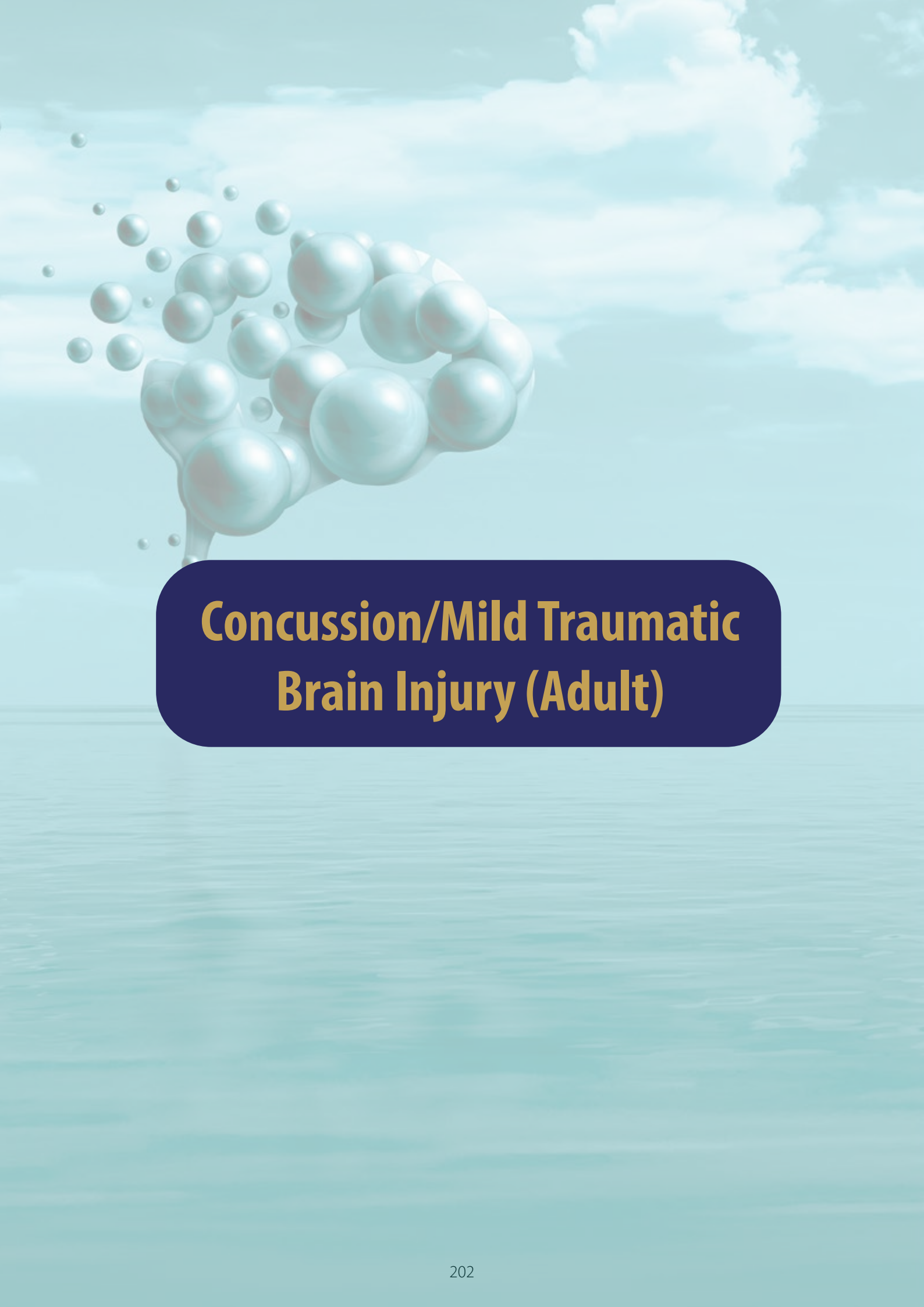

Concussion/Mild Traumatic Brain Injury (Adult)

P030. Applying the New 2021 Consensus Criteria for Traumatic Encephalopathy Syndrome Retrospectively to Case Studies of Boxers from the 20th Century

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Aims: There is considerable interest in whether former contact, collision, and combat sport athletes are at increased risk for later in life neurological diseases. The first consensus criteria for the diagnosis of traumatic encephalopathy syndrome (TES) were published in 2021. We apply the consensus criteria for TES retrospectively to cases of chronic brain damage in boxers described in articles published in the 20th century.

Method: The sample included 155 boxers identified in 24 articles published between 1929 and 1999. We applied the consensus diagnostic criteria for the three core clinical features (i.e., progressive course, cognitive impairment, and/or neurobehavioral dysregulation), in addition to the supportive features, including whether there was a delayed onset of symptoms, motor signs, or psychiatric features. Two authors reviewed each historical case description and coded the criteria for TES.

Results: Cognitive impairment was noted in 62.6% of cases, and in 27.7% of cases the person's cognitive functioning appeared to be broadly normal. Neurobehavioral dysregulation was present in 25.8%. One third (31.6%) were progressive, 10.3% were not progressive, and the course could not be clearly determined in 58.1%. In total, 27.7% met the TES consensus criteria, 27.1% did not, and 45.2% had insufficient information to make a diagnostic determination. Psychiatric features extracted included symptoms of depression (11.0%), suicidality (0.6%), anxiety (3.9%), apathy (2.6%), and/or paranoia (11.6%).

Discussion: TES, in the 20th century, was described as a neurological syndrome, not a psychiatric condition - and this supports the decision of the consensus group to remove psychiatric diagnoses from being either a core or supportive diagnostic feature.

Conclusions: Future research is needed to determine if, and the extent to which, the emergence, course, or severity of cognitive impairment, neurobehavioral dysregulation, or both are caused directly or indirectly by chronic traumatic encephalopathy neuropathologic change.

Keywords: Concussion, Dementia, Neurological Disorders

P031. Predictors of Recovery Three Months after Mild Traumatic Brain Injury at Older Age

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Aims: This study aims to determine the influence of several predictors on recovery in elderly patients three months after mild traumatic brain injury (mTBI) using a multifactorial approach combining demographic factors with psychological factors such as cognitive reserve, emotional distress, frailty, post-injury cognitive complaints and social support.

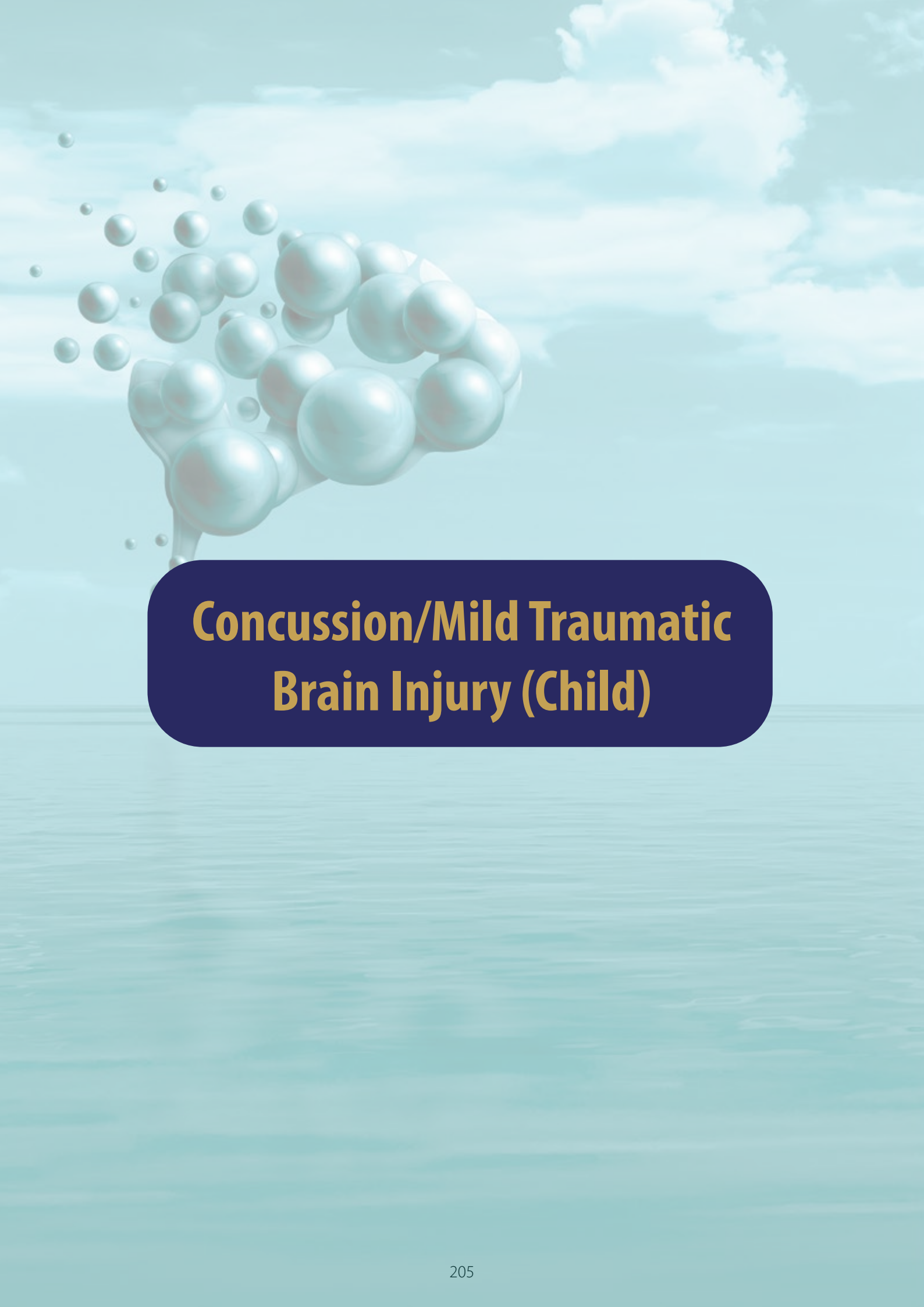
Method: Data was obtained in a large prospective cohort study. A total of 188 patients with mTBI aged between 60 to 94 years (M = 70.8, SD = 7.4) at the time of injury participated in the current study. Questionnaires on cognitive reserve (Cognitive Reserve Index questionnaire), emotional distress (Hospital Anxiety and Depression Scale), frailty (Groningen Frailty Index), self-reported post-injury cognitive complaints corrected for pre-injury complaints (Head Injury Symptom Checklist) and social support (Social Support List – Interactions-12) were administered at two weeks post-injury. The Glasgow Outcome Scale-Extended (GOSE) was used to assess complete recovery (GOSE = 8) and incomplete recovery (GOSE ≤ 7) three months after injury.

Results: Results showed that 39% of the patients recovered completely three months post-injury. Non-recovered patients had significantly higher scores for depression and frailty ($p < 0.05$) and experienced more post-injury complaints of memory, concentration problems and slowness ($p \leq 0.05$) compared to recovered patients. Logistic regression analysis identified gender and frailty as significant predictors for recovery three months after mTBI. Male patients were more likely to recover completely. Patients with higher levels of frailty were less likely to recover completely.

Discussion: A model including demographic factors (age, gender and educational level) and psychological factors (emotional distress, frailty and post-injury cognitive complaints) can predict (in)complete recovery three months after mTBI in elderly patients.

Conclusions: These findings can be used to identify a specific group of elderly patients with an increased risk of incomplete recovery after mTBI. This allows for close monitoring and timely interventions when necessary.

Keywords: mTBI, elderly, outcome



Concussion/Mild Traumatic Brain Injury (Child)

P032. Association between social determinants of health and concussion among high school students in the United States

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Aims: Social determinants of health (SDoH) refer to the environments and conditions in which individuals are born, raised, educated, and live that influence individual and group differences in health status and outcomes. We examined the association between SDoH and the likelihood of sustaining a concussion among adolescents.

Method: Participants were 7,164 adolescents who completed the 2021 Adolescent Behaviors and Experiences Survey conducted by the United States Centers for Disease Control and Prevention (52.7% girls; mean age=16.0 years, SD=1.2).

Results: One in ten adolescents (n=716; 10.0%; 11.8% of boys, 8.3% of girls) reported sustaining a concussion while playing a sport or being physically active during the past year. Seven of ten (70.3%) reported experiencing at least one of eight SDoH. A multivariable logistic regression was conducted with recent concussion as the dichotomous outcome in the subgroup of youth who reported participating in sports (n=3,374). The model was statistically significant ($p<.001$), well calibrated (Hosmer and Lemeshow, $p=.29$), and explained 10% (Nagelkerke R2) of the variance in concussion. Controlling for all other predictors, housing instability (OR=4.3, medium effect size) and limited English language proficiency (OR=3.13, medium effect) were the strongest independent predictors. Adolescents who were bullied (OR=1.80, small effect), who lived in neighborhood where there is violence (OR=1.80, small effect), and who experienced food insecurity (OR=1.52, small effect) were more likely to have sustained a concussion.

Discussion: This study, to our knowledge, is the first to apply a SDoH framework to examine whether SDoH are associated with sustaining a concussion in youth. Several SDoH were independently associated with this injury.

Conclusions: Research is needed to understand the nature of these determinant-injury associations. Whether SDoH are associated with specific treatment and rehabilitation needs, and time to recover following concussion, should be examined with prospective studies.

Keywords: Concussion, Adolescents, Socioeconomic Status

P033. Impaired episodic memory consolidation over one week in children after mild traumatic brain injury

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Aims: Recent evidence suggests that children after severe TBI may suffer accelerated long-term forgetting (ALF), an elevated memory loss over time that remains undetected on standardized neuropsychological memory tests. So far, there are no studies investigating whether children after mild traumatic brain injury (mTBI) suffer ALF. Thus, we investigated 1-week verbal recall and recognition performance after mTBI and compared it to healthy controls.

Method: We present data 3-6 months after mTBI and included prospectively 55 children after mTBI / 52 healthy controls. Our verbal memory test consisted of 17 words which were learned over four learning runs; free recall was tested immediately, 30 minutes and 1-week after learning; recognition performance was evaluated 30-min and 1-week after learning. We computed repeated measure ANCOVA's (controlling for age and maternal education) to investigate verbal recall and verbal recognition over time between groups. Additionally, we conducted a linear regression analysis to predict 1-week recall.

Results: Regarding verbal recall and recognition, we found a significant interaction effect between time and group as well as a significant group effect: While patients showed a significantly reduced verbal recall and recognition performance after 1-week, their memory performance was comparable 30-min after learning. Linear regression analysis indicated that group and verbal recall 30-min after learning, but not verbal learning or executive functions, predicted delayed recall after 1-week.

Discussion: Given that delayed verbal recall and recognition performance after 1-week was significantly reduced in pediatric mTBI, our data indicate impairments in episodic memory consolidation over time, even 3-6 months after very mild injuries. 1-week recall was not predicted by executive functions or age, but by group and verbal recall 30-min after learning.

Conclusions: Children after mTBI may suffer subtle impairments in memory consolidation, why clinicians should include delayed assessments of memory performance in their examination, given the clinical relevance of long-term memory in everyday life.

Keywords: verbal memory consolidation over one week, pediatric mild traumatic brain injury

Dementia (Alzheimer's Disease)

P034. European Inter-Societal Delphi Consensus for the Biomarker-Based Aetiological Diagnosis of Neurocognitive Disorders

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Aims: Cerebrospinal fluid (CSF) and imaging biomarkers are necessary for the aetiological diagnosis of neurocognitive disorders, but evidence on their rational clnical use is incomplete. A European multidisciplinary task force from eleven relevant scientific societies (including FESN) has defined a diagnostic workflow for the efficient use of biomarkers, filling the evidence gap on biomarker prioritisation with a formal Delphi consensus procedure.

Method: Group members participated in virtual Delphi rounds and voted on specific questions regarding the diagnostic workup of neurocognitive patients, based on their experience and evidence from the literature. Consensus was reached at a threshold of 70% agreement, or 50%+1 when a question required rediscussion.

Results: Six rounds have been completed so far. Panellists agreed on the clinical workspace of the workflow (specialist outpatient service), the stage of application (prodromal and mild dementia), and the patient age window (biomarker use strongly encouraged under 70 and of limited usefulness over 85).

Discussion: The patient-centred workflow features three levels of assessment: W1: clinical profiles based on the integrated results of neuropsychology, MRI atrophy, and blood tests; W2: first-line biomarkers according to W1's clinical suspicion; W3: second-line biomarker when the results of first-line biomarkers are inconsistent or inconclusive. CSF biomarkers are first-line in the suspect of Alzheimer's disease (AD) and when inconsistent neuropsychological and MRI findings hinder a clear diagnostic hypothesis; dopamine SPECT/PET for those leading to suspect Lewy body spectrum; FDG-PET for the clinical profiles leading to suspect frontotemporal lobar degeneration and motor tauopathies, followed by CSF biomarkers in the case of atypical metabolic patterns (with possible AD aetiology).

Conclusions: The workflow will promote consistency in diagnosing neurocognitive disorders across countries, and rational use of resources. The initiative has an impact in preparing clinicians to work in the upcoming clinical space where etiological disease-modifying drugs are expected to be available.

Keywords: dementia, consensus criteria, biomarkers

P035. Personality traits and everyday functioning in patients with the behavioral variant of frontotemporal dementia

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Aims: Behavioral variant frontotemporal dementia (bvFTD) is characterized by early and prominent personality changes that affect everyday functioning. Goal of the present study is to illustrate the pattern of personality changes after disease onset and investigate the relationship between personality traits and functional status in bvFTD patients.

Method: A total of 20 patients diagnosed with bvFTD were rated with informant-based measures with regards to their personality traits and performance on activities of daily living. Premorbid and current personality traits were assessed with the Greek version of the Goldberg's International Personality Item Pool Questionnaire (IPIP) (1), designed to measure the Big Five personality traits. Performance on everyday activities was assessed with the Greek version of the Disability Assessment for Dementia (DAD) (2) and the Functional Activities Questionnaire (FAQ) (3). Descriptive statistics were used for the delineation of personality changes, whereas Pearson's correlations and regression analyses were performed to identify associations between personality and functional status.

Results: BvFTD patients demonstrated a significant decrease in conscientiousness, intellect, extraversion, and agreeableness, while they showed a considerable increase in the factor of emotional stability. Lower levels of conscientiousness and higher levels of emotional stability were associated with greater functional impairment.

Discussion: BvFTD is associated with pervasive personality changes. Interestingly, unlike other types of dementia, bvFTD patients become less neurotic over the course of the disease. In that framework, higher levels of emotional stability are related to worse functional outcomes, maybe due to the negative impact of emotional flatness on initiation and effective performance of everyday activities.

Conclusions: Research on personality correlates of functional status in dementia is considered of great importance, as it can contribute to the better understanding of the different everyday functioning levels demonstrated by patients with the same clinical syndrome.

Keywords: personality traits, everyday functioning, behavioral variant frontotemporal dementia

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P036. Incidental recall of items from the naming test in the CERAD-NB: clinical validity for detecting mild Alzheimer's disease

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Aims: We have previously shown that incidental recall of Boston Naming Test items reliably differentiates between mild AD and controls (1). In the present study, we examined whether a) incidental recall of the naming test in the CERAD-NB would be reliable for detecting mild Alzheimer's disease (AD) and b) whether including the incidental recall score in CERAD-NB Total Score (2) would increase its' diagnostic accuracy.

Method: The incidental memory task simply entails immediate recall of the 15 items in the naming task, without any instruction to memorize them. The sample consisted of 64 participants; 34 patients with mild AD and 30 healthy older controls. The diagnostic accuracy of the incidental memory task as well as those of the standard CERAD-NB memory tasks was analyzed. Similarly, the diagnostic accuracy of the CERAD-NB Total Score with and without the incidental recall performance was analyzed.

Results: All CERAD-NB memory tasks had very good accuracy in differentiating between mild AD patients and controls, but the incidental memory task had the highest accuracy, AUC = .956. Adding the incidental memory score to CERAD Total Score minimally increased its accuracy (AUC without incidental recall = .967, AUC with incidental recall = .971).

Discussion: The results are in line with our previous study and provide further evidence that a recall task of incidentally encoded items is very reliable in differentiating between mild AD and healthy controls.

Conclusions: The incidental recall task is easy and fast to administer and could thus be a clinically valid addition to the CERAD-NB test battery.

Keywords: incidental memory, CERAD-NB, Alzheimer's disease

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P082. Arizona Battery of Cognitive-Communication Disorders Second Edition in Patients with mild Alzheimer's disease: A validation Study

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Aims: Alzheimer's disease, the most common cause of dementia, accounts for most cases of cognitive decline in elderly people and is expected to increase significantly by 2050. In Greece there are no standardized test batteries available at present to assess cognitive – communication functioning in patients with mild Alzheimer's disease (AD). In this respect, this study investigated the validity of the Greek adapted Arizona Battery of Cognitive-Communication Disorders, Second Edition (ABCD2) in this population.

Method: Two demographicaly matched groups over 65 years old, consisting of the Control group and a mild Alzheimer's group, were administered the brief battery of Addenbrooke's Cognitive Examination- Revised, and the ABCD-2, which contains 17 brief subtests for cognitive – communication evaluation. The Clinical Dementia Rating, a 5-point scale which assesses six domains of cognitive and functional performance, was used to assess Alzheimer's stage and the Geriatric Depression Rating scale was used to exclude non-treated depressive participants. Assessment duration was 60-90 minutes.

Results: Statistical analysis revealed significant differences between the two groups in verbal short-term memory and verbal recognition memory, as well as episodic memory. Various aspects of communication also differed between the two groups.

Discussion: Most cognitive - communication domains differed compared with the healthy group, although not at a statistically significant level. This was somewhat expected if one considers that language and cognition decline negatively influences communication ability.

Conclusions: The current study demonstrates the test's ability to differentiate participants with mild AD from those with normal neurocognitive and communication function.

Keywords: ABCD-2, Alzheimer's disease, validation study

P083. Critical menarche age threshold associated with neurocognitive disorder in old age

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Aims: Previous studies reported a positive association between women's late-life cognitive function and total menstrual span, but findings have been inconclusive. We examined the presence of a critical menarche age window affecting cognitive vulnerability and resilience among older women.

Method: We examined data from 1082 Greek, older women [MAge=72.69 years, SD=5.48, MEducation=7.44 years, SD=4.80), participating in an epidemiological study (1), who provided complete demographic information, medical and menstrual history, and received a comprehensive neuropsychological assessment.

Results: Women with menarche between 15-17 years of age had a higher odds ratio of presenting poorer performance on the Mini Mental State examination-MMSE (OR=.93, 95% CI=.87-.99), and neuropsychological tasks assessing memory (OR=.75, 95% CI=.60-.95), executive functioning (OR=.71, 95% CI=.54-.93) and global cognition (OR=.71, 95% CI=.53-.95), but not language, visuospatial perception, and attention/speed of information processing, compared to women with menarche between 11-14 years of age (adjusting for age, education, and hysterectomy operation and estrogen supplementation). Furthermore, menarche between 15-17 years of age was associated with the presence of mild Neurocognitive Disorder (NCD) with psychiatric symptoms or due to Alzheimer's disease, while menarche from 11-14 years of age was associated with the absence of NCD.

Discussion: Our study suggests that 11-14 years of age may constitute a critical menarche age window, increasing women's cognitive resilience in late-life. These findings are supported by animal studies and neuroimaging data indicating an increased brain sensitivity to sex hormones in early adolescence, declining with age.

Conclusions: Women with menarche in late adolescence may be at increased risk for presenting cognitive decline in old age. Future studies should examine the impact of cognitively-stimulating interventions in reversing the risk for this population.

Keywords: menarche, adolescence, neurocognitive disorder

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P084. Effects of lexical variables on the sequential recall in a category fluency task in Mild Cognitive Impairment and Alzheimer's Disease

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Aims: To assess the contribution of lexical variables in determining the order of recall in a category fluency task in individuals with Mild Cognitive Impairment (MCI) and Alzheimer's Dementia (AD).

Method: 28 healthy controls (HC), 34 MCI, and 18 AD patients were enrolled. They underwent a fluency test assessing the "Birds" and "Furniture" categories [1]. The order of production of words was recorded; frequency, typicality, number of letters, and two measures of semantic relationship (Extended Gloss Overlap and path length) [2] were taken into account for each lexical entry. Linear models were computed with order of production as dependent variable, and lexical variables and diagnostic category as predictors.

Results: none of the lexical variables was associated with the order of recall of words belonging to the "Birds" category. For "Furniture", in HC the order was predicted by typicality (B=-2.523;p<0.001), frequency (B=-0.015;p= 0.044), and number of letters (B=0.424;p<0.001). In MCI, the order of production was predicted by frequency (B=-0.020;p= 0.008) and number of letters (B=0.291; p=0.004), but not by typicality (B=-0.399;p=0.774). In AD, none of the lexical variables showed any influence on the order of production. The comparison between the slopes among the groups showed a significant difference for typicality between HC and MCI (p=0.003) and HC and AD (p=0.019).

Discussion: in HC, we found that typicality and frequency descended from the first to the last word produced, whereas the number of letters showed the opposite trend. The same behavior was observed in MCI, with the exception of typicality. This finding suggests that MCI category fluency tasks are influenced by variables associated with retrieval difficulty, but not by aspects associated with semantic representation (typicality).

Conclusions: the lack of effect of typicality in word generation in MCI subjects may be the consequence of early impairment of semantic representation.

Keywords: semantic memory; Alzheimer's Disease; Mild Cognitive Impairment

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P085. Give me a sign: Concrete symbols facilitate wayfinding in Alzheimer's disease dementia

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Aims: Alzheimer's disease dementia (ADD) is associated with impaired orientation particularly in unknown environments. Signs offer may offer an opportunity to compensate for these deficits. Previous studies of our working group revealed that people with ADD benefit most from concrete symbols with positive contrast polarity. Based on these results, we devloped optimized signs and evaluated their benefit in a real-life like environment.

Method: We assessed 30 subjects with ADD and 36 healthy controls by using a Sign Comprehension Paradigm (SCP) in a real-life like environment. Nonparametric mixed model analyses of variance were used to analyze the effect of different symbols and additional scripture (double coding) on SCP performance speed and accuracy.

Results: Analyses revealed a significant main effect of symbol design on SCP speed as well as an interaction effect of group*symbol, indicating a benefit for subjects with ADD at concrete, optimized signs. Furthermore, analyses of SCP error rates revealed main effects of group and coding condition as well as an interaction effect of group*coding. Subjects with ADD made more errors than healthy controls, but SCP error rates decreased in the double-coding condition.

Discussion: Our results revealed an advantage of concrete double-coded symbols over conventional symbols, particularly for people with ADD.

Conclusions: Our findings strongly suggest the implementation of concrete double-coded signs on dementia wards to facilitate wayfinding in older people living with ADD.

Keywords: signs, orientation, Alzheimer

P086. Apraxia testing to support dementia differential diagnosis in middle age

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Aims: Dementing diseases that manifest before age 65 (early-onset dementia) are prone to diagnostic delays and misdiagnoses because they are rare and often present with atypical symptoms. Tests of memory and executive ability may not reveal these atypical diseases, and yet may return pathological results for individuals with from nondegenerative conditions. The Dementia Apraxia Test (DATE) was developed to support dementia differential diagnosis, but its performance has not been investigated in middle-aged populations.

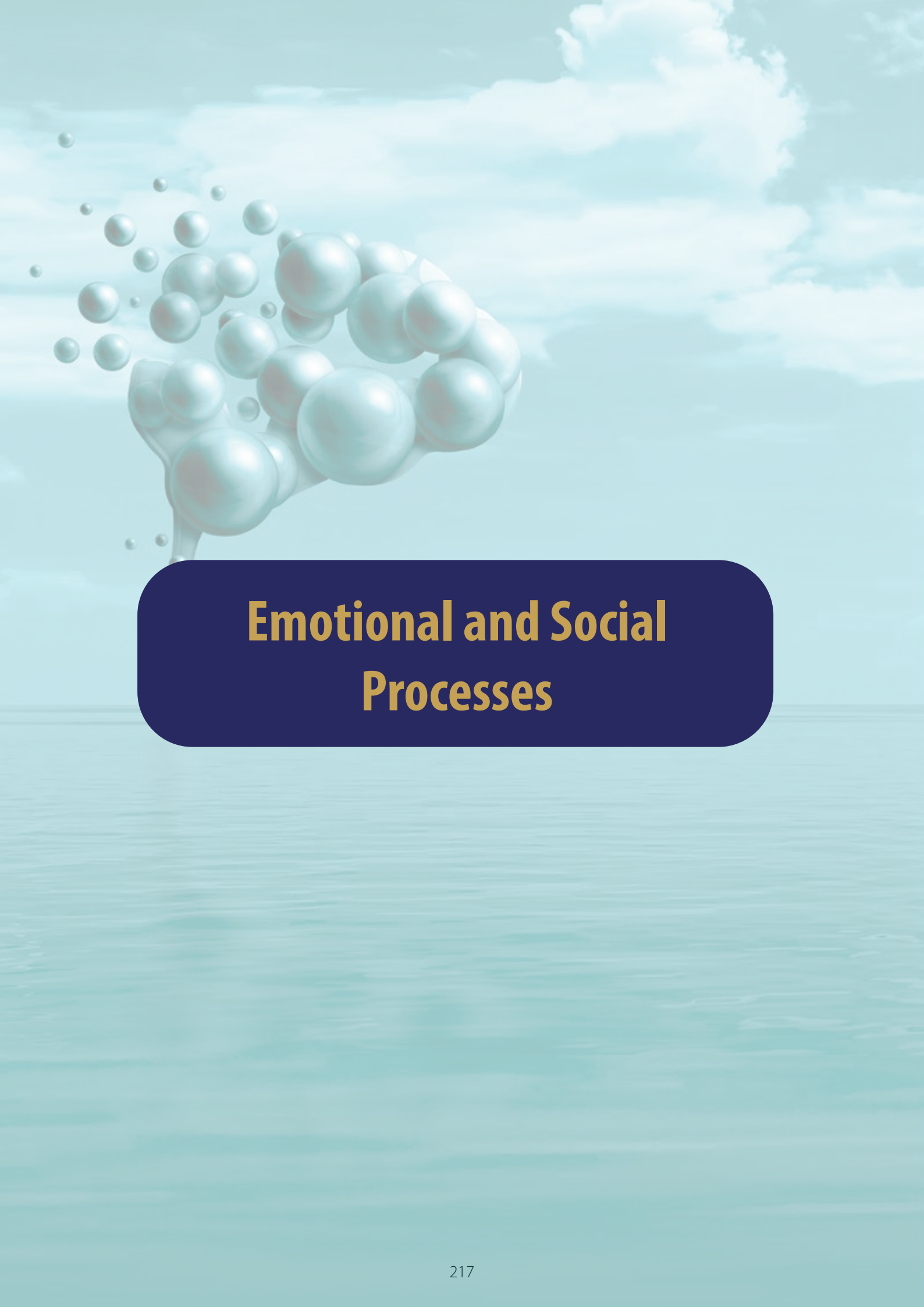
Method : Our prospective cross-sectional study involved patients referred for dementia investigations based on recent cognitive and affective symptoms. The DATE was administered as a blinded measurement prior to a battery of standard tests. Patients who later received a diagnosis of probable Alzheimer's disease (AD) or a psychiatric condition were included in receiver operating analyses to define optimal discriminating cutpoints between these conditions. A comparison group included age-matched healthy volunteers.

Results: Early-onset AD patients (n = 24, mage = 61) exhibited limb apraxia to various degrees, while psychiatric patients (n = 23, mage = 57) performed at the level of healthy participants. The limb subscale of the DATE correctly classified 43/47 patients, resulting in a total accuracy of 91% (sens., 83%; spec., 100%; Youden index, 0.83; area under curve, 0.942). The DATE was more accurate than memory tests.

Discussion: The DATE identified most AD patients and excluded dementia in psychiatric patients, some of whom performed abnormally on memory tests. The root of limb apraxia lies in the left parietal lobe, which tends to degenerate in the first stages of early-onset AD.

Conclusions: Apraxia testing seems to accurately detect dementia in middle-aged people.

Keywords: Apraxia, diagnostic tests, early-onset dementia



Emotional and Social Processes

P037. Is affective and cognitive theory of mind associated to the functional connectivity of the cerebellum in the behavioral variant of frontotemporal dementia?

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Aims: The Behavioral variant of Fronto-Temporal Dementia (bvFTD) is hallmarked by progressive decline in socially appropriate behavior.1 Recently, consensus has been reached on the cerebellar role in social cognition.2,3 This study explored the pattern of cerebello-cerebral functional connectivity (FC) changes in the bvFTD and their association with the ability to predict others' behavior by inference of their mental states (Theory of Mind, ToM).
Method: bvFTD patients and a group of healthy subjects (HS) completed the computerized Yoni task evaluating affective and cognitive ToM abilities. All participants underwent an MRI scanning at 3.0T including T1-weighted and resting-state functional MRI images. A generalized linear model was used to compare ToM performances between bvFTD patients and HS. A voxel-based morphometry was used to assess cerebellar grey matter (GM) changes and a seed-based analysis was performed to test cerebello-cerebral FC patterns between regions of reduced cerebellar GM. The left and right cerebellar dentate nucleus (DN) masks were also selected as regions of interest for a second seed-based analysis since they represent major cerebellar output channels. Correlations between ToM scores and FC patterns were tested.

Results: bvFTD patients showed an impairment in both affective and cognitive ToM domains. Compared to HS, bvFTD patients showed a significant cerebellar GM loss involving the cerebellar Crus I and II. Functional hyperconnectivity was found between these cerebellar regions and cerebral regions of the mentalizing brain network. Interestingly, increased cerebello-cerebral FC inversely correlated with ToM performances of bvFTD patients.

Discussion: bvFTD patients showed an impairment in both affective and cognitive ToM domains. Compared to HS, bvFTD patients showed a significant cerebellar GM loss involving the cerebellar Crus I and II.

Conclusions: Functional hyperconnectivity was found between these cerebellar regions and cerebral regions of the mentalizing brain network. Interestingly, increased cerebello-cerebral FC inversely correlated with ToM performances of bvFTD patients.

Keywords: Fronto-Temporal Dementia, Social Cognition, Cerebellum

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P038. Apathy and Effort Expenditure for Social and Monetary Rewards: An Incentive Force Study in Healthy Individuals

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Aims: Apathy, characterized by decreased voluntary and goal-directed behavior, is a frequent symptom in clinical settings. Apathetic behaviors are also observed in the non-clinical population to varying degrees, shown to interfere with daily functioning. Here, we aimed to find out whether and to what extent apathy levels in healthy individuals affect the processing of monetary and social rewards.

Method: An adapted incentive force task was employed in a non-clinical sample of young adults with varying apathy scores. A masked monetary or social reward was presented for 16ms (subliminal/implicit condition) and for 100ms (supraliminal/explicit condition), and mean tapping speed per reward served as the dependent variable. We hypothesized that individuals with high apathy levels would be less willing to increase their effort expenditure for rewards, relative to individuals with lower apathy scores.

Results: Overall, participants were willing to make more effort for consciously distinguishable larger rewards, and refrained from investing effort for distinguishable smaller rewards. Individuals with high apathy levels invested less effort when social rewards were presented subliminally (implicit condition), but not when social rewards were presented supraliminally (explicit condition), relative to individuals low in apathy. For monetary rewards, no significant apathy-related differences were observed.

Discussion/Conclusions: In both monetary and social contexts, reward values and awareness levels interactively influenced individual subjective effort expenditure. Apathy in healthy individuals was related to reduced willingness to invest effort into subliminally perceived social rewards, indicative of a reduced sensitivity to implicitly perceived social rewards. This may have implications for daily social functioning, given that many social signals in everyday life are implicitly expressed and perceived.

Keywords: apathy, social reward, monetary reward

P039. Single-trial task of facial emotion recognition: What the data say?

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Aims: The performance on a simple facial emotion recognition task was analysed in a group of adolescents against their IQ and self-assessed competence of emotional perception and understanding.

Method: Ability to recognize a total of eight emotional expressions was assessed by ad hoc devised 8-item photo-based instrument in three groups of higher secondary school students: typically developing (TD), n=95; borderline IQ (B), n=44; mildly intellectually disturbed (MID), n=60.

Results: Reliability was observed to be α=.68 based on the overall sample. The instrument discriminated between groups ($F(2,196)=23.06$, $p<.001$, $\eta 2=.19$) and emotions; recognition accuracy rates were higher for happiness (TD, 98.9%; B, 86.4%; MID, 73.3%) compared to other emotions and for six basic emotions (M=0.64, SD=0.26) compared to additional two (M=0.30, SD=0.38). Apart from moderate correlation with IQm in MID group ($r(58)=.32$, $p=.01$), no other correlations to IQ scores were established. Regression model consisting of both IQ scores explained 11.3% of the variation in basic emotion recognition in combined sample of B+MID groups ($F(2,101)=7.54$, $p=.001$, adjusted $R2=.113$), but only IQm proved to be significant predictor ($\beta=.27$, $p=.008$). There was no congruence of ability to recognize emotions from facial expressions with self-assessed competence to perceive and understand emotions measured by cross-culturally validated scale (1).

Discussion: However scarce, our data fit well into evidence on basic emotion recognition in intellectually disturbed and typical population (2,3). Despite the issue of reliability of such a plain measure, discriminative efficacy of facial emotions as single-stimuli objects appeared to be decent. The lack of agreement with the self-assessed ability of emotional perception speaks once more against breezy mixing of self-assessment and performance measures of joined constructs.

Conclusions: Facial emotion recognition continues to be clear and sound cue to emotional processing even when assessed with the simplest of possible tasks.

Keywords: facial emotion recognition, intellectual disability

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P040. Alterations in moral cognition in Parkinson's disease and its association with socio-cognitive functions

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Aims: Patients with Parkinson's disease (PD) can be characterized by social cognition deficits, particularly in emotion recognition and mentalizing. However, in these patients, changes in moral decision-making, possible as a consequence of the fronto-striatal alterations, are poorly investigated. This study aims to examine possible alterations in different sub-components of moral cognition in PD patients with a novel task (MOral COgnition-MOCO) and analyzing the relationship to other socio-cognitive dysfunctions.

Method: 28 PD patients and 28 healthy control (HC) participants matched for demographic variables were included. All participants underwent a clinico-neuropsychological assessment, including tests of emotion recognition (Ek60), mental states attribution (SET, FACE-mes) and empathy (IRI). All subjects performed the MOCO, consisting of three parts evaluating altruistic/egoistic tendency, moral judgement based on intentionality and moral foundations. In the latter subtask, specific questions investigated the detection of moral transgression, discrimination of moral foundations (authority, loyalty, care, fairness) and the inference of emotional reactions. Between-group analyses in MOCO performance were computed, as well as correlation analyses between socio-cognitive and clinical variables in PD patients.

Results: Comparison between PD and HC showed significant differences in performances at MOCO in both moral judgement ($U=271$; $p=0.045$) and moral foundation subtasks, in particular in the sub-components of moral discrimination ($U=252$; $p=0.018$) and emotional inference ($U=157$; $p<0.001$). Correlations in PD patients between the performance at MOCO and other social cognition tasks showed that mental states attribution was positively associated to moral judgement (FACE-mes $rs=0.38$; $p=0.045$) and to emotional inference subtask of moral foundation (SET $rs=0.41$; $p=0.03$). The latter was also associated to empathic attitude (IRI $rs=0.54$; $p=0.003$).

Conclusions: The current study underlines possible alterations in moral cognition in PD patients, which might be associated with socio-cognitive dysfunctions in affective processing, with important theoretical and clinical implications for cognitive characterization of these patients.

Keywords: neuropsychology, social cognition, Parkinson's disease

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P041. Cerebellar contribution to social cognition: a functional connectivity study in patients with cerebellar neurodegenerative disorders.

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Aims: Over the last years, increasing evidence has acknowledged the cerebellar role in social mentalizing (Van Overwalle et al., 2020). A cerebello-cerebral mentalizing network has been identified (Van Overwalle and Marien, 2016) thus suggesting functional interplay between the mentalizing regions in the cerebellum and the mentalizing regions in the cerebrum. However, the mechanisms through which cerebello-cerebral networks contribute to social functioning are still to be clarified. The present study aimed to investigate the relations between cerebello-cerebral functional connectivity (FC) changes and deficits in theory-of-mind (ToM) abilities in presence of cerebellar pathology.

Method: ToM performances were assessed in patients with cerebellar neurodegenerative disorders (CB) and a group of healthy subjects (HS). Resting-state fMRI scans were acquired in order to characterize the FC patterns within the mentalizing cerebello-cerebral network. The mentalizing network comprised 5 regions of interest (ROIs) (Van Overwalle and Marien, 2016) including left (L) and right (R) temporo-parietal junction (TPJ), the precuneus, the dorsomedial prefrontal cortex (dmPFC) and a postero-lateral cerebellar region (P-Cereb) encompassing the right Crus II. The Network-based statistics (NBS) (Zalensky et al., 2010) was performed to investigate the presence of FC alterations associated to cerebellar damage and patients' ToM performances.

Results: Altered ToM performances were observed in CB patients compared to HS. NBS analyses showed decreased FC in CB compared to HS specifically between L-TPJ and R-TPJ, and R-TPJ and dmPFC. Interestingly, CB patients' altered ToM scores significantly correlated with FC between each nodes' pair with the exception of P-Cereb and R-TPJ.

Discussion: These preliminary results suggest that cerebellar structural alterations associated to neurodegenerative cerebellar disorders may result in a lack of cerebellar modulation on key cerebral mentalizing regions affecting cortico-cortical FC and social cognition performances in patients.

Conclusions: FC changes within distinct cerebello-cerebral mentalizing network may specifically account for patients' social impairment.

Keywords: resting-state fMRI, Theory of Mind, mentalizing networks

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P042. Social norms knowledge in the early and differential diagnosis of the behavioural variant of frontotemporal dementia

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Aims: Social knowledge is a socio-cognitive facet that includes understanding of social boundaries and adapting behavior according to social context. Overadherence or violation of social norm can characterize cognitive profile of neurodegenerative patients. In this study, we explored social knowledge error patters in the behavioral variant of frontotemporal dementia (bvFTD), compared to Alzheimer's disease (AD) and healthy controls, with the aim to define the diagnostic performance of error patterns in early and differential diagnosis of bvFTD.

Method: Social norms questionnaire (SNQ) was administered to 33 bvFTD,20 AD and 20 matched HC. Global score (SNQgs), overadhere (SNQoes) and break (SNQbes) subscales scores were compared in bvFTD vs AD and HC. Diagnostic performance of SNQgs, SNQoes and SNQbes were evaluated with receiver operating characteristic (ROC) curve analysis. Stepwise logistic regression model was used to accurately classify bvFTD, including in the model those variables found to be significant predictor variables.

Results: While all scores significantly differed in bvFTD vs HC, in bvFTD vs AD SNQoes score was not significantly different between groups. SNQgs showed an excellent performance in both early (bvFTD vs HC = AUC 0.90) and differential diagnosis (bvFTD vs AD = AUC 0.82). Logistic regression analysis identified SNQbes as the main variable, in combination with SNQgs, in accurately distinguishing bvFTD from HC and correctly classifying the 93% of patients. The combination of SNQbes and SNQgs was able to distinguish bvFTD from AD, correctly classifying the 90% of bvFTD patients.

Conclusions: Social cognition is a crucial cognitive domain early affected in bvFTD. SNQ is a useful tool to assess socio-cognitive skills for the early and differential diagnosis of bvFTD. Error pattern analysis may add relevant information for the diagnosis of bvFTD, in which violation of social norms are signature of the social pattern.

Epilepsy/Seizures

P043. Hippocampal shrinkage after temporal lobe resection and its influence on postoperative verbal memory change

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Aims: In temporal lobe resections (TLR) in patients with temporal lobe epilepsy, hippocampus (hs) sparing surgical procedures are generally considered effective in preventing postoperative memory decline. However, with this approach, some patients may develop a postoperative shrinkage of the ipsilateral hc. The aim was to examine whether this shrinkage (further) affects verbal memory outcome.

Method: We analyzed data of 24 patients who underwent hc sparing TLR between 2010 and 2020. We included data on verbal memory (long-term retention), duration and age at onset of epilepsy, lateralization of surgery, seizure outcome, postoperative hippocampal shrinkage, and damage to the hippocampal head during surgery.

Results: The analyses showed that (1) no differences in verbal memory change were found between patients with and without postoperative hippocampal shrinkage or damage to the hippocampal head; (2) patients with language dominant TLR exhibited a significantly increased memory decline compared to patients with non language-dominant TLR; (3) lateralization of surgery and preoperative memory performance explained a large amount of the variance ($R^2 = .43$) of postoperative memory decline; (4) early onset of epilepsy was associated with higher rates of memory decline ($r = .382$).

Discussion: Our results suggest that sparing the hc in TLR may not necessarily prevent postoperative verbal memory decline. The fact that damage to the hippocampal head had no effect on postoperative verbal memory may be evidence for a functional compensation or reorganization of the hc alongside an anterior-posterior axis.

Conclusions: As in more extensive, hc including surgical procedures, the level of preoperative memory performance and the lateralization of surgery seem to be important factors in presurgical risk assessment. As a next step, we will validate the results with a larger sample and additionally investigate which postoperative volumetric changes of the hc are crucial in verbal memory decline.

Keywords: hippocampus, verbal memory, focal epilepsy surgery

P044. Prognostic factors for neurocognitive outcome in children with periventricular nodular heterotopias

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Aims: Periventricular nodular heterotopias (PNH) results from a failure of neuronal migration during brain development. They can occur in isolation or associated with other brain malformations and are typically related to focal epilepsy. The main objective of this study is to identify prognostic factors for neurocognitive outcome in individuals with PNH.

Method: descriptive and analytical study of a cohort of 46 children diagnosed with PNH. We reviewed their clinical and neuroimaging features and performed neuropsychological assessments including Wechsler scales, Vineland adaptative Scale-III and behavioral scales.

Results: Twenty-four individuals (52%) had isolated PNH, whereas in 22 they were associated with brain malformations. Twenty-two subjects (48%) had epilepsy, 14 within the group of other brain malformation and 8 within the isolated PNH group, (58 and 33% of these groups, respectively). Epilepsy onset occurred in the first 2 years of life in 77% of patients, in childhood in 9% and in adolescence in 13%. The median IQ in the whole cohort was 83, within the lower-middle values, ranging from 27 to 111. The median IQ in individuals with epilepsy was 21,5 points lower than in those without epilepsy (IQ 85 vs. 63,5). In the same way, the median IQ was lower in subjects with brain malformations (IQ 67) than in the isolated PNH group (IQ 83). Among individuals with epilepsy, those with an early onset showed the lowest IQ (60, compared to 83 in those with a later onset). Twenty percent of individuals had some risk indicator for autism spectrum disorder, being higher within the individuals with epilepsy or complex brain malformations.

Discussion - Conclusions: PNH may be the cause of paediatric-onset epilepsy and neurodevelopmental disorders. The coexistence of other brain malformations as well as early onset of epilepsy appear to be risk factors for a worse neurocognitive prognosis.

Keywords: Heterotopias, Cognition, Epilepsy

P045. Social outcomes of childhood epilepsy with onset before school-age –15 years follow-up

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Aims: The aim of this population-based follow-up study was to determine long-term social outcome in children with early-onset epilepsy.

Method: A cohort of preschool-aged (3-6 yrs) children with active epilepsy (CWE) was identified in September 2004. The cohort consisted of 64 children (33 girls, 31 boys) and mean age at onset of epilepsy 26.98 months (SD = 21.05). School-age behavioral and academic outcomes (n = 43) were assessed by teachers with the Child Behavior Checklist. Social outcome as young adults was later determined by reviewing participants' medical, psychological, and social records of the Tampere University Hospital including the records of the Outpatient Intellectual Disabilities Clinic. Statistical analysis used $\chi 2$ for categorical data and t-tests for continuous variables.

Results: At school-age, internalizing and externalizing behavior problems ($p < .01$) were reported in CWE. About 25% of children had clinically significant behavior problems. Further, low academic competence and a need for learning support was reported in 65.4%. Special educational support was related to complicated epilepsy ($p = .001$). Mortality before young adulthood was 14% (n = 9). Mean age for 55 survivors was 21.52 years (SD = 1.26) at the end of follow-up. Of these, 25 were not followed at the clinics of the University Hospital. Fifteen were still on antiepileptic medication (AEDs) due to active epilepsy. Social outcome was good (living independently, studying or employment) for 10 participants, moderate (needed some external support) for 15 and 11 had poor outcome (complete dependence on others, institutionalized). Most important determinant of poorer social outcome was intellectual disability (ID) ($p = .002$).

Discussion: For some CWE long-term social outcome is more favorable. However, epilepsies emerging early in life with comorbid ID carry significantly poorer social outcome.

Conclusions: Childhood epilepsies with early onset seizures are heterogenous conditions with variable social outcome.

Keywords: childhood epilepsy, long-term social outcome

P046. Assessing social cognition abilities in temporal and frontal epilepsy

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Aims: The present study investigated social cognition in patients with temporal (TLE) and frontal lobe epilepsy (FLE). The aim was to assess emotional recognition and empathy through tasks disregarding linguistic abilities (e.g. comprehension).

Method: TLE and FLE patients (n=14; n=12; mean age=37.9) completed a whole neuropsychological assessment, including a social cognition abilities evaluation:
• The Emotion Recognition Battery (ERB) (1), specifically the Facial Affect Naming sub-scale, in which patients had to indicate which verbal label best described the facial emotional expression of faces;
• The Awareness of Social Inference Test (TASIT), in which patients were presented with video clips and had to indicate the emotion conveyed by individuals' interaction;
• The Cambridge Sympathy Test (CST) (2), in which participants were shown photographs of people in various real-life situations; patients were instructed to rate sympathy and distress they experienced on a Likert scale;
• The Interpersonal Reactivity Index (IRI) and the Toronto Alexithymia Scale (TAS-20) for the self-assessment of empathic traits and alexithymia, respectively.

Results: Comparing individual patient's scores with a reference sample (3), we found defective performance in BREF (38,5% of the total sample), CST (30,8% of the total sample, 87.5% were TLE), TASIT, IRI (15,4% of the total sample) and TAS-20 (15,4% of the total sample, 100% FLE).
A significant difference between patients' groups emerged in the TAS-20, in which FLE obtained higher scores.

Discussion: Using tests requiring subjects to evaluate their own emotional affective state (e.g. CST), instead of self-reported questionnaires, revealed impaired empathic abilities, especially in TLE.
On the other hand, FLE patients showed difficulties in recognising and distinguishing their own emotions (e.g. TAS-20).

Conclusions: An extensive assessment of social cognition abilities might quantify the empathic and the affective difficulties observed in patients with frontal and temporal lesions.

Keywords: epilepsy, social cognition, empathy

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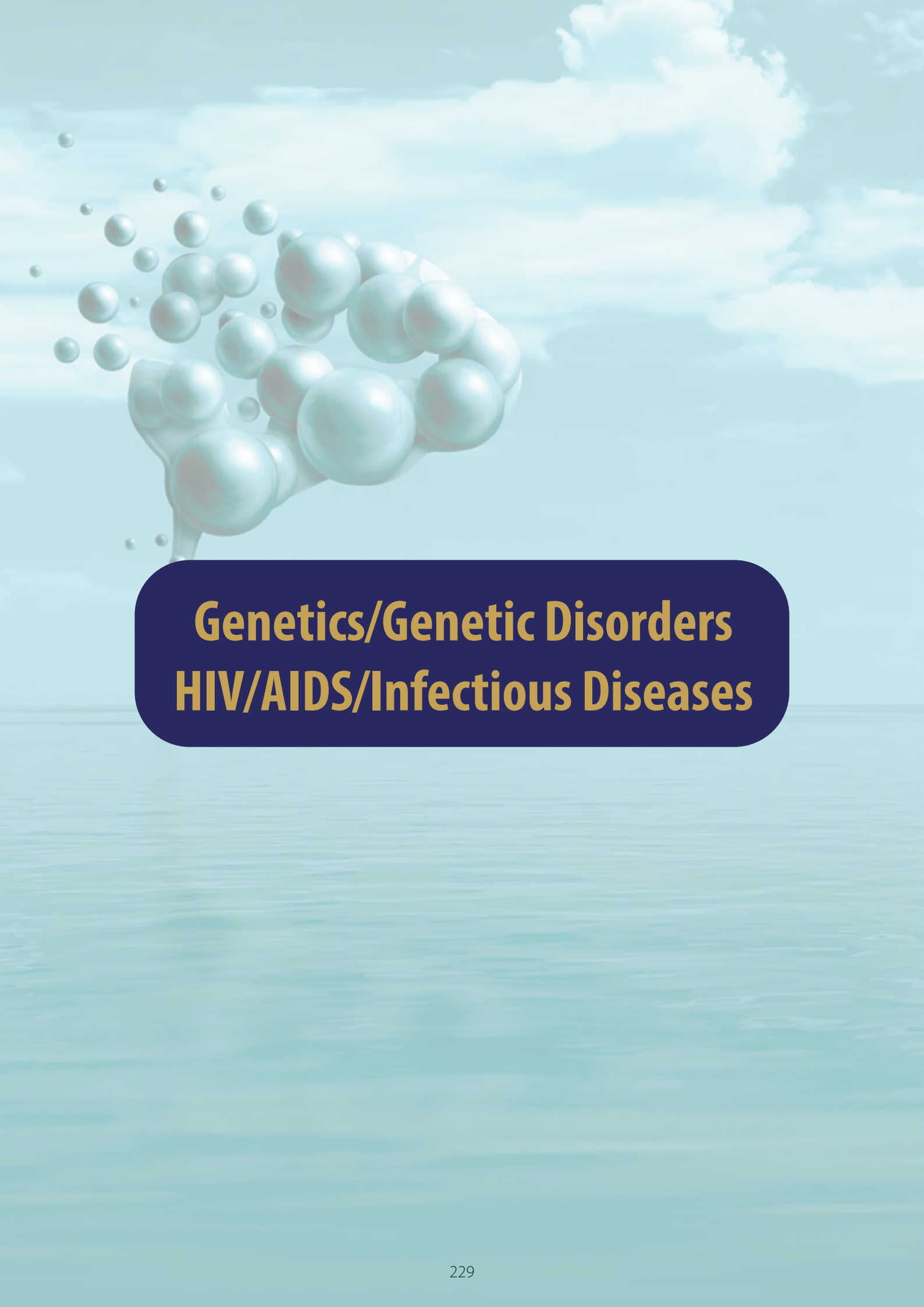

Genetics/Genetic Disorders
HIV/AIDS/Infectious Diseases

P047. The dynamics of change of cognitive functioning in patients in after SARS-CoV-2 infection

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Aims: SARS-CoV-2 may influence the level of cognitive functioning in patients regarding the domains (just to name a few) such as: attention, memory, executive or language functions. The aim of the presented study was to check the dynamics of change of the level of cognitive functioning during the time of around 5 months after the experienced infection.

Method: For the purpose of the study the remote neuropsychological assessment was conducted twice (with the gap of 3 months) with the usage of two parallel versions of The Brief Test of Adult Cognition by Telephone (BTACT) (Lachman et al., 2014). The clinical group included 219 participants (with good general health before Covid-19), the control – 80 with the majority of women (74%), aged between: 18-65, Polish.

Results: It has been proved that infection with SARS-CoV-2 lowers the level of cognitive functioning in comparison to the control group both in the first measurement in domains of episodic and working memory ($U=3138,0$, $p\leq0,001$) and inductive reasoning ($U=4129,0$, $p\leq0,001$) and in the second measurement in domains of speed processing and task switching/inhibition control ($U=1916,00$, $p=0,002$). With the second measurement the results of the clinical group increased significantly in domains of episodic ($Z= - 4,378$, $p\leq0,001$) and working memory ($Z=-3,157$, $p=0,002$).

Discussion: Presented study had typical limitations for remote neuropsychological assessment. Differences observed between the clinical and the control group and within the experimental group could possibly have more complex background than the infection itself (e.g stress connected with pandemic, isolation etc.), however undoubtfully showed the dynamics of change of the level of cognitive functioning within around 5 months after experiencing Covid-19.

Conclusions: Obtained results may contribute to better understanding of the essence of dynamics of neuropsychological disorders following SARS-CoV-2 infections and possibly give indications for the following interventions.

Keywords: SARS-CoV-2, cognitive functioning, longitudinal research

Mild Cognitive Impairment

P048. Effects of musical presentation on verbal working memory span in aging and Mild Cognitive Impairment: It goes with a swing

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Aims: By healthy aging, working (WM) and episodic memory (EM) are negatively affected. In amnestic mild cognitive impairment (aMCI), memory impairment typically occurs. Promising results of musical mnemonics on EM performance in Alzheimer's dementia (AD) have been found. However, effects of musical presentation of to-be-remembered verbal information on WM performance have not been studied in (a)MCI or AD. Especially in (a)MCI, musical mnemonics may benefit optimalisation of WM performance. Therefore, we examined the effects of musical presentation of digits on WM performance.

Method: 32 sequences of mono-syllabic digits in Dutch were pre-recorded in four conditions: sung to an unfamiliar pitch sequence with an added rhythmic pattern ("melody") or without ("pitch"), spoken with an unfamiliar rhythmic pattern ("rhythm") or without ("spoken"). Musical expertise was assessed using the Self-Report Inventory of the Goldsmiths Musical Sophistication Index. Thirty-two cognitively unimpaired older adults (OA) and 32 persons with aMCI participated.

Results: Rhythm facilitated performance in both groups ($p = .001$, $\eta p2 = .158$). Pitch ($p = .048$, $\eta p2 = .062$) and melody ($p = .012$, $\eta p2 = .098$) negatively affected performance in both groups. Musical expertise contributed positively ($p = .021$, $\eta p2 = .090$).

Discussion: Rhythm may be effective regardless of differences in WM performance, possibly facilitating chunking, enhancing WM performance. Pitch could possibly have increased stimulus complexity, resulting in WM overload. Musical expertise may have contributed to effective recall of musical mnemonics. We recommend future research of rhythmic presentation on WM performance in (a)MCI and AD.

Conclusions: We provide the first findings of rhythm facilitating WM in OA and aMCI to a similar extent, extending previous research in students and cognitively unimpaired young and OA. A rhythmically spoken presentation is recommended in designing a musical mnemonic, which may be a potentially helpful strategy for remembering some information for a short period of time.

Keywords: Working memory, Musical mnemonics, Mild Cognitive Impairment

P176. The performance on the Greek Version of MoCA mini protocol among AD-MCI and PD-MCI patients

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Aims: It has been demonstrated that the MoCA mini protocol is a valid and reliable cognitive screen for patients with stroke and transient ischemic attack. However, the clinical utility of the mini edition has not been examined in other clinical populations. The aim of this study was the age-and education-matched comparison of mini MoCA performance between AD-MCI and a PD-MCI patients.

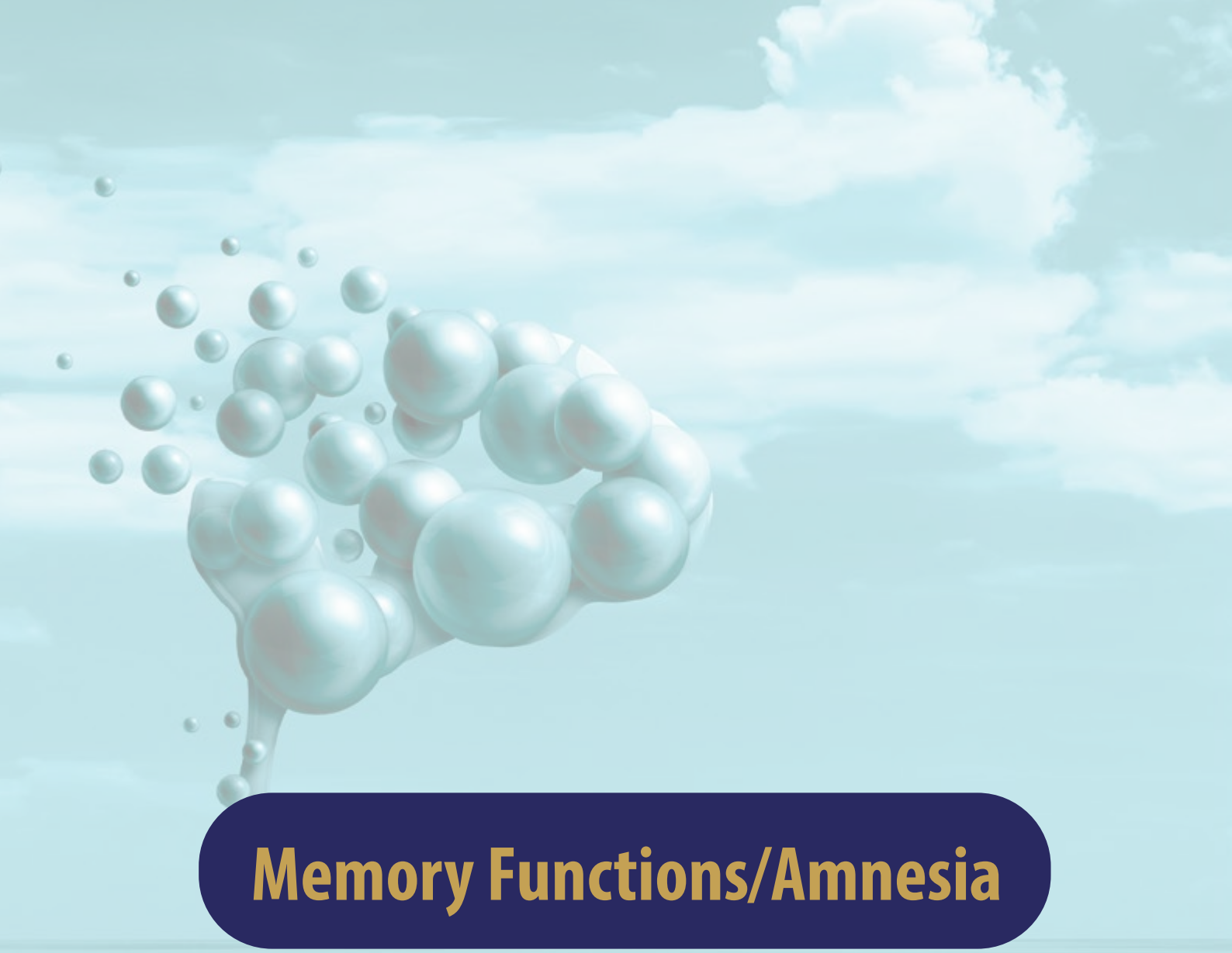
Method: A total of 68 patients were recruited from the Department of Neurology, Athens Naval Hospital. Based on neuroimaging and neuropsychological data, patients had a neurological diagnosis of AD-MCI (N = 29), and PD-MCI (N = 39). The Greek Version of the MoCA mini protocol was administered including four subscales were extracted from the original edition of MoCA; attention (1st trial of 5 words recall), executive function (phonemic verbal fluency), orientation and memory (2nd trial of 5 words delayed recall). Administration of the MoCA mini protocol took five minutes.

Results: Independent t – test results indicated significant differences among the two subgroups; PD-MCI patients had lower performances on attention and executive function measures, and AD-MCI group had lower scores on memory measure. Contrastingly, no significant difference was observed on orientation subscale.

Discussion: Our findings suggest that Greek Version of the mini MoCA reliably differentiates the performance of groups, and indicates distinct neuropsychological profiles which in line with the neuropathological patterns.

Conclusions: Mini MoCA is brief, free from motor and visual factors, and highly feasible for tele-administration. It could be a part of clinical evaluations in primary healthcare system as a sensitive cognitive screening measure targeting high-risk individuals for further neurological and neuropsychological investigation.

Keywords: mini MoCA, AD-MCI, PD-MCI



Memory Functions/Amnesia

P049. Eye-movements as proxy for memory deficits in daily situations: innovative neuropsychological assessment of visual working memory

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Aims: To estimate deficits in visual working memory (VWM) capacity following acquired brain injury, patients are generally asked to memorize an increasing number of briefly presented items, after which it is assessed how many items have been retained. Such tests disregard that in daily life information typically remains available in the external world. Instead of memorizing information we can easily sample information by making eye movements, using the environment as 'external memory'. Contrarily, when it is difficult to access external information, reliance on VWM storage increases1. This implies a cost-efficient trade-off between sampling and storing, in which the maximum VWM capacity might rarely be used when interacting with the environment. To assess whether memory deficits influence how patients employ this dynamic trade-off, we investigated the tendency to sample externally or store internally based on information availability and memory functioning.

Method: We compared gaze behaviour of individuals with Korsakoff's amnesia (n=24) and neurotypical controls (n=27) on a copy task that was designed to provoke different strategies (sampling versus storing).

Results: In general, amnesia patients sampled more often and longer as compared to controls. When sampling cost increased, both groups sampled less often but longer, which we interpreted as an attempt to memorize more information at once. Interestingly, patients sampled disproportionately more often than controls whilst also performing disproportionately worse.

Discussion: These results suggest that amnesia patients sample frequently, because they do not fully compensate for an increase in sampling costs by memorizing more at once.

Conclusions: Amnesia evokes a relatively heavy reliance on external sampling, even when sampling is costly. We identified naturalistic eye-movement biomarkers for subtle changes in memory usage that are not captured by assessing one's maximum storage capacity, but that rather occur in dynamic interaction with the environment.

Keywords: working memory, eye-movements, acquired brain injury

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P050. Amnesia and false memories: evidence from a multiple case study

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Aims: Amnesic syndrome is often related to the production of false memories (FM). False memories refer to recollections that are in some way distorted or, in extreme cases, they involve remembering events that never happened at all. We can distinguish different types of FM such as intrusions and false recognitions, commonly found during recall and recognition phases of memory tasks and confabulation, a particular symptom which consists of actions or verbal statements that are unintentionally incongruous to the patient's history background, present and future situation. Our aim is to investigate the relationship between different types of FM and the severity of amnesic syndrome, in amnesic patients of various neurological etiology.

Method: Confabulation are collected with the Confabulation Battery (Dalla Barba, 2018), which involves the retrieval of various kinds of information tapping episodic and semantic domains. The production of intrusions and false recognitions is assessed with the Free and Selective Cued Reminding Test (Grober & Buscke, 1988) a verbal episodic memory test, classically used in the neuropsychological evaluation.

Results: Our findings show that i) the production of intrusions is related to the severity of amnesic syndrome rather than to the production of confabulation, ii) confabulation is mostly related to the executive deficit rather to the severity of amnesic syndrome iii) the production of false recognitions is related to the presence of confabulation and executive deficit.

Discussion: These results show that various types of memory distortions are underpinned by different cognitive mechanisms in particular the severity of the amnesic syndrome and executive deficits.

Conclusions: A comprehensive assessment of FM seems crucial in amnesia for a better knowledge of different types of memory disorders and their impact on daily life.

Keywords: amnesia, false memories, confabulation

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P052. Nonverbal memory tests revisited: neuroanatomical correlates and differential influence of biasing cognitive functions

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Aims: The detection of right temporal lobe dysfunction with nonverbal memory tests has remained difficult in the past. Reasons for this might be the potential influence of other biasing cognitive functions such as executive functions or the verbalisability of nonverbal material. The aim of this study was to investigate three classic nonverbal memory tests by identifying their neuroanatomical correlates with lesion-symptom mapping (LSM) and by probing their independence from verbal encoding abilities and executive functions.

Method: In a cohort of 119 patients with first-time cerebrovascular accident, memory performance was assessed in the Nonverbal Learning and Memory Test for Routes (NLMTR), the Rey Complex Figure Test (RCFT), and the Visual Design Learning Test (VDLT). Calculating multivariate LSM, we identified crucial brain structures for these three nonverbal memory tests. Behavioural analyses were performed to assess the impact of executive functions and verbal encoding abilities with regression analyses and likelihood-ratio tests.

Results: LSM revealed for the RCFT mainly right-hemispheric frontal, insular, subcortical, and white matter structures and for the NLMTR right-hemispheric temporal (hippocampus), insular, subcortical, and white matter structures. The VDLT did not reach significance in LSM analyses. Behavioural results showed that amongst the three nonverbal memory tests the impact of executive functions was most pronounced for RCFT, and the impact of verbal encoding abilities was most important in VDLT. Likelihood-ratio tests confirmed that only for NLMTR did the goodness of fit not significantly improve by adding executive functions or verbal encoding abilities.

Conclusions: These results suggest that amongst the three nonverbal memory tests the NLMTR, as a spatial navigation test, could serve as the most suitable marker of right-hemispheric temporal lobe functioning, with the right hippocampus being involved only in this test. In addition, the behavioural results propose that only NLMTR seems mostly unaffected by executive functions and verbal encoding abilities.

Keywords: Nonverbal memory, lesion-symptom mapping, neuropsychological marker

Neuroimaging

P053. Subjective cognitive complaints and its associations to response inhibition and neural activation in patients with stress-related exhaustion disorder

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Aims: Stress-related exhaustion is associated with cognitive deficits, measured subjectively using questionnaires targeting everyday slips and failures or more objectively as performance on cognitive tests. Yet, only weak associations between subjective and objective cognitive measures in this group has been presented, theorized to reflect recruitment of compensational resources during cognitive testing. This explorative study investigated how subjectively reported symptoms of cognitive functioning and burnout levels relate to performance as well as neural activation during a response inhibition task.

Method: 56 patients diagnosed with stress-related exhaustion disorder (ED; ICD-10 code F43.8A) completed functional magnetic resonance imaging (fMRI) using a Flanker paradigm. To investigate associations between neural activity and subjective cognitive complaints (SCCs) and burnout, respectively, scores on the Prospective and retrospective memory questionnaire (PRMQ) and the Shirom-Melamed burnout questionnaire (SMBQ) were added as covariates of interest to a general linear model at the whole-brain level.

Results: PRMQ and SMBQ levels were largely uncorrelated with both task performance and BOLD-response in frontal brain regions. An association was observed between the PRMQ and stronger BOLD-response in an occipitally situated cluster comprising the cuneus and the superior occipital gyrus

Discussion: The results harmonize with previous research showing a weak relationship between subjective and objective cognitive measures in this clinical group. We propose that the correlation between SCCs and neural activity may indicate a slight compensational process at the level of basic visual attention which may go unnoticed in cognitive testing but are reflected in the experience of everyday cognitive failures.

Conclusions: The findings add to a general notion that the cognitive dysfunction experienced by this group is difficult to capture using the neuroimaging paradigm of the current study. Future confirmatory research should seek to validate the results by targeting the cuneus and the superior occipital gyrus as specific regions of interest.

Keywords: subjective cognitive complaints, response inhibition, stress-related exhaustion

P054. Dynamic causal modeling of cerebello-cerebral social mentalizing network: estimating the effective connectivity at rest

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Aims: The role of the cerebellum in social mentalizing has been recognized and the functional connectivity between cerebellar and cerebral mentalizing regions has been identified. Nevertheless, thus far very few studies have specified the directionality of the connections and inferred the causality of the underlying mechanism. Accordingly, the Dynamic Causal Modeling (DCM) has been used on task-related fMRI data of healthy subjects (HS) performing social mentalizing tasks, allowing to estimate the causal effective connectivity (EC) of cerebello-cerebral mentalizing networks, and revealing a mentalizing cerebello-cerebral closed-loop. On this basis, we applied DCM to resting-state fMRI data to test the EC within cerebello-cerebral mentalizing network in absence of experimental manipulations.

Method: Twenty HS [mean(SD) age=52.2 (6.13); M/F=7/13] underwent an MRI protocol at 3T (Magnetom Allegra, Siemens), including 3D T1-weighted and RS-fMRI scans. RS-fMRI data were pre-processed using SPM8 (http://www.fil.ion.ucl.ac.uk/spm/). By applying DCM, EC was tested between acknowledged mentalizing regions, namely the right cerebellar Crus II, the dorsal and ventral medial prefrontal cortex (dmPFC; vmPFC), bilateral Temporo-parietal junctions (TPJ) and Precuneus (Pcun).

Results: Surprisingly, we found unidirectional connections from the right cerebellum to contralateral Pcun, TPJ and dmPFC, thus showing no functional closed-loop at rest. Additionally, unidirectional connections were found within the cerebrum itself.

Discussion: These results are largely consistent with anatomical observations and previous DCM findings. Nevertheless, while a bidirectional EC within cerebello-cerebral closed-loop is detected in HS while performing social mentalizing tasks, this is the first study that show that unidirectional EC from the cerebellum to the cerebral mentalizing regions characterizes this intrinsic network at rest.

Conclusions: The present RS-fMRI data show that the EC between cerebellar and cerebral mentalizing regions is unidirectional at rest.

Keywords: cerebello-cortical causal connectivity, mentalizing

P055. Development of Two Parallel-forms of an Emotion Stimulation Paradigm: a Test-retest fMRI Study

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Aims: Emotion dysfunction constitutes a common trait among different neurodegenerative pathologies leading to a crescent interest in studying neural substrates of emotion stimulation through fMRI. In rehabilitation, the test-retest reliability of an fMRI task is fundamental to properly evaluate the effectiveness of treatment. Previous studies investigating the reliability of fMRI emotion-stimulation paradigm, indicated robust activation within visual areas but poor reliability within emotion-processing ones, ascribing the poor repeatability to neural response suppression of repeated stimulation1. In this framework, the present study proposed the development of two parallel-forms of an emotion-stimulation task and assessed test-retest reliability.

Method: Twenty-seven healthy subjects underwent a scan-rescan fMRI acquisition within 5 months, on a 3T Siemens Prisma scanner (gradient-echo sequence, TR/TE=2000/30ms). The paradigm consisted of a block-design including 4 conditions: positive, negative, and neutral stimuli, chosen from the International Affective Picture System, plus a crosshair fixation. The two parallel-forms were implemented by matching the stimuli for arousal and dominance. Preprocessing was performed on functional images using SPM12. The general linear model was used to contrast the different conditions among subjects and to perform a random effect analysis at group-level. A ROI-based approach was used to extract the average raw signal for each measurement (parallel-form) separately using MarsBars. To test repeatability, the intraclass correlation coefficient (ICC) was calculated using SPSS.

Results: Thirty and fifty ROIs were identified for the positive and negative conditions respectively, yielding good (0.6–0.74) to excellent (0.75–1) ICC within both visual and emotions-processing areas, such as the amygdala and hippocampus.

Discussion: The employed protocol proved to be robust also within emotion-processing areas besides visual ones. This could be ascribed to the use of two parallel forms.

Conclusions: This paradigm could be useful to overcome neural response suppression effects in test-retest paradigms used for the evaluation of treatment effects in clinical populations.

Keywords: emotions, fMRI, test-retest

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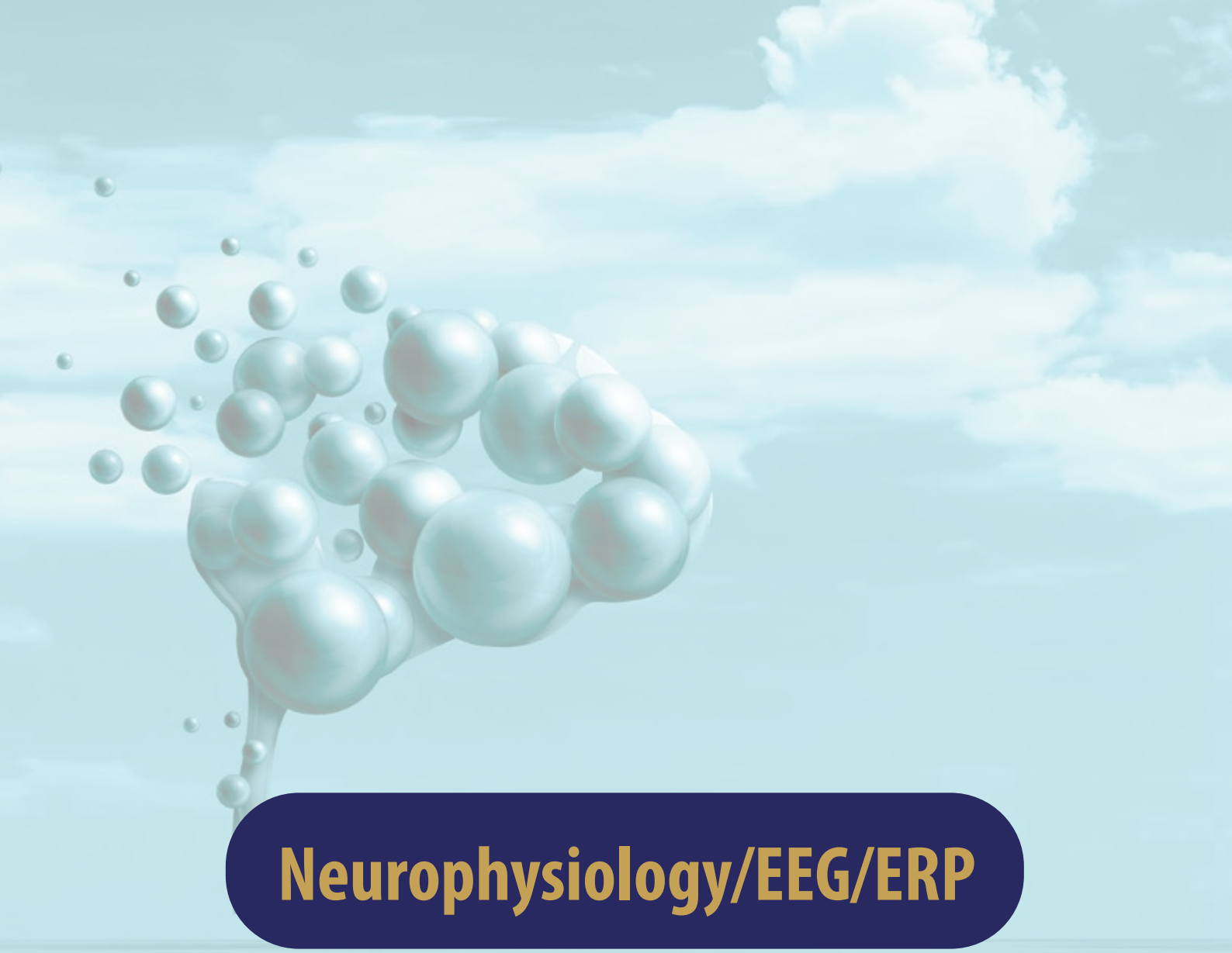

Neurophysiology/EEG/ERP

P056. Exploring the cerebral laterality of writing and its relationship to handedness: A functional transcranial Doppler ultrasound study

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Aims: For the majority of individuals, oral language is left-lateralized; this pattern can differ between left- and right-handers. The aim of this study was to compare the cerebral lateralization for written language between left- and right-handers.

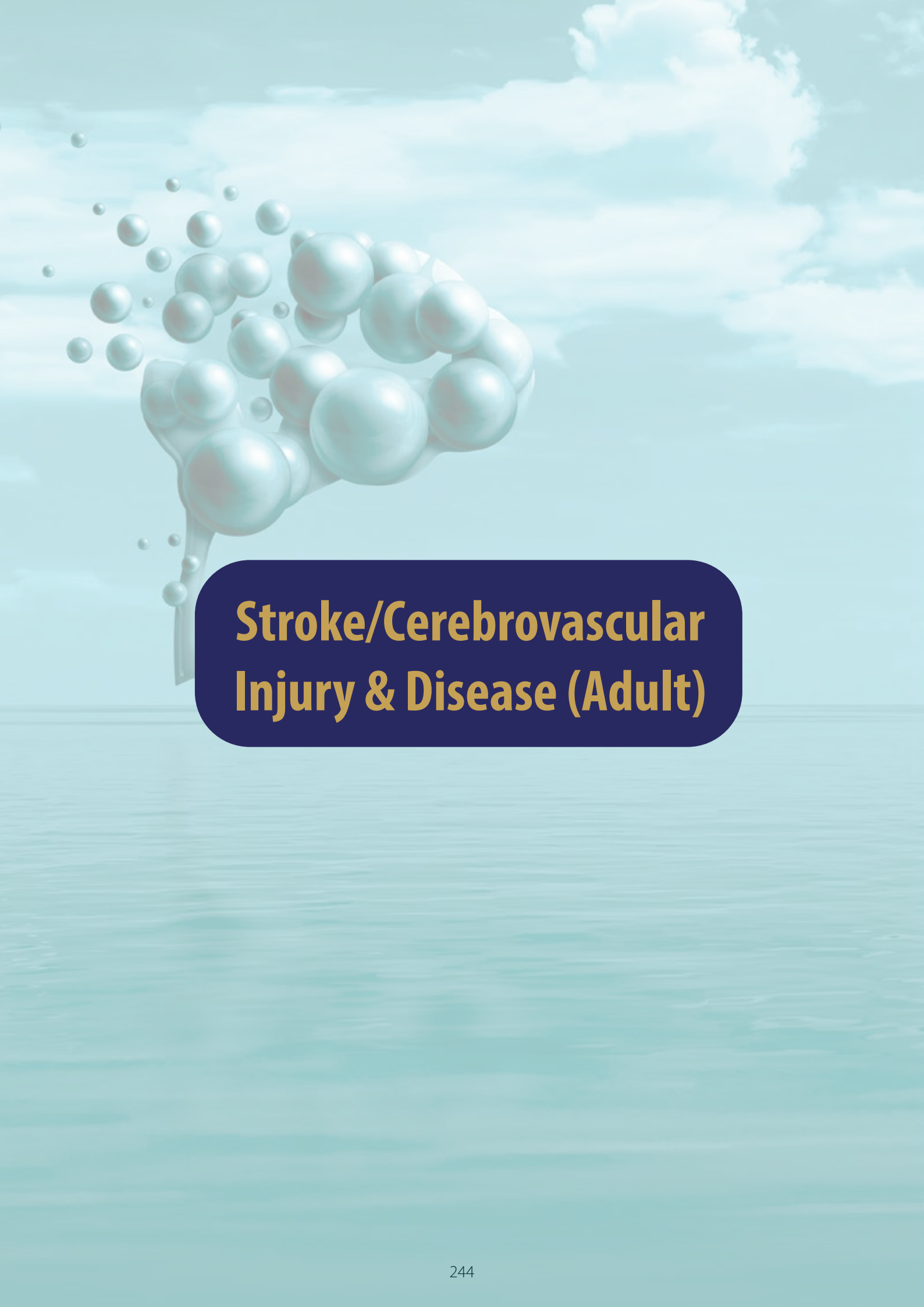
Method: Cerebral lateralization for 30 participants of each handedness group was assessed using functional Transcranial Doppler ultrasonography during three different tasks : (a) oral generation of words starting with a given letter, (b) written generation of words starting with a given letter, and (c) repeatedly copying a given letter (a control condition to isolate the motor component of writing). In addition to the three lateralization indices, one for each task, a forth index, corresponding to the linguistic component of writing, was calculated by subtracting the index for letter copying from the one for written word generation. Handedness was determined using the Edinburgh Handedness Inventory. To assess the quality of the evidence, we conducted Bayesian t-tests for independent groups.

Results: As expected, right-handers were left-lateralized for all tasks, while left-handers were -atypically- right-lateralized for all tasks, with lateralization for written word generation being most strongly lateralized. Of note, the lateralization index for the linguistic component of written language was close to zero and no difference was observed between the two handedness groups.

Discussion: Findings could indicate : (i) a real absence of a difference between handendess groups when it comes to the cerebral laterality for written language, (ii) that the control condition could not successfully isolate the motor movement (with higher linguistic processes also engaged in letter copying), or (iii) that the hand movement during writing introduces a ceiling effect on brain activation.

Conclusions : Written language is multifaceted with higher linguistic processes that remain to be explored. Handedness interplays with this complexity and should always be taken into consideration when it comes to cerebral lateralization.

Keywords: lateralization, writing, handedness



Stroke/Cerebrovascular Injury & Disease (Adult)

P057. This is not my body: covert disownership in acute stroke patients

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Aims: Disownership is a neuropsychological condition in which patients experience the feeling that one or more body parts do not belong to them anymore1. The syndrome is usually assessed with a semi-structured interview (overt disownership), but a more subtle form was detected using a non-declarative visual analogue scale2, i.e., "covert" disownership (CD). This study investigates the prevalence of CD, its association with concomitant deficits, and its neural correlates.

Method: 74 acute stroke patients (38 RBD, 34 LBD, 2 bilateral) and 34 healthy controls were recruited. Patients underwent clinical cognitive tests, including overt and CD measures. We also assessed hand functionality, using the Nine Hole Peg Test.

Results: Our preliminary results indicate that 4% of patients showed overt disownership and 27% CD. 12% presented with CD for the left upper limb following a right lesion; 6.8% for the right hand and 2.7% for the right arm, following a left lesion. We observed that 63.6% of patients with CD for the hand were also affected by personal neglect (26% for patients without CD), 60% by allocentric neglect (15.7% for patients without CD), 81.8% by egocentric neglect (44.4% for patients without CD) and 18.2% by anosognosia for illness (5.5% for patients without CD). Also, a trend suggested a correlation between disownership and functionality of the affected upper limb.

Discussion: Our preliminary data suggest that a more subtle form of disownership does exist in the acute phase after stroke, and seems related to the functionality of the upper limb and some associated neglect-related deficits.

Conclusions: Because a declarative standard interview may fail detecting the presence of disownership, a greater number of patients show CD in the acute phase after stroke, also for right body parts following a left-brain damage. Further analyses are needed to unveil the brain networks involved in this disorder.

Keywords: Bodily self-consciousness, disownership, acute stroke

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P058. Anosognosia for Unilateral Spatial Neglect: explicit and implicit knowledge of errors

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Aims: Patients with brain lesions are sometimes not aware of their neurological and cognitive deficits, and even deny their presence, a phenomenon called anosognosia (AN). Unilateral spatial neglect (USN) is a neuropsychological syndrome in which patients fail to pay attention and to represent the space contralateral to a brain lesion. Patients with USN clinically show a striking unawareness of their symptoms, but little is known about the mechanisms of AN for USN1. The aim of this study is to investigate the behavioural and neural characteristics of AN for USN. We explore if neglect patients, who are usually "explicitly" unaware, can show signs of "implicit" awareness of their spatial deficit.

Method: 22 right-brain-damaged stroke patients and 23 age-matched healthy participants were included. Patients were diagnosed with (n=10) or without (n=12) USN based on a full neuropsychological exam. All participants underwent a computerized Visual Search task, with targets present on the right or left part of the space. Each response was followed by an explicit evaluation of their own performance (i.e., Likert scale) while EEG was recorded. A sub-group of patients and control participants were selected based on their number of errors to investigate brain potentials elicited by error commission (Error Related Negativity, ERN2).

Results: Stroke patients without USN and healthy participants showed a correct explicit detection of their errors. USN patients were, as expected, explicitly unaware of their errors; moreover, unlike control participants, they did not show any ERN response to error commission.

Discussion: In this study, EEG is used as a measure of implicit awareness of errors. AN for USN seems characterised not only by an explicit, but also by an implicit unawareness of errors.

Conclusions: USN can bring about a general defective implicit and explicit monitoring processing of visuo-spatial performance.

Keywords: anosognosia, unilateral spatial neglect, error related negativity

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P162. Targeting phonology or semantics during alexia rehabilitation improves reading aloud response times and accuracy in individuals with chronic left hemisphere stroke

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Aims: Millions of people are living with aphasia, which impairs multiple aspects of language, including reading. Reading deficits in aphasia are prevalent and severely limit autonomy and reduce quality of life. There is currently no one standard approach to treating reading deficits, likely because of the variability in stroke lesion distribution leading to differences in cognitive sources of impairment. We investigated outcomes following a tailored reading treatment targeting primarily one information processing component (phonology or semantics).

Method: We modified two effective anomia treatments to target reading by focusing on written materials throughout treatment and using reading outcomes (reading aloud accuracy and response times (RT)) to measure treatment success. Four participants with a single chronic left-hemisphere stroke (Mage=59, SD=11.63, MWAB, AQ=66.93, SD=25.44) each received 60 hours of either phono-motor treatment (PMT)(1), aimed at rebuilding and strengthening damaged phonological neural networks, or Semantic Feature Analysis (SFA), which retrains word knowledge through co-activation of semantic information.

Results: Improved reading aloud accuracy from baseline to after treatment was evident in 3 of 4 participants illustrated by a significant interaction of assessment time by participant. Changes in RT varied (decreased after SFA and increased after PMT) and likely reflected individual reading strategies. For example, patient 1 showed longer RT during follow-up than baseline, which may represent increased focus on ortho-phonological parsing following PMT. In contrast, patient 4 had faster RT at follow-up, which may represent decreased reliance on letter-by-letter reading. For this patient, stimulus length had a significant effect on RT during baseline, but not follow-up testing.

Discussion - Discussion: Our preliminary data indicate that treatments targeting specific information processing components can be be effectively tailored to improve reading. In our study, one participant failed to improve, possibly due to a larger lesion. In addition to accuracy, we observed that analyzing RT can clarify individual reading strategies.

Keywords: Alexia, Stroke, Aphasia

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P163. Neuropsychology at the stroke unit – Must have?

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Aims: The Montreal Cognitive Assessment (MoCA) has become internationally established for the initial, rapid assessment of cognitive impairment following stroke. However, it underestimates the cognitive deficits of acute stroke patients. At the same time, standardized neuropsychological testing is usually only used in the post-acute phase or rehabilitation. As the aim of this study, we wanted to record how many patients are neuropsychologically impaired not only on the stroke unit, but above all during the course, but score normal on the MoCa.

Method: 31 patients after stroke were assessed between day one and day three on the stroke unit with the MoCA and a standardized neuropsychological examination (in 3 blocks of 30min) to compare the results and test their prognostic validity in a follow-up after six weeks.

Results: The MoCA assessed 17 of the 31 patients as normal and 14 as impaired. In the neuropsychological testing, all patients who were deficient according to MoCA showed deficits, and 15 patients who were supposedly not deficient showed moderate to severe neuropsychological deficits. At the follow-up examination, 75% of the patients assessed as inconspicuous according to MoCA showed persistent cognitive impairment, and 91.7% of the patients who were initially deficient in the MoCA also showed relevant deficits in neuropsychological follow-up.

Discussion: The MoCA is not sensitive enough to identify cognitive deficits. An extension by standardized neuropsychological procedures is needed, especially in the executive and memory functions.

Conclusions: Adequate assessment of cognitive performance in the stroke unit cannot be achieved with a creening procedure such as the MoCa alone but must be supplemented by standardized neuropsychological diagnostics. Neuropsychology at the stroke unit – Must have!

Keywords: Stroke Unit, neuropsychological assessment, MoCA

P164. Testing the Coping Hypothesis: Associations of Processing Speed and Attention with Mental Fatigue in Patients with Subarachnoid Hemorrhage

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Aims: This study investigates whether there are deficits in processing speed and attention in the subacute stage after subarachnoid hemorrhage (SAH). In case deficits are found, we aim to find out whether they are related to mental fatigue and subjective complaints.

Method: Neuropsychological assessment was performed five months post-SAH. Processing speed was assessed using the Trailmaking Test Part A (TMT-A) and Reaction Time tasks S1 (RTs1) and S2 (RTs2) of the Vienna Test System (VTS). Attention was assessed using the Trailmaking Test Part B (TMT-B) and Reaction Time task S3 (RTs3) and Determination Test (DT) of the VTS. 3 items of the Checklist for Cognitive and Emotional Consequences following stroke (CLCE-24) were used to measure subjective complaints in processing speed and attention. Mental fatigue was measured using the Dutch Multifactor Fatigue Scale (DMFS).

Results: 79 SAH patients were included. SAH patients scored significantly worse compared to the control group on all measures of processing speed and attention ($p < .05$). Worse performance on tests of processing speed and attention were related to increased mental fatigue. Worse performance on the RTs1, RTs2 and DT were related to more subjective complaints. A strong correlation between mental fatigue and subjective complaints was found ($r = .691$).

Discussion: These findings are in line with the coping hypothesis, which postulates that in order to compensate for reduced processing speed or attention, patients need to use more mental effort. This mental effort could subjectively be experienced by the patient as mental fatigue or as cognitive complaints.

Conclusions: For clinical practice, it is important to thoroughly assess processing speed and attention in order to alter interventions to the patients' individual needs and to ultimately improve mental fatigue and cognitive complaints.

Keywords: subarachnoid hemorrhage, information processing speed, mental fatigue

P165. Adapting to challenges: coping styles and distress in subarachnoid hemorrhage recovery

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Aims: To investigate the relationships between coping style, cognitive complaints, cognitive performance, and psychological factors 6 months post-SAH. Second, to investigate the influence of coping style on the prevalence of cognitive complaints 1-year after subarachnoid hemorrhage (SAH) and. Second,

Method: Coping style was assessed 6 months post-SAH with the Utrecht Coping List in 56 SAH patients. Coping profiles were divided into active (n = 24, 43%) versus passive/avoidant coping style (n = 32, 57%). The Checklist for Cognitive and Emotional Consequences following stroke was used to assess cognitive complaints 6 months (subacute stage) and 1-year (chronic stage) post-SAH. Furthermore, we examined cognitive performance (processing speed, memory, attention, executive functioning), mood, anxiety, and mental fatigue 6 months post-SAH.

Results: In the subacute stage post-SAH, patients with passive/avoidant coping had significantly higher depression ($p = 0.03$), anxiety ($p = 0.002$) and mental fatigue scores ($p = 0.03$) as compared to patients with active coping. No differences were found for cognitive deficits and cognitive complaints. In the chronic stage, however, SAH patients with passive/avoidant coping reported more cognitive complaints ($p = 0.03$) than patients with active coping. Also, number of cognitive complaints increased significantly between 6 months and 1-year post-SAH, only in the passive/avoidant group ($p = 0.01$).

Discussion: SAH patients with passive/avoidant coping report more symptoms of depression, anxiety, and mental fatigue in the subacute stage post-SAH as compared to SAH patients with active coping style. Interestingly, only in the chronic stage, patients with passive/avoidant coping reported more cognitive complaints. Also, SAH patients with passive/avoidant coping report more cognitive complaints over time.

Conclusions: The use of passive/avoidant coping styles could be related to the development of long-lasting complaints after SAH. Intervention programs that target reduction of these complaints should therefore take into account coping style of patients.

Keywords: stroke, coping, cognition

P166. The association of personality traits with poststroke fatigue in daily life: An exploratory experience sampling method and cross-sectional study

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Aims: Fatigue is a frequently occurring and persistent symptom after stroke. Many biological, psychosocial, and behavioral factors have been associated with poststroke fatigue, but research into associations with personality traits is relatively sparse. In this study, we explored whether personality traits were related to poststroke fatigue measured with conventional fatigue questionnaires as well as experience sampling methodology (ESM).

Method: Twenty-four individuals with stroke completed 10 daily questionnaires about momentary (here-and-now) fatigue for six consecutive days using the mHealth ESM application PsyMateTM. Further, they completed questionnaires assessing personality (NEO-FFI and LOR-T) and fatigue (FSS).

Results: Results showed that higher extraversion (ß=-.44, SE=.12, p=.001; 95% CI=-.67-.19) and optimism (ß=-.18, SE=.06, p=.007; 95% CI=-.30-.05) were associated with lower momentary fatigue. No association was found between neuroticism and momentary fatigue, but higher neuroticism (r=0.531, p=.008, 95% CI=.160-.759; r=.574, p=.003, 95% CI=.245-.767) was associated with higher scores on the retrospective FSS scales.

Discussion: This study aimed to investigate the relationship between poststroke fatigue in daily life and personality traits. We conclude that personality traits differentially influence poststroke fatigue, but this also depends on the way fatigue is measured (with retrospective or with momentary measures).

Conclusions: When functional gains are not in line with expected gains during the rehabilitation treatment of fatigue, it may be appropriate to take into account how person characteristics are related to momentary fatigue.

Keywords: poststroke fatigue, experience sampling method, personality traits

P167. Dyadic coping after stroke – A sorrow shared is a sorrow halved?

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Aims: Many stroke survivors suffer from chronic impairments that interfere with everyday life. These changes pose a challenge not only to the patients, but also to their partners who are confronted with taking over new tasks and roles (e.g., in care and support). When in a relationship, chronic illness requires coping reactions from both partners, so-called dyadic coping. According to the developmental-contextual model by Berg and Upchurch dyadic coping unfolds as a consequence of illness appraisal processes and determines both partners' illness adjustment. Successful dyadic coping usually correlates with positive relationship and individual outcomes. The present study aims to investigate longitudinal associations between stroke appraisal, dyadic coping, and adjustment in couples after stroke.

Method: A sample of 17 couples (stroke survivor and partner) participated in a survey 4 (t1), 12 (t2), and 18 months (t3) after the stroke. The perceived centrality of the stroke to one's life (Centrality of Event Scale) was assessed at t1, dyadic coping (Dyadic Coping Inventory) at t2, and quality of life (WHOQOL BREF) at t3. An actor-partner interdependence model (APIM) examined the longitudinal associations of these variables intra- and interpersonally.

Results: The higher the patients perceived the event centrality at t1, the more dyadic coping they reported at t2. Results for partners demonstrated a trend in the opposite direction. A positive association between dyadic coping and higher physical and psychological quality of life at t3 emerged only for partners, but not for patients.

Discussion: For partners of stroke patients, perceiving joint coping efforts significantly affects their quality of life, whereas patients' well-being might rather depend on other factors in this phase of recovery.

Conclusions: A dyadic perspective on coping after stroke allows to better understand illness adjustment processes and may present a relevant target for (couple) interventions.

Keywords: stroke, dyadic coping, APIM

P168. Using routine clinical brain imaging for lesion symptom mapping of domain-specific cognitive impairments in stroke

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Aims: This large-scale lesion-symptom mapping study set out to investigate the necessary neuro-anatomical sub-strates of 5 cognitive domains frequently affected post stroke: Language, Attention, Praxis, Number, and Memory. This study aimed to demonstrate the validity of using routine clinical brain imaging and standard bedside cognitive screening data from a large, real-world patient cohort for lesion-symptom mapping.

Method: Behavioural cognitive screening data from the Oxford Cognitive Screen and routine clinical neuroimaging from 573 acute patients was used in voxel-based lesion-symptom mapping analyses. Patients were classed as impaired or not on each of the subtests within 5 cognitive domains.

Results: Distinct patterns of lesion damage were associated with different domains. Language functions were associated with damage to left hemisphere fronto-temporal areas. Visuo-spatial functions were associated with damage to posterior occipital areas (Visual Field) and the right temporo-parietal region (Visual Neglect). Different memory impairments were linked to distinct voxel clusters within the left insular and opercular cortices. Deficits which were not associated with localised voxels (e.g. executive function, praxis) represent distributed, bilateral functions.

Discussion: The standardised, brief Oxford Cognitive Screen was able to reliably differentiate distinct neural correlates critically involved in supporting domain-specific cognitive abilities.

Conclusions: By demonstrating and replicating known brain anatomy correlates within real-life clinical cohorts using routinely collected scans and standard bedside screens, we open up VLSM techniques to a wealth of clinically relevant studies which can capitalise on using existing clinical data.

Keywords: Stroke, Cognition, LesionMapping

P169. The Novel Subtask-Specific Cognitive Impairments Predictive of Depression Severity Six-Months Post Stroke

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Aims: Domain-specific cognitive impairments are associated with depression amongst stroke survivors (1). It remains unclear whether specific subcomponents of cognitive domains (e.g., recognition, picture naming) predict depression. This study investigated which task-specific cognitive impairments predict depression severity.

Method: OCS-Recovery participants (N = 385) completed the Oxford Cognitive Screen (OCS) and the Hospital Anxiety and Depression Scale (HADS) six-months post-stroke. Multiple linear regression was performed to predict depression severity from impairments on the 5 OCS cognitive domains, which were further disaggregated to specific tasks within such domains where an association was found (10 OCS tasks).

Results: Only memory impairments (B = 1.09, p = .039, R2 = .08) and spatial attention impairments (B = 1.09, p = .032, R2 = .08) were mildly associated with depression severity. Language, executive function, numeracy, and praxis were not significantly associated with depression severity. When disaggregating memory domain subtasks, only episodic recognition impairments, and not orientation or verbal recognition impairments, significantly predicted depression severity (B = 1.78, p = .015, R2 = .02). Participants with episodic recognition memory impairments had significantly higher HADS-D scores (M = 7.22, SD = 3.96), than those without (M = 5.18, SD = 4.52), t(53.57) = -2.87, p = .005. In the domain of attention, visuo-spatial neglect asymmetries did not predict depression severity (ps > .05), though overall accuracy performance did (B = 1.95, p < .001, R2 = .04). Participants with spatial selective attention impairments were significantly more depressed (M = 6.56, SD = 4.29) than those without (M = 4.90, SD = 3.88), t(228.96) = -3.64, p < .001).

Discussion: These exploratory analyses suggest the importance of considering episodic recognition and selective attention impairments when developing accessible depression interventions for stroke survivors.

Conclusions: Domain-specific associations in memory and attention were most associated with depression severity 6 months post-stroke.

Keyword: Stroke, Cognitive Impairment, Depression

References:

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P170. Long-term cognitive outcome of working-age stroke patients

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Aims: The purpose of this study was to specify long-term cognitive changes of young stroke patients after the spontaneous recovery.

Method: A total of 20 working-age patients (Mage = 47,7, SD = 6,33) with relatively mild unilateral ischemic stroke and 17 matched control subjects participated in the study. Their cognitive status was assessed with several validated tests of attention (Trail Making Test, Bourdon-Wiersma Dot Cancellation Test), memory (WAIS-III Digit Span, Auditory Verbal Learning Test, Rey-Osterrieth Complex Figure) and executive abilities (Verbal Fluency, 5-Point Test) and with two novel tests developed to assess working memory (Comparisons Test) and processing speed (Circles Counting Test).

Results: The patients performance on average of 2,3 years post-stroke (SD = 1,26) was significantly lower in several tests assessing attention and verbal memory compared to control subjects. Analysis of individual patient profiles showed that in about one third of the patients the results were at least 1,5 SD below the mean of the control group in ≥ 4 different test performances.

Discussion: The study indicates that long-term cognitive outcome for most younger patients with relatively mild stroke is rather favorable although some of them might have more permanent cognitive dysfunction that is more likely to go unnoticed in healthcare. Cognitive impairment in turn might result in poor functional and emotional outcome as the daily life of younger adults is usually more demanding. The results are similar to those found in several previous studies although comparable extensive neuropsychological studies assessing the cognition after optimal time frame are lacking.

Conclusions: The study draws attention to the necessity of a more thorough neuropsychological assessment of younger patients with relatively mild stroke.

Keywords: young stroke, neuropsychological assessement, long-term cognitive outcome

P175. Social cognitive ability of mindreading in patients with stroke at subacute phase

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Aims: The aim of this study was to examine the effect of stroke on social cognitive ability of mindreading in particularly the understanding of another individual's feelings, and intentions from eyes.

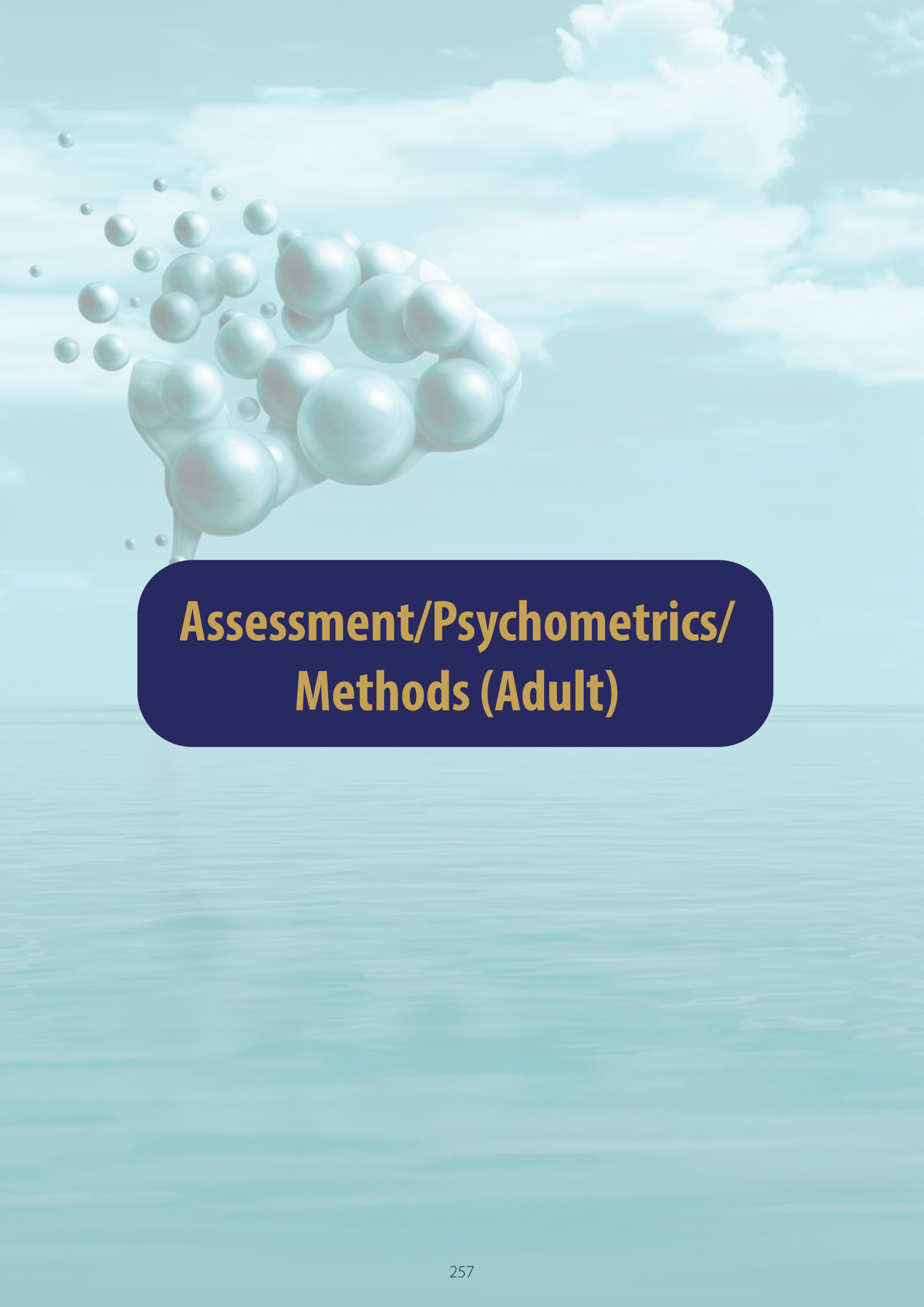
Method: A total of 22 inpatients admitted to the "THESEUS" Rehabilitation Center examined after an ischemic stroke event at subacute phase (13 right brain-damaged, 9 left brain-damaged) and compared with a matched group of healthy controls (HC, N = 20). The assessment of mindreading ability was conducted using The Reading the Mind in the Eyes Test (RMET) which captures the ability to identify mental states from gaze. Global cognitive status was evaluated with the Montreal Cognitive Assessment (MoCA).

Results: One-way Anova analysis showed that the stroke patients performed significantly worse on the RMET than HC. In contrast, there didn't exist any significant differences between RBD and LBD patients in their mindreading ability. RMET showed significant correlation with MoCA. Older age and low level of education were predictors of worse performance on the RMET.

Discussion: This study indicates that ischemic stroke at subacute phase has a negative effect on the mindreading of gaze displayed mental states and suggest that mindreading impairments manifest independently from the side of the brain damage. Furthermore, global cognitive status and demographic factors are related with these social cognitive difficulties.

Conclusions: Mindreading impairments are present in the subacute stroke, which may contribute to social cognitive deficits of patients with negative affect of their functioning. Assessment and rehabilitation of social cognition functions needs to be a key component of neuropsychological protocols in stroke patients at subacute phase.

Keywords: mindreading, social cognition, stroke



Assessment/Psychometrics/ Methods (Adult)

P059. A brief questionnaire to evaluate the semantic disorder in Alzheimer's disease: the "Mini SKQ" (Semantic Knowledge Questionnaire)

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Aims: It is now well-accepted that semantic memory disturbance is one of the first symptom in Alzheimer'disease (AD). However, this ability is not always investigated in the traditional neuropsychological assessment and is rather evaluated through non-specific semantic measurements. The objective of the Semantic Knowledge Questionnaire (SKQ) was to explore semantic impairment in AD patients. Proposed by Laiacona et al.[1], revised in a French version by Simoes Loureiro and Lefebvre[2], SKQ assesses some levels of hierarchy and attributes in semantic memory by the mean of 120 questions about 30 objects. The score for each question is 1 (expected answer) or 0 (error).
The objective of this work is to create a brief version of our SKQ, with the most discriminant questions to AD, in order to be easily used in clinical environment.

Method and results: We administered SKQ to 39 healthy senior (MMSE > or = 28) and 35 mild AD (MMSE>20). An item by item analysis were conducted to compare our groups in order to pick up the most differentiated items. 12 items discriminating both group at a level of significance of p=.001 (by a khi-square analysis) were selected (4 questions about intracategorical aspects; 4 questions about perceptual attributes and 4 questions about thematical/functional attributes). We also performed correlational analyses for non-parametric data (Kendall's Tau correlation) to ensure that the failure to these 12 items are well correlated with AD (p=.001). Finally, a Bravais-Pearson correlation analysis confirms the correlation between the score at mini-SKQ and the full version of SKQ (r=.992; p=.001).

Conclusions: The Mini-SKQ is a fast and easily administered questionnaire, adapted for screening semantic knowledge. The failure to the items of the mini-SKQ is highly correlated to AD. These first observations underline that mini-SKQ could potentially be attractive for screening semantic memory deterioration in a clinical use.

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P060. The importance of response times measures in three verbal fluency tasks

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Aims: Verbal fluency is a commonly used task in clinical and experimental neuropsychology. It refers to a person's ability to generate relevant words, according to phonemic or semantic criteria within a limited amount of time (usually 1 minute). The traditional measure of verbal fluency tasks is the number of correct responses, but recent research has provided additional quantitative and qualitative measures, which are more informative about the underlying cognitive processes that are employed. This research aimed to study the response times (first response latency) of the most common tasks and their possible correlation with educational level.

Method: Three common verbal fluency tasks (phonemic, semantic, excluded letter fluency) were administered to 44 healthy participants (aged 18 to 39 years old), divided in 2 groups, according to their educational level.

Results: The comparison of the 3 tasks indicated that semantic fluency had the shortest response time and excluded letter the longest ($Z = -5.35$, $p < 0.0005$). Furthermore, education appeared to have a statistically significant positive influence ($p < 0,05$) on the mean response times of the participants.

Discussion: These results constitute an underexamined way to investigate lexical organization and access in verbal fluency. Moreover, they indicate that education contributes not only in the overall performance, but also in response times.

Conclusions: Our findings highlighted firstly the fact that word retrieval according to initial letter differs significantly from word retrieval according to a semantic criterion and secondly the education's strong influence in an additional feature of verbal fluency tasks.

Keywords: verbal fluency, response times, lexical access

P061. Mini Linguistic State Examination: Preliminary Data of a Screening Tool for Primary Progressive Aphasia

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Aims: Preliminary data concerning the diagnostic potential of Mini Linguistic State Examination (MLSE) regarding the three variants of Primary Progressive Aphasia (PPA) - semantic, logopenic and agrammatic/non fluent- are to be presented. MLSE is a 15-minute screening tool for the categorization and monitoring of PPA, providing differential scoring profiles of the affected language domains.

Method: MLSE was translated and adapted to reflect the Greek linguistic and cultural characteristics. A small group (n=9) of already diagnosed patients (6 lvPPA, 2 nfPPA, 1 svPPA) with average symptoms duration of 3,67 years was blindly tested by trained psychologists to obtain preliminary data on the efficacy of MLSE in the PPA assessment.

Results: MLSE measures five key language domains. Motor Speech consists of 30 items (α=.95), Phonology of 28 (α=.84) following the exclusion of two items, Semantics consists of 20 items (α=.61), Syntax of 10 items (α=.82) and Working Memory of three items (α=.57) after removing one item. Kruskal-Wallis analyses were performed to detect differences in subjects' performance per domain in relation to diagnosis. No statistically significant differences were found between the three PPA subtypes (Motor Speech: H(2)=4.99, p=.08; Phonology: H(2)=1.50, p=.47; Semantics: H(2)=.97, p=.61; Syntax: H(2)=2.46, p=.29; Working Memory: H(2)=.31, p=.86).

Discussion: The five MLSE domains exhibit moderate to highly acceptable reliability. Despite the statistically insignificant results, MLSE succeeded in providing a comprehensive overview of the patients' language profile to the blinded clinicians, an outcome that emphasizes the clinical utility of the tool and allows the forecasting of encouraging results in the subsequent stages of the study.

Conclusions: The preliminary data, although not quantitatively confirming the ability of the test to differentiate between PPA variants, indicate patterns in their performance. Limitations include the small and improperly distributed number of patients across subtypes, along with the long interval between disease onset and study enrollment.

Keyword: PPA, Screening, MLSE

P062. EnVision - CP: Creating a test battery to assess visual perceptual functions in adults with cerebral palsy

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Aims: About 40-50% of children with cerebral palsy (CP) are estimated to have visual perceptual impairments. To date, no studies have focused on adults with CP. The aim of the current project was to develop a test battery suitable for assessing visual perceptual functions in adults with CP.

Method: We reviewed the child CP literature to identify visual perceptual functions that could be relevant to assess in an adult CP population. Suitable tests were identified for each function. Tests that are used in a clinical context and tests for which the response mode can be adapted for individuals with communicative challenges were prioritized. In addition, short screening tests were prioritized over in-depth tests to limit testing time.

Results: The process resulted in the pilot test battery for the EnVision-CP project. The battery includes assessment of sensory vision, oculomotor functions, and low- to high-level visual perception using published tests from e.g., Leuven Perceptual Organization Test and the Visual Object and Space Perception battery.

Discussion: The CP population is very heterogeneous with varying degrees of deficits within the motor, communication and cognitive areas. It is therefore difficult to find tests that are well suited for all participants. Very few tests are designed and validated to assess visual perceptual functions in adults with CP, so most tests identified for the project are designed for other populations.

Conclusions: The test battery can potentially be used to assess visual perception in adults with CP. A thorough pilot study is required to determine if it is suitable for an adult CP population.

Keywords: Cerebral palsy, visual perception, adults

P063. The Multi-Modal Evaluation of Sensory Sensitivity (MESSY): assessing sensory hypersensitivity after acquired brain injury

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Aims: Increased sensory sensitivity (sensory hypersensitivity) is a common symptom after acquired brain injury. Due to a lack of appropriate diagnostic tools these complaints are often missed by clinicians. In addition, to date, available scientific literature is limited to light and noise hypersensitivity after mild traumatic brain injury. This study aimed to investigate how prevalent sensory hypersensitivity is in other modalities and after other types of brain injury using a patient-friendly sensory sensitivity assessment.

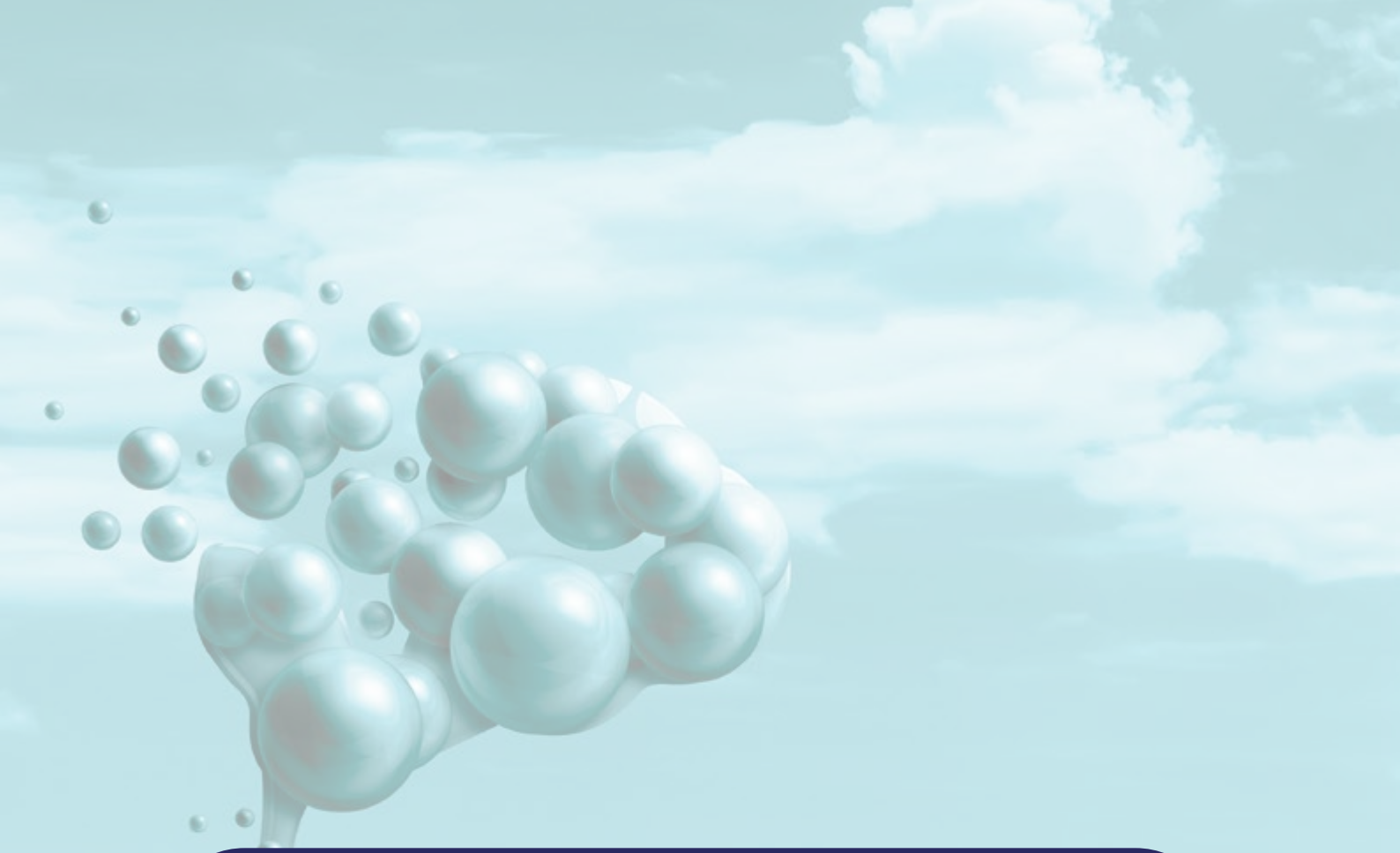
Method: We developed the Multi-Modal Evaluation of Sensory Sensitivity (MESSY), a questionnaire that assesses sensory sensitivity across multiple sensory modalities (visual, auditory, tactile, olfactory, gustatory, temperature, and motion sensitivity). 818 neurotypical adults and 341 adults with a chronic acquired brain injury (including stroke, traumatic brain injury, and brain tumour) completed the MESSY online.

Results: The MESSY had a high convergent validity (spearman rho correlation coefficient: .71), internal consistency (Cronbach alpha: .94), and test-retest reliability (spearman rho correlation coefficient: .84) in neurotypical adults. 76% of the stroke patients, 89% of the traumatic brain injury patients, and 82% of the brain tumour patients reported a post-injury increase in their sensory sensitivity (judged using open-ended questions). These complaints occurred across all modalities with multisensory, visual, and auditory hypersensitivity being the most prevalent. Patients with post-injury sensory hypersensitivity scored significantly higher on the multiple-choice items of the MESSY as compared to neurotypical adults and acquired brain injury patients without post-injury sensory hypersensitivity (across all sensory modalities).

Discussion: Sensory hypersensitivity is prevalent after different types of acquired brain injury as well as across several sensory modalities.

Conclusions: The MESSY provides a valid and reliable assessment of sensory sensitivity and can improve recognition of post-injury sensory hypersensitivity by clinicians as well as inspire further research.

Keywords: sensory hypersensitivity, acquired brain injury, assessment



Behavioral Neurology/Cerebral Lateralization/Callosal Studies

P064. Young Non-Alcoholic Wernicke Encephalopathy Patient Achieves Remission with Thiamine and Intensive Cognitive Rehab: A Success Story Post-Obesity Surgery

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Aims: To describe a patient with severe non-alcoholic Wernicke Encephalopathy who achieved remission following prolonged thiamine treatment. Wernicke Encephalopathy is an acute medical emergency caused by thiamine deficiency and if left untreated, it can result in chronic amnesia due to Korsakoff syndrome.

Method: A 25-year-old patient presented to the emergency department of a general hospital with symptoms of weakness, loss of sensation, ataxia, eye-movement disorders, and confusion. She had undergone obesity surgery (gastric sleeve) five months prior. After receiving thiamine treatment, she was transferred to a cognitive rehabilitation facility for young TBI patients, where her acute and later cognitive outcome was evaluated.

Results: Despite displaying the full symptoms of Wernicke Encephalopathy and being bedridden for at least one week before admission, the patient showed significant improvement following prolonged thiamine injections and intensive cognitive rehabilitation. She required minimal assistance during the day and was able to live independently. On examination, she showed signs of amnesia, but her overall cognitive functioning had significantly improved.

Discussion: Intensive cognitive and physical rehabilitation can result in a relatively optimized cognitive functioning and autonomy for young non-alcoholic Wernicke Encephalopathy patients.

Conclusions: Acute and intensive parenteral thiamine treatment combined with cognitive rehabilitation can alleviate the core symptoms of Wernicke Encephalopathy and lead to a superior outcome for young patients diagnosed with this condition.

P065. Cognitive functioning is associated with fine motor performance in persons with Parkinson's disease

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Aims: This study investigated if fine manipulative skills are affected by cognitive functions in persons with Parkinson's disease (PD).

Method: Participants with PD were recruited as a part of the iPARK study, a randomized controlled trial (ClinicalTrials) investigating the effects of cognitive training in persons with PD. Participants underwent extensive cognitive testing including a range of neuropsychological tests, tapping Executive functioning, Working memory, Episodic memory, Problem solving, and Processing speed. Here, baseline data from 84 persons with PD were analyzed respectively for most affected, least affected and both hands with linear regression using Purdue Pegboard performance as the dependent variable and the cognitive measures as independent variables. Age (mean 65.3) and gender (female=42%) were included as covariates in each model.

Results: The results showed that executive functions were significantly positively associated with Purdue Pegboard performance on the most affected side ($p=0.036$) but not on the least affected side ($p=0.094$). Processing speed was positively associated with Purdue pegboard performance on both sides ($p<0.001$ for both), while no significant associations were found for Working memory, Episodic memory and Problem solving.

Discussion: Poor manual dexterity and fine manipulative skills measured by Purdue Pegboard Test have been suggested to predict increased activities of daily life (ADL) dysfunction as well as cognitive decline in PD. Conversely, the present results suggest that intact cognitive functioning may support fine motor performance. This was particularly true for the more affected side. There is typically a motor symptom asymmetry in early stages of PD, connected to asymmetric dopaminergic degeneration. Since the performance of the more affected side mirrors increased dopaminergic degeneration, it could be that more cognitive control is required for planning and movement organization relative the less affected side.

Conclusions: Cognitive functioning influences fine motor performance in PD, especially at the more affected side. Possibly, cognitive training could have beneficial effects on motor symptoms.

Keywords: Parkinson's disease, Cognitive function, motor dysfunction

P066. Atypical brain functional segregation in people with situs inversus totalis: a replication-extension study

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Aims: Decades of neuroscientific research support the existence of a stereotypical functional division between the hemispheres. Usually, one hemisphere is dominant for speech and high-level processes involved in skilful manual action (praxis), while the other is dominant for face recognition and visuospatial processes. A previous study ran by our lab investigated whether this arrangement was reversed in situs inversus totalis (SIT), a rare condition in which the positioning of the internal organs is completely mirrored.

Method: People with SIT (N=15) and typical visceral asymmetry (situs solitus, SSO, N = 15) completed four fMRI tasks tapping into different lateralized functions (speech, praxis, spatial attention, and face recognition). While people with SIT showed similar population-level hemispheric dominance as SSO-controls, arrangements departing from the typical pattern of
hemispheric segregation were observed more often in SIT. The current study revisited the question whether hemispheric segregation is more variable in SIT by recruiting a new and
bigger sample (N = 20 SIT, N = 20 SSO), and once again using fMRI to determine hemispheric segregation involving the same four functions.

Results: The higher rate of atypical segregation in SIT was replicated. Moreover, by combining the new and the previous datasets, we could now reveal that this effect was driven almost entirely by a specific subpopulation whose SIT is idiopathic in origin. By contrast, patients with visceral reversal in the context of primary ciliary dyskinesia had similar rates of atypical segregation as controls.

Discussion: Unlike some other species, in humans the mechanisms for visceral and brain lateralization appear largely unrelated. Sporadic atypical functional lateralization, however, seems to be more prevalent in SIT (in particular when idiopathic in origin), suggesting their population bias towards typical functional segregation is more variable.

Conclusions: In humans the mechanisms for visceral and brain lateralization appear largely unrelated.

Keywords: situs inversus totalis, hemispheric functional segregation, brain laterality

Development/Standardization of Psychometric Tests

P087.Photo-based task for measuring affective empathy: development and psychometric properties

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Aims: Subjective empathetic response to a set of photorealistic stimuli was tested in a group of healthy responders with an aim to create simple unidimensional tool for assessment of affective empathy intended to complement other, composite measures.

Method: Twenty photos of people in distress (target scale) and 20 of people in neutral states (non-target) were selected from Wikimedia Commons (all under free-to-use license). B/W stimuli showed clearly visible facial expressions and situational context and were balanced by age, gender and ethnicity. An online, photo-based instrument was administered to convenient sample of adults (N=118; 50% female; 19-69 years old), with the instruction to answer 'How touching is this photo to you?' using five-point Likert scale.

Results: High internal consistency of the target (α=.89) and non-target scale (α=.94) was observed. In order to obtain reliable measure with fewer items, the scale was shortened using principal component analyses. Both 10-item target scale (α=.85) and 5-item non-target scale (α=.90) showed good reliability. The factor analyses of the short-form scale yielded two-factor solution. In comparison to males (M=3.70, SD=0.69), female participants (M=4.23, SD=0.59) had higher scores on the short-form target scale ($t(116)=4.45$, $p<.001$, $d=0.83$).

Discussion: A simple measure of empathy can be a useful complement to compound measures that often carry additional/unwanted load (i.e., by relying on high-level verbal skills). Besides the fact that plain non-verbal empathy measures are scarce in the literature, even the power of the photograph to generate strong affective response has been challenged due to its overuse in contemporary media (1). Our results suggest the opposite, while the data agree with another similar endeavor recently shared (2,3).

Conclusions: Using photographic stimuli that represent people in vulnerable states seems to be reliable supplement to commonly used measures of affective empathy.

Keywords: affective empathy, photorealistic stimuli

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P088. Greek normative data for the Symbol Digit Modalities Test

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Aims: The Symbol Digit Modalities Test (SDMT) is a substitution test, which was developed to measure psychomotor speed and is used to detect possible cerebral dysfunction in children and in adults. This study aimed to develop Greek normative performance data for the SDMT.

Method: The SDMT was administered as part of a broad neuropsychological battery to 266 healthy, community-dwelling individuals (118 males; minimum-maximum age: 16-86 years old; mean age: 44.60 years (SD=17.93); mean educational level: 13.3 years (SD=3.3); handedness right: 92.1%). All scores of SDMT (Written, Oral) were calculated. Multiple linear regression analyses were performed to explore the effect of demographic variables such as age, education, and sex on SDMT performance. The sample was divided into eight age groups: 16-22, 23-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-86 years and was further classified into three educational levels: 0-9, 10-12 and 13+ years.

Results: Multiple regression analyses revealed an effect of age and education on SDMT performance [Written: Age: $F(1,246)= 245,662$; $p<.001$; $B= -.590$; $R^2= .500$; Education:$F(1,246)= 166,610$; $p<.001$;$B= 2,897$; $R^2= .404$; Oral: Age: $F(1,246)= 220,913$; $p<.001$; $B= -.671$; $R^2= .473$; Education: $F(1,246)=157,274$; $p<.001$; $B= 3,329$; $R^2= .390$;]. Comparison of performance among age groups revealed significant differences in all SDMT scores ($p<.001$).

Discussion: Our findings confirm the strong relationship between age and education with SDMT performance and add to the ambivalent nature of the sex effect on the test. They also point out the utility of the development of SDMT norms for the Greek population.

Conclusions: The SDMT is among the most used neuropsychological tests in a global level. We present Greek normative data age and education corrected and available for use in the professional settings for neuropsychologists.

P089. The Dice Trail Test: A nonverbal version of the Trail Making Test for individuals with Down's Syndrome

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Aims: The Trail Making Test (TMT) is a commonly used instrument to assess cognitive flexibility but requires an understanding of the alphabetic and numeral system which limits its applicability for people with intellectual disability (ID). Here we examine the feasibility and validity of the newly developed Dice Trail Test (DTT) in Down's Syndrome (DS).

Method: In a first evaluation, we included 66 DS participants aged 8-57 years (younger and older children; younger and older adults) with mild to moderate ID and 66 typically developing age-matched controls. Participants connect dice according to the ascending number of dots (DDT-A) or alternate between dots and colors (DTT-B). A difference between both parts composes a flexibility score. We assessed convergent validity with the TMT as well as category switching and assessed divergent validity with the Boston Naming Test (BNT).

Results: DS participants with mild ID yielded higher odds for task completion (88%) compared to moderate ID (61%, OR = 4.31, $p < .05$). There was an interaction on completion time ($p < .001$, $\eta\_p\text{^}2 = .25$) between effects of DTT-condition (DTT-A vs. DTT-B) and group (DS vs. Controls): Prolonged completion time in DTT-B compared to DTT-A was observed, but this increase was more pronounced in DS compared to controls. Controlling for age, DTT flexibility in DS correlated moderately with category switching ($r = .43$) but not with BNT. There was also a moderate relationship between DTT flexibility and TMT in controls ($r = .33$). In DS, older adults showed higher flexibility in DTT compared to younger children ($p < .05$).

Discussion: Slower performance in DTT-B than DTT-A, distinguishability between groups and good convergent and divergent validity in DS support the test's usefulness.

Conclusions: Although limited in its applicability for moderate ID, DTT seems to be a valid tool to assess cognitive flexibility in DS.

Keywords: Down's Syndrome, Validation


Ethics

P090. Perception of ethical misconduct by neuropsychology professionals in Greece

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Aims: We aimed to identify perceived ethical misconduct in neuropsychology professionals in the country of Greece.

Method: This study originates from a international protocol which collected data for the status of neuropsychology in Greece. An online-based questionnaire was distributed between December 2019 to February 2020, investigating core areas of the profession, such as training, employment status, research and ethics. Out of a total 85 questions, 23 specifically inquired about ethical aspects of the specialty.

Results: A total of 133 self-identified neuropsychology professionals were included in the final sample. The majority of the respondents were women [(81%), (mean age 35 years)]. Ninety-four participants provided responses to the 21 questions of ethical misconduct. A high percentage (60.9%) affirmed knowing others who present themselves as neuropsychologists without having the proper training or expertise and 71.9% indicated knowing others who do not possess adequate training to work as neuropsychologists. More than half (53.5%) reported knowing colleagues who lack skills to work with patients coming from culturally diverse backgrounds, and a further 53.4% reported knowing professionals that appear as authors on publications without having made any significant contribution. Ethical misconduct regarding professional relationships were less reported by participants.

Discussion: The most commonly reported ethical lapses in our study were in the areas of training, skills and expertise. The next most frequently occurring unethical behaviors associated with clinical care provision and publications followed by misconduct within professional relationships.

Conclusions: The frequency with which neuropsychologists in Greece reported perceived ethical misconduct is a cause of major concern and reflect the lack of specialty-area certification in Greece which could provide guidelines for competency to enter the profession. This study can serve as a starting point to improve training on ethics and to enforce sound ethical practices for all interested parties and the field as a whole.

Executive Functions/ Frontal Lobes

P091. Molecular genetic structure of the Wisconsin card sorting test

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Aims: This study primarily aimed to explore possible associations between COMT, DRD2, and BDNF genes and Wisconsin Card Sorting Test performance. Assessing these phenotypes' molecular genetic associations could illuminate how DNA variation gives rise to individual differences in executive abilities.

Method: Molecular genetic analyses were performed on 404 twins. The sample was drawn from the Serbian Twin Registry (#7744418-GENIUS), a national, multidisciplinary twin database. For most twin pairs (96.8%), zygosity was determined via buccal swab DNA analysis. Trained researchers administered WCST the to the entire sample.

Results: Performance on the WCST revealed no significant differences between the three genotypes on COMT and DRD2. Significant main effects of BDNF genes were found on Non-Perseverative Errors, Trials to Complete the First Category, Failure to Maintain Set, Categorizing Efficiency, and the WCST factor score. After the correction for multiple testing, only Trials to Complete the First Category still showed significant main effects of BDNF genes. Carriers of the BDNF Met+ genotype exhibited better performance in cognitive functions compared to the BDNF Met- genotype.

Discussion: Although Non-Perseverative Errors, Trials to Complete the First Category, Failure to Maintain Set, and Categorizing Efficiency represent different WCST indicators, they may all constitute a unique aspect of executive functions. Since the total number of trials to complete the first category reflects the ability to switch from an incorrect sorting concept, which incorporates set shifting and response inhibition capacity, our finding is consistent with earlier studies reporting that Met carriers had higher average performance in non-hippocampal-based tasks, including the Go/NoGo response inhibition task and other executive tasks (e.g. ,the Stroop task), along with better nonverbal reasoning skills.

Conclusions: Our results contribute to growing evidence on BDNF's role in cognitive process regulation. The BDNF Met + genotype showed significant main effects on different WCST measures.

Keywords: executive functions, WCST, BDNF

P092. Conflict monitoring in bilingual speakers with Parkinson's disease: the role of language use

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Aims: The present study aimed at investigating the role of bilingualism on conflict monitoring and resolution in patients with Parkinson's diseases (PD). Specifically, we investigated the effect of active bilingualism (balanced use of the two languages and high language proficiency) could increase executive control efficiency compared to inactive bilingualism.

Method: 40 healthy controls and 30 patients with PD performed a Spatial Stroop task. The task required participants to respond according to the left/right direction of an arrow via pressing one of two keys. In the congruent condition, the direction of the arrow and its position on the screen relative to the target key was the same, while in the incongruent condition the direction of the arrow and its relative location was not the same. Participants were classified as being active or inactive bilinguals according to their language proficiency in Catalan and Spanish, age of second language acquisition, and frequency of language code-switching.

Results: First, PD patients were less accurate in performing the task than healthy controls, especially in the incongruent condition. Second, PD patients who were classified as being active bilinguals outperformed inactive bilingual patients and were significantly faster in the congruent condition. Third, the effect of bilingualism on participants' performance was explained by the level of language proficiency and the frequency of use of the two languages.

Discussion: The significant difference in processing congruent trials between the two bilingual groups of participants with PD suggests that active bilingualism enhances conflict monitoring, but not conflict resolution. This bilingualism effect was independent of occupation, educational level and job attainment.

Conclusions: Actively speaking two languages across lifespan is a protective factor against the decline of conflict monitoring in bilingual patients with PD. Future research should investigate the role of active bilingualism in other executive control processes affected by PD.

Keywords: bilingualism, conflict monitoring, Parkinson's disease

P093. Self- and parent-rated profiles of behavioral executive function in 17-year-old adolescents with a history of very preterm birth

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Aims: To assess whether very preterm (VPT) birth is associated with executive function (EF) problems in adolescence as compared to term birth. To compare self- and parent-rated EF profiles between the groups.

Method: A total of 88 VPT-born children (birth weight ≤ 1500 grams and/or < 32 gestational weeks) and 64 full-term born controls were assessed for behavioral EF using the Behavior Rating Inventory of Executive Function (Self-report and Parental questionnaire). This inventory includes eight subscales of which three relate to Behavioral Regulation Index (BRI), and five relate to Metacognition Index (MI). For VPT-born adolescents, a full-scale IQ was assessed using WISC-IV at 11 years.

Results: Preliminary results showed no significant difference in self-reported EF problems between the VPT-born and full-term adolescents (IQ ≥ 70 at 11 years of age). However, the parent-rated EF differed between the groups with higher rates of EF problems for VPT-born adolescents in the MI ($p = .016$), Inhibition ($p = .042$), Initiate ($p = .002$), Working memory ($p = .008$), Plan and organize ($p = .049$), and Monitor ($p = .016$) subscales.

Discussion: Our preliminary results are in line with previous research in showing that the behavioral EF problems of the VPT-born adolescents manifest especially in the subscales for metacognitive skills. [1,2] As previous research suggests, the behavioral EF problems are most evident in parental-rated profiles.[3]

Conclusions: Adolescents born VPT tend to rate their EF in self-reports as similar to that of their age-matched controls, but parent-ratings differ. The results suggest that, at adolescence, self-reports are recommended to be complemented by parental ratings to assess EF problems.

Keywords: very preterm born adolescents, executive function, behavioral rating scales

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P094. Characterising phonemic fluency by transfer learning with deep language models

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Aims: We aimed to produce the first comprehensive qualitative analysis of incorrect and correct words generated in a phonemic fluency task, in a large sample of patients with focal, unilateral frontal or posterior lesions and healthy controls.

Method: We conducted a detailed analysis of errors, low frequency words and clustering/switching on the phonemic ('S') fluency test, in a sample of 239 patients with focal, unilateral frontal or posterior lesions and 136 healthy controls. We further analysed patients' and healthy controls' responses by employing stochastic block modelling and transfer learning with Generative Pretrained Transformer 3 (GPT-3)-based deep language representations of the entire sequence of words generated by each patient and control. We then conducted predictive modelling to investigate whether deep language representations of word sequences significantly improved the accuracy of detecting presence/absence of frontal lesions using the phonemic fluency test.

Results: The error analysis revealed several novel findings: a non-lateralized frontal effect for profanities, left frontal effects for proper nouns and permutations and a left posterior effect for perseverations. Our analysis also revealed a left frontal effect for low frequency words. From our novel transfer learning approach two distinct communities emerged that contained a large number of frontal patients, both of which exhibited significantly lower overall S performance. Crucially, the most characteristic words in the first (left frontal) community tended to be profanities, proper nouns and low frequency words. Predictive modelling showed that a model incorporating GPT-3 derived word sequences predicted presence/absence of frontal lesions with far greater accuracy than other features.

Discussion: Our study reveals a characteristic pattern of phonemic fluency responses produced by patients with frontal lesions.

Conclusions: These findings demonstrate the significant inferential and diagnostic value of characterizing qualitative features of phonemic fluency performance using deep language modelling.

Keywords: Fluency; frontal lobes; machine learning

P095. Digital v. real-life Multiple Errands Tests: a mixed-method comparison of OxMET and MET-Home including feasibility & acceptability

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Aims: The Multiple Errands Test (MET) is a highly ecological test of executive dysfunction. The MET assesses problem solving within time and rule constraints in real-life tasks, and was recently standardised in an in-person (MET-Home) and computer-tablet (OxMET) context. We aimed to establish the feasibility and acceptability of both tasks and compare the two MET tests.

Method: 97 participants (47 moderate stroke, 50 healthy adults) were convenience sampled from the community. Stroke survivors were on average 515 days post-stroke. All were administered the OxMET and MET-Home and questionnaires on ADLs, depression, mobility & disability. We examined correlational associations between both METs. We assessed feasibility of who could attempt/complete either MET and what predicted completion/accuracy. Finally, we sought qualitative feedback from participants regarding both METs.

Results: The correlational analysis showed that MET-Home accuracy was significantly related to multiple OxMET metrics ($r>=.30$ & $p<.006$). Feasibility was be high for both tests, but especially for the OxMET. When controlling for age, education, sex, mobility, stroke severity, and disability; MET-Home completion was associated with mobility levels, whereas OxMET completion was associated with education and stroke severity. MET-home accuracy scores were associated with disability and stroke severity, but there were no significant associations with OxMET accuracy. Participants largely found the OxMET more acceptable than the MET-Home, but found the MET-Home more intellectually challenging.

Discussion: The OxMET had higher completion rates, and scores were independent of disability and stroke severity. In contrast, the MET-Home was found to be more stimulating by some, but also less acceptable by stroke survivors overall and required sufficient mobility to complete.

Conclusions: The study highlights that both MET task scores are moderately related, providing very good convergent validity. The OxMET digital administration provides a more acceptable and inclusive assessment, especially to people with mobility restrictions and more severe stroke.

Keywords: multiple errands test, mixed-methods, executive function

Forensic Neuropsychology/ Malingering

P096. Sub-optimal Effort and Over-report: The use of Performance Validity Test and Symptom Validity Test of Mentally Illness Offenders in Criminal Law

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Aims: This study's objectives are to 1) examine the construct validity of Performance Validity Test (PVT) and Symptom Validity Test (SVT), 2) determine whether offenders with mental illness who put in suboptimal effort (feign cognitive impairment) also over-report their symptoms (feigned psychopathology).

Method: A total of 62 participants met the inclusion criteria were referred in the legal process to undertake forensic psychiatric evaluations. Individualized testing was used to collect data for PVT using the Test of Memory Malingering (TOMM) to measure feigned memory impairment and SVT using the Thai version of the symptom validity test (SVT-Th) to measure feigned psychopathology.

Results: The results indicated that there was no statistically significant linear relationship between the PVT (TOMM) and SVT (SVT-Th) (r= -.093, p > .05), indicating that the construct validity was different (. Furthermore, there was no relationship between the suboptimal effort performance (TOMM score < 45) and over-report symptoms (SVT-Th score > 79) (x^2 (1, N =62) = .002, p > .05.), suggesting that feigned memory impairment and feigned psychopathology may not occur concurrently.

Discussion: The PVT's and SVT's constructs were proven to be conceptually distinct and consistent with the theory. Surprisingly, individuals who attempt to perform poorly on testing are not always faking being mentally ill or malingering. Unexpectedly, offenders are more likely to attempt to evade legal punishments by feigning cognitive abnormality while conducting psychological testing, which is performed with minimal effort to act as memory impairment and also over-reporting of psychotic symptoms such as delusions or hallucinations.

Conclusions: This evidence supports the concept that TOMM functions as PVT, whereas SVT-Th functions as SVT, and both constructs measure differently. On the other hand, not all instances of malingering occur concurrently in situations with suboptimal and exaggerated psychopathology. Consequently, one measure is determined for each individual and circumstance.

Keywords : sub-optimal effort, over-report, mentally illness offenders

P097. Performance Validity Tests: diverging effects of education on normal effort and malingering

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Aims: The study aimed: 1) to confirm the ability of two common stand-alone performance validity tests (PVTs) to detect malingering, and 2) to explore the effects of demographic characteristics on malingerers' performance.

Method: Test of Memory Malingering (TOMM) and Coin-in-the-Hand (CITH) test were applied to 121 healthy adults recruited in the community and 42 patients with diagnosis of an autoimmune disease with central nervous system involvement (AID group). Fifty-five healthy participants were asked to feign memory impairment (FMI group) and the remaining 66 healthy participants were asked to provide their normal effort (NE group) while performing the tests. Chi-square, Mann-Whiney, and Kruskal-Wallis were used for group comparisons. ROC curves and diagnostic statistics were performed to identify the best cut-off scores. Multiple logistic regressions were applied to explore demographic predictors of poorer malingering (i.e., ≤25 percentile of the distribution of the FMI sample).

Results: The best cut-off scores to differentiate FMI from NE were: CITH score <9 and TOMM Trial 1 <42, Trial 2 <45, and Retention <48. All cut-offs had a sensitivity and a specificity of 100%, except for TOMM Trial 1 which had a specificity of 98.5%. All AID participants scored above the cut-off on all measures (100% specificity) except TOMM Retention Trial (93.5% specificity). Within the FMI group, more years of education were related to higher scores on the CITH test and to lower scores on the TOMM Trials.

Discussion: Study results confirm the ability of two stand-alone performance validity tests to detect malingering in healthy individuals. These tools showed good clinical validity in a sample of neuroimmunological disorders of the central nervous system. Significant effects of education were observed on malingerers' performance. Though, the pattern of associations were task specific.

Conclusions: The strategies applied to feign memory impairment are affected by the individual's educational backgroup.

P098. Free-Standing Performance Validity Tests (PVTs) Have Higher Classification Accuracy in Examinees with Limited English Proficiency than Embedded Validity Indicators (EVIs)

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Aims: The present study compared the classification accuracy of free-standing PVTs and embedded validity indicators (EVIs) in a sample of Romanian undergraduates with limited English proficiency (LEP) using an experimental malingering (expMAL) paradigm.

Method: 95 participants (81 females; MAge = 23.4, SD = 5.3; MEducation = 14.7, SD = 2.0), were randomly assigned to the control (n = 65) or expMAL (n = 30) conditions and completed a battery of neuropsychological tests administered in English.

Results: Free-standing PVTs demonstrated the highest classification accuracies at previously published cutoffs (TOMM-1 ≤43: .77 sensitivity at .91 specificity; WCT ≤45: .67 sensitivity at .95; specificity; IOP-M ≤31: .80 sensitivity at .94 specificity). The signal detection profile of EVIs was more variable, ranging from excellent (D-KEFS Word Reading ACSS ≤6: .80 sensitivity at .94 specificity; HVLT-R Recognition Discriminability ≤9: .63 sensitivity at .97 specificity) to poor (Digit Span ACSS ≤6: .27 sensitivity at .94 specificity; TMT-A T ≤19: .23, sensitivity at .96 specificity).

Discussion: Free-standing PVTs based on the forced-choice paradigm demonstrated excellent classification accuracy regardless of verbal mediation levels. Cutoffs needed to be adjusted downward on several EVIs to reach acceptable specificity, indicating their sensitivity to the deleterious effects of LEP. The poor classification accuracies of the TMT need to be further explored in examinees with LEP.

Conclusions: Established cutoffs on free-standing PVTs performed well in this LEP sample. However, there was an inexplicable fluctuation in the classification accuracy of EVIs, indicating a need for future research before their widespread clinical application in patients with LEP.

Keywords : limited English proficiency, free-standing performance validity tests, embedded validity indicators

P099. Multivariate Models of Performance Validity: The Cumulative Risk of False Positive Errors Can be Effectively Controlled with Adjusted Cutoffs

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Aims: To empirically evaluate the risk of inflated false positive rate in multivariate models of performance validity tests (PVTs).

Method: Archival data were collected from 100 consecutively referred patients with TBI. The classification accuracy of embedded PVTs in groups of 5, 7, 9, 11 and 13 was evaluated against free-standing PVTs as criterion measures using two different aggregation methods.

Results: The traditional threshold of "≥2 PVT failures" did not reach .90 specificity when the number of PVTs was >5. However, adjusting the multivariate cutoffs achieved high (≥.90) specificity and correctly classified 92-96% of the overall sample.

Discussion: There is no such thing as "too much information" in performance validity assessment. High specificity can be maintained by adjusting the multivariate cutoffs as the number of PVTs in the model increases. There was a positive linear relationship between sensitivity and the number of PVTs in the model at comparable specificity levels.

Conclusions: Methodological artifacts (the purity of criterion groups, applying dichotomous versus multi-level cutoffs) do influence the classification accuracy of multivariate models of PVTs. However, the cumulative risk of false positive errors can be effectively controlled through the appropriate adjustment of multivariate cutoffs.

Keywords: forensic neuropsychology, performance validity assessment, multivariate models

P100. Twenty years of pre-trial assessment in offenders with suspected acquired brain injury

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Aims: Acquired brain injury (ABI) appears prevalent in the forensic population and may involve neuropsychological impairment resulting in reduced criminal responsibility, insufficient response to treatment and increased risk of recidivism(1). The current research aimed to explore the prevalence of ABI, cognitive functions and criminal behavior.

Method: This retrospective research is based on pre-trial mental health reports of adult offenders suspected of ABI or other neurological diseases, who were consecutively examined by forensic specialists at the request of the Dutch judiciary between 2003 and 2023. They underwent a pre-trial neuropsychological assessment, brain MRI scan, and behavioral neurological examination.

Results: The total sample consisted of 313 offenders, with a mean age of 47.5(SD=17.1), of whom 12.5% were female. Criminal behavior included violence(66.1%), sex offense(16.3%), property crime(14.7%), arson(7.7%) and other(12.5%). Structural brain abnormalities were detected in 59.1%, and included focal lesions due to ABI (23.3%), white matter lesions(19.8%), atrophy(16.6%), congenital brain abnormalities(4.8%), brain tumor(4.2%) and other(2.2%). Within the total sample, clinical neurological diagnoses included dysexecutive syndrome(21.1%), mild cognitive impairment(15.0%), dementia(10.2%), epilepsy(6.1%) and other(8.6%). Offenders with structural brain abnormalities were significantly older compared to offenders without structural brain abnormalities (52.8 vs. 39.7 years respectively, $p<.001$) and significantly more often showed impairment on a cognitive flexibility test($p=.043$). Having structural brain abnormalities seemed more likely for sex-offenders than for non-sex offenders, but not significantly (OR 1.63, 95% CI 0.86-3.10).

Discussion: During the prosecution, one should consider the presence of ABI and in case of suspected ABI perform neurodiagnostics. Furthermore, there is need for research within a general forensic population with longitudinal design to better understand the relationship between ABI, cognition and crime.

Conclusions: Structural brain abnormalities were found in nearly two-thirds of the current sample and therefore neurodiagnostics in offenders with suspected ABI or other neurological diseases is recommended to improve judicial decisions and treatment options.

Keywords: Forensic neuropsychology, brain injury, criminal behavior

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P101. Reconceptualizing persistent post-concussive syndrome (PCS) as a functional neurological symptom disorder (FND)

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Persistent post-concussive syndrome (PCS) is characterized by chronic and non-specific physical, cognitive, and emotional symptoms attributed to uncomplicated mild traumatic brain injury (mTBI). While often subjective, these sequelae can be significant enough to impair daily functioning and can lead to involvement in personal injury litigation or disability applications. We argue that PCS is in fact a special case of functional neurological symptom disorder (FND). This conceptualization re-examines the evidence regarding the etiology and maintenance of PCS symptoms through the lens of an FND diagnosis. More specifically, we propose that for certain individuals, the mTBI event acts as a trigger for chronic symptoms without clear etiology that are re-attributed to the injury. The associated cognitive deficits and somatic symptoms are inconsistent with neurological factors related to the mTBI. During neuropsychological assessment, PCS often presents as non-credible cognitive deficits and/or symptom report. The symptoms characterizing the clinical presentation and maintenance of PCS mirror those associated with FND symptoms. The relationship between PCS course and psychological factors (somatization in particular) further supports the notion of PCS as a functional disorder. Our hypothesis does not negate the influence of potential biopsychosocial factors (in fact, it attempts to integrate those) and is likely not applicable for every mTBI case, but rather argues that an FND framework offers the most parsimonious and plausible clinical conceptualization of the persistent, internally and neurologically inconsistent, and medically unexplained symptoms associated with a distinct minority of mTBI cases. We illustrate this model of PCS through several case studies. Given the inherent complexity of PCS, neuropsychologists have and will continue to play an important role in the evaluation and clinical management of such patients. The "PCS = FND" conceptualization offers potentially significant clinical insights into the diagnosis and treatment of PCS as well as future research directions with this population.

Keywords: uncomplicated mild traumatic brain injury (mTBI), functional neurological disorder (FND), post-concussive syndrome (PCS)

Inclusion and Diversity/ Multiculturalism

P102. Do normative data specific to Greek Australian older adults improve validity of neuropsychological assessment results?

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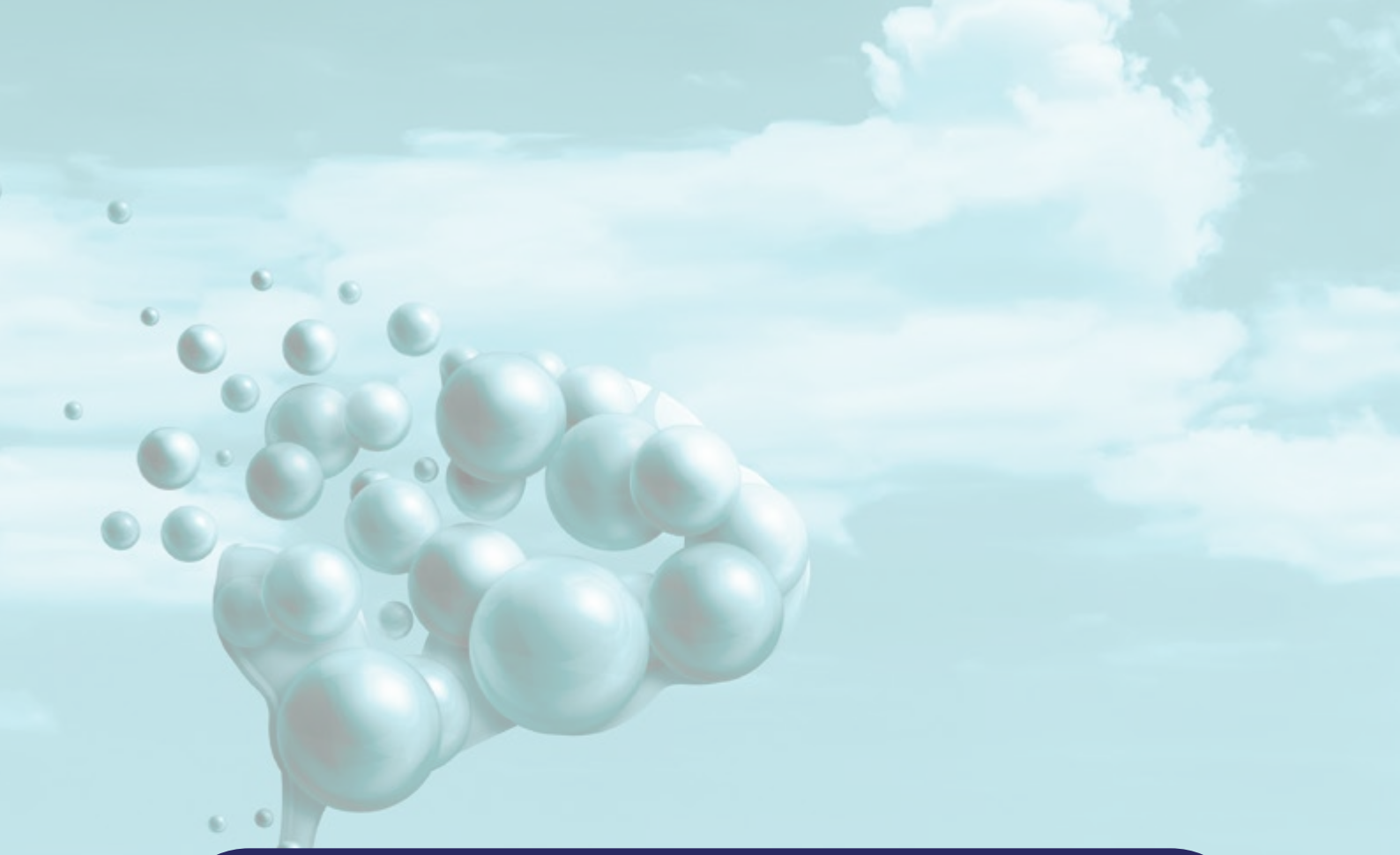
Aims: The aim of this study was to compare Greek Australian and mainstream normative data with regards to impairment rates they yield within a healthy Greek Australian older adult sample. We also examined whether optimal cut scores could be identified, capable of sensitively and specifically distinguishing between healthy Greek Australians from those with Alzheimer's disease (AD).

Method: Ninety healthy Greek Australian older adults and 20 demographically matched individuals with AD completed a range of neuropsychological measures, including the WAIS-IV GR, verbal and visual memory, confrontational naming, and executive functions. Normative distributions and impairment rates derived from the use of either Greek Australian norms or mainstream norms were calculated and compared. Receiver operative characteristics curve analysis was used to investigate sensitivity and specificity.

Results: Impairment rates derived from the Greek Australian norms showed that rates of impairment generally fell within the expected 15–16% range. In contrast, impairment rates for all tests derived using mainstream norms ranged from 22-74%. Comparisons between healthy and AD participants showed significant differences on all measures. Area under the curve results ranged from .721 to .999 across all measures, with most tests displaying excellent sensitivity and specificity.

Discussion: The application of mainstream norms within our Greek Australian sample resulted in higher impairment rates than would be expected for healthy individuals. In contrast, the use of demographically focused norms accurately classified neurologically healthy Greek Australian older adults. Finally, we were able to establish high sensitivity and specificity in our sample across a broad range of neuropsychological measures in distinguishing healthy participants from those with AD.

Conclusions: Mainstream norms were found to be inappropriate, potentially leading to erroneous diagnostic outcomes. Use of Greek Australian specific norms and cut points appear to partially ameliorate this issue. Clinical implications are discussed alongside future research directions.



Infectious Diseases/Encephalitis/ Meningitis (Incuding HIV/AIDS)

P103. Relation between eye movements metrics and cognitive performance in post-COVID condition individuals

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Aims: Neurodegenerative disorders affect eye movement control. Recent research suggests that individuals with post-Covid condition (PCC) and cognitive impairment may also have eye movement problems. We investigated the association between eye movement measures and cognition performance in PCC individuals.

Method: The sample included 65 individuals with PCC and 20 healthy controls. Eye movements were measured using an eye tracker (EyeLink 1000 Plus, SR-Research Ltd., Canada). Visual stimuli for pro/anti-saccades, smooth pursuit, and fixation tasks were provided on a computer monitor. The Stroop Color and Word Test (SCWT) was used to evaluate executive function and processing speed. Using Pearson's correlation coefficients, eye movement parameters were correlated with SCWT. Statistical analyses were performed in SPSS Statistics 18. The alpha level was p=0.05.

Results: Stroop-word significantly correlated with antisaccades peak velocity (r=0.301; p=.018) and mean amplitude of saccades during smooth pursuit (r=-0.294; p=.012); Stroop-color was related to prosaccades latency (r=-0.239; p=.045), antisaccades peak velocity (r=0.253; p=.048), mean amplitude of saccades during smooth pursuit (r=-0.251; p=.033) and fixation BCEA (Bivariate Contour Ellipse Area) (r=-0.238; p=.043). The Stroop color-words were significantly linked with prosaccades peak velocity (r=0.250; p=.036), antisaccades duration (r=-0.257; p=0.049), antisaccades amplitude (r=-0.321; p=.012), mean amplitude of saccades during smooth pursuit (r=-0.403; p0.001), and fixation BCEA (r=-0.288; p=.014).

Discussion: The associations between antisaccades and fixation could be related to the failure of PCC individuals to regulate cognitive interference. Other suggested associations involving prosaccades and smooth pursuit would be associated with slower mental processing.

Conclusions: The findings suggest that participants with PCC have eye movement impairments that may be attributable to impaired executive function and processing speed.

Keywords: eye movements, post-COVID condition, executive function, mental processing speed.

P104. The role of COVID-related neurocognitive symptoms, stigma and emotional functioning in long-term PTSD-like symptoms in COVID-positive sample

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Aims: Previous research has shown that the COVID-19 pandemic is related to increased levels of emotional distress, mental health problems and Post-Traumatic Stress Disorder (PTSD) symptoms. However, the long-term psychological impact in terms of PTSD symptoms has yet to be examined. The current study sought to identify factors associated with PTSD symptomatology among individuals that tested positive for COVID-19 during the pandemic in Poland.

Method: We conducted a prospective two-phase longitudinal study consisted of an online survey at approximately 4-months interval. A total of 1,707 participants were recruited, out of which 341 reported that they had at least one test for COVID-19 confirming the infection and participated in the second assessment. Participants filled out a set of questionnaires including Patient Health Questionnaire (PHQ-9), Generalised Anxiety Disorder Assessment (GAD-7) and Primary Care PTSD Screen for DSM-5 (PC-PTSD-5). Additionally, participants were asked to answer questions regarding COVID-related stigma and social support, experienced medical and neurocognitive COVID-19 symptoms as well as sociodemographic and medical data were obtained.

Results: Two hierarchical regressions were performed. Results revealed that emotional functioning and COVID-related stigma positively predicted PTSD-like symptoms longitudinally. Moreover, PTSD-like symptoms in the second assessment were negatively associated with education and positively associated with the intensity of neurocognitive symptoms and PTSD-like symptoms at phase 1.

Discussion: Results suggest that the subjective experience of COVID-related neurocognitive symptoms, stigma and emotional functioning during the pandemic play an important role in the development of long-COVID PTSD symptomatology.

Conclusions: Findings implicate that interventions to detect and counteract short- and long- term psychological consequences of the COVID-19 pandemic are necessary.

Keywords: COVID-19, PTSD, neurocognitive functioning

P105. Executive function is associated with the identification of odors in a sample of post-Covid condition individuals

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Aims: Olfactory dysfunction (OD) is an early indicator of degenerative illnesses of the central nervous system. OD is present in psychiatric and metabolic disorders and has been linked to executive dysfunction. OD is common in post-COVID-19 condition (PCC) patients, as are memory, processing speed, and executive function deficits. The mechanisms of long-term OD in COVID-19 and their potential links to cognition impairment are unknown. Our objective was to study the relationship between OD and executive function in PCC individuals.

Method: The sample comprises 75 PCC participants (63% female; mean age = 51.21, SD = 6.40; mean education = 13.80, SD = 3.50;). Olfactometry was performed with the Barcelona Olfactory Test (BOT-8). We obtained: odor detection, memory, and odor recognition. In addition, we used the Spanish version of the University of Pennsylvania Smell Identification Test (UPSIT). The executive function was evaluated using verbal fluency (phonetic and semantic), TMT-B, and the Stroop word-color Test. We did a correlation analysis between olfactory and executive function tests. Adjusting for age, sex, education, and depressive symptoms, a linear regression was performed to assess the impact of olfactory measures on executive function. The alpha level was set at p=0.05. Statistical analyses were performed in IBM SPSS Statistics 27.

Results: Stroop word-colors correlate with odor recognition (r = .28; p= .016) and UPSIT (r = .30; p = .017), and semantic fluency was related to UPSIT score (r = .27; p = .036). The linear regression model, which includes education (B =.36; p =.003), sex (B = -.25; p = .0033), and total UPSIT (B = .24; p = .0047), explains 23% of the variance of Stroop word-colors. Semantic fluency was not explained by any olfactory measure.

Conclusions: Poor executive function is associated with lower education level, female sex, and a decreased capacity to identify odors in PCC individuals.

Keywords: Post-COVID-19 condition; executive function; olfactory dysfunction

P106. Mental processing speed are related to the quality of life in individuals with the post-COVID condition

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Aims: Post-COVID-19 condition (PCC) patients have memory, mental processing speed and executive function deficits and a worse health-related quality of life (HRQoL). In neurodegenerative conditions, acquired brain damage or systemic disease such as lupus erythematosus, HRQoL has been related to depressive symptoms and cognition. We aimed to explore the relationship of cognitive functions on HRQoL in PCC individuals.

Method: The sample comprises 392 PCC participants. We administered the EurQol-5D-3L questionnaire to evaluate the HRQoL. We used the Rey Auditory verbal Learning Test (RAVLT) to assess memory, Digit symbol test to assess mental processing speed and the Stroop Color and Word Test to assess executive function. Depressive symptoms were assessed by Patient Health Questionnaire (PHQ-9) and fatigue with Chadler Fatigue Questionnaire (CFQ). Linear regression analyses were performed to estimate the impact of cognitive measures on the HRQoL, adjusting for age, sex, economic status, severity of COVID-19, days since the positive test, depressive symptoms, and fatigue. The alpha level was set at p=0.05. Statistical analyses were performed in IBM SPSS Statistics 27.

Results: Of the 392 PCC subjects, 216 were COVID-19 outpatients (79.2% female; mean age = 47.68, SD= 9.37), 86 were hospitalized (48.8% female, mean age = 53.86, SD= 8.84) and 88 were critical (ICU) (47.7% female; mean age = 52.29, SD= 8.14). The 48% of the variance of the EurQol was explained by a model containing PHQ-9 score (β = -.39; p =.0001), CFQ score (β = -.29; p =.0001), digit symbol score (β =.13; p =.002), sex (female) (β =-.09; p =.037) and days of evolution (β =-.08; p =.044).

Conclusions: Depressive symptoms, fatigue, lower mental processing speed, female sex and more days with the condition are related to poor HRQoL in PCC individuals. Cognitive rehabilitation could help improve the HRQoL of people with this condition.

Keywords: Post-COVID-19 condition; processing speed; health related quality of life.

P117. The specificity of anosognosia for hemianesthesia and anosognosia for body representation disorders after stroke

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Aims: After a stroke, patients are not always aware of their functional or cognitive deficits. Research into anosognosia previously found a dissociation between anosognosia for hemianesthesia (AHA) and anosognosia for hemiplegia (AHP) (Marcel et al., 2004). However, little is known about awareness of body representation disorders such as left-right disorientation and finger agnosia. The current study investigated whether a dissociation also exists between AHA and anosognosia for (structural) body representation disorders (ABRD).

Method: Performance of 69 patients on various somatosensory and body representation tasks was examined within two weeks after their stroke and compared to the patient's judgment of their performance. The somatosensory tasks assessed 2-point discrimination, touch sensitivity, and thermal discrimination, while left-right disorientation and finger agnosia were assessed for structural body representation disorders. A questionnaire was used to assess anosognosia. In addition, a standardized neuropsychological assessment was administered.

Results: All patients who were impaired on the structural body representation tasks were not aware of their impairment (27/27). In addition, most patients with tactile deficits also were not aware of them (26/39). However, three patients with hemianesthesia, who were aware of their tactile deficit, were not aware of their body representation impairment. This suggests a specific problem with awareness for body representation deficits. Performance on standardized neuropsychological tests did not predict either AHA or ABRD.

Discussion - Conclusions: These results show that a lack of awareness of somatosensory and body representation impairments is prevalent shortly after stroke. A single dissociation exists with ABRD occurring in some patients without AHA. These results are consistent with previous studies showing that awareness of a certain deficit can be impaired independent of awareness for other deficits.

Keywords: stroke, body representation, anosognosia

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P171. Side-specific implicit training of attentional allocation – implications for neglect rehabilitation

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Aims: Patients with spatial neglect have problems disengaging their attention from ipsilesional stimuli. Although this aspect of the neglect syndrome has long been described, no current treatment addresses this issue directly and side-specifically. In this study we propose a paradigm that could serve as such a training and we test – as a proof of concept – its effects on the attentional allocation of healthy participants.

Method: We trained 36 participants between 20 and 35 years of age in a spatial orienting paradigm in which cues on one side were predictive of the opposite side, while the cues on the opposite side were neutral. We then compared reaction times before, during, and after this training.

Results: We could show that (1) this side-specific training specifically accelerated attentional reorientation away from the predictive cues to the predicted location, (2) this effect persisted even when cues became unpredictive again, (3) it could be achieved implicitly, i.e., without the participants' knowledge of the true cue-target-relationship, and (4) it relied – as intended – on the learning of the cue's predictiveness of the target location and not on pure target occurrence probabilities.

Discussion: This side-specificity in the training is of special interest, as it has methodological as well as potential therapeutic advantages. Training participants side-specifically allowed us to predict a lateral asymmetry in attentional processes and reaction time data which we were able to test within participants, reducing possible confounding factors like unspecific training effects and between-person differences. Furthermore, side-specific attentional training might provide the opportunity to counteract lateral spatial biases such as in the neglect syndrome.

Conclusions: Our results not only contribute to the knowledge about the spatial orienting of attention but might also form the basis for a new treatment approach for patients with spatial neglect.

Keywords: Attention, Spatial orienting paradigm, Unilateral spatial neglect

P172. One-year longitudinal decline in spatial location memory in Huntington's disease

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Aims: Deficits in visuo-spatial short-term memory have been associated with Huntington's disease (HD) (Glikmann-Johnston et al, 2019). We assessed the validity and sensitivity for detecting cognitive decline of the Object-Location memory test adapted from Pertzov et al. (2012).

Method: Seventy HD and 35 controls participants were included in this study. A subgroup of 58 HD and 36 controls participants completed the test again after one year. The task consisted of the presentation of 1 to 5 images for 1 to 5 seconds. After a 1 second blank, an object identification task was introduced. Using the mouse, the participant had to select the target image from a distractor and move it to its initial location. Error location was measured by the distance between the "true" and the "choice" locations. We analyzed whether their reports were grouped around locations of the other images in the array (swap errors).

Results: At baseline, HD participants performed worse than controls on all measures for the long span condition (4 and 5 images). After one-year, location distance significantly increased in the long span condition in HD patients. It was associated with a higher rate of locations close to the distractors. No longitudinal changes were observed in the controls. Performance and decline in these spatial measures were correlated with traditional cognitive and disease progression ones.

Discussion: The Object-Location memory test provides an objective cognitive tool to assess overall HD disease state. HD participants have a differential longitudinal decline in memory for object-location information, with a degradation of the link between identity and location in visuo-spatial working memory in the case of high memory load.

Conclusions: Spatial memory is relevant to the cognitive phenotype of HD. Performance over time in this test might be a cognitive endpoint for use in clinical follow-up.

Keywords: Huntington's disease, spatial working memory, longitudinal follow-up

P173. 3-year-follow up of the recovery process until return to work in patient post stroke with initially severe spatial neglect

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Aims: Disorder of attention network, including spatial neglect, often remains even after getting back to daily living and would largely affect return-to-work (RTW) in patients post stroke. This case report aimed to precisely describe the 3-year of recovery process until RTW in a patient with initially severe spatial neglect.

Method: The case was 59 years-old male who suffered right hemorrhage with severe spatial neglect in subacute phase. We followed over 3 years until his RTW. In addition to the Behavioral Inattention Test (BIT) and Catherine Bergego Scale (CBS), PC based reaction task (reach task and gaze task) and Free viewing task (@Attention; Creact Corp., Tokyo) were performed to evaluate the recovery process.

Results: One month after onset, he had severe spatial neglect (BIT9/146, CBS25/30). Six months after onset, BIT score improved to 137/146, but he still failed to detect many targets located in left space in the reach reaction task. While gaze distribution tended to shift to the right space during free viewing task, the patient began to show leftward gaze shift before stimulus onset during gaze reaction task. At the time of twenty-four months after onset, the patient showed remarkable leftward gaze shift in the free viewing and the gaze reaction task, those presumably depended on the awareness for neglect symptoms. Since intentional gaze shift to neglected space would make fatigue and much effort (CBS3/30), we attempted to optimize the compensatory strategy. Thirty-eight months after onset, reaction time toward left space was improved, and the extent of leftward gaze shift seemed to be optimized. And then, he could RTW.

Discussion & Conclusions: The recovery process in this patient involved not only functional recovery but also a time-dependent alteration of the compensatory strategies. Detailed description of such case would provide useful information for rehabilitation of stroke patients with spatial neglect.

Keywords: spatial neglect, recovery process, eyetracking

P174. Preserved abstract spatial knowledge and impaired navigation in a blind patient

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We studied a 67-year-old right-handed man, blind since the age of 30, who, after a traumatic brain injury (TBI) lost his spatial navigation ability, while maintaining preserved spatial knowledge. In sighted people, vision can compensate for impaired navigation skills. In our patient, the lack of vision made impossible this type of compensation, thus revealing the non-visual components of spatial navigation. We assessed the patient 21 months post-TBI when he could find his way successfully within a 600m radius of his house, but he was still unable to navigate in less familiar environments. We devised ad hoc experiments, in which we asked the patient to follow several known routes and to learn new routes. The patient was able to localize correctly his right and his left, as well as forward and backward, but deviated unpredictably to the right or to the left during walking, a difficulty he did not experience pre-TBI. When asked to turn around, he often performed incomplete rotations. The patient was able to find his way only when semantic information or relevant landmarks were verbally indicated. Yet, he was able to accurately describe the corresponding routes during path-planning. He also complained of post-TBI difficulties in time estimation. Structural MRI revealed contusions in the right hemisphere, mainly involving the superior, middle and inferior temporal gyri, encroaching upon the hippocampal and parahippocampal regions. White matter tractography showed complete disconnection of the right inferior fronto-occipital and inferior longitudinal fasciculi, and partial disconnection of the right portions of the splenium of the corpus callosum. The retrosplenial cortex and the cingulum bundle were spared. We suggest that the present case study could be an important step forward in understanding non-visual navigation, its deficits, and its neural underpinnings in the human brain.

Medical/Neurological Disorders (Adult)

P107. Cognitive, physical, and emotional sequelae after COVID-19 infection: Preliminary data

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Aims: With neurological and psychiatric manifestations being a common SARS-CoV-2 infection aftermath, we aimed to explore probable post-COVID-19 cognitive changes in healthy Greek adults, in association with subjective cognitive complaints, quality of life, and illness variables.

Method: Sixty-two healthy adults (47 women, 21-63 years old, M=39.81, SD=15.99) diagnosed with COVID-19 up to 8 months ago underwent thorough neuropsychological evaluation. Data were collected on symptoms severity, quality of life, sleep, fatigue, and depression after the infection.

Results: Among the participants 14.5% reported change in cognitive functioning. Global Pittsburgh Sleep Quality Index was indicative of poor sleep (M= 6.18, SD= 3.8), while 31.6% surpassed the cutoff for excessive fatigue. No systematic deviations from normative data were observed. However, verbal learning was associated with depression (r= -.25, p<.05), whereas (visual and verbal) delayed recall was associated with fatigue severity (r=-.37, r=-.26, p<.05 respectively). Time since diagnosis accounted for 9.8% of variance on TMT-B ($F(1, 60)= 6.511$, p=.013). Subjective cognitive change was associated with ongoing disease symptoms (r= .45, p<.001), depression (r= .36, p<.01), sleep quality (r= .31, p<.05) and general health (r= -.29, p<.05), while self-reported cognitive deficits at the time of the assessment were negatively correlated with delayed visual, immediate and delayed verbal recall (r= -.27, -.26, -.32, p<.05).

Discussion: Although no cognitive deficits were detected, objective and subjective measures were associated with depression, fatigue and quality of life highlighting the multidimensional imprint of COVID-19. Fatigue, sleep disorders and mood alterations are identified as a prevalent impact, stressing the lingering consequences of COVID-19 on everyday functioning.

Conclusions: These persistent effects primarily on memory and executive functioning underline the cognitive toll of SARS-CoV-2 and sketch a profile of physical and cognitive exhaustion in otherwise healthy individuals. Thorough evaluations of a larger sample will elucidate the relationships proposed by our preliminary data.

Keywords: COVID-19, cognitive impairment, neuropsychological assessment

P108. Simulation of pain: Integrating an eye tracker with the Numerical Pain Rating Scale (NPRS)

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Aims: The use of Numerical Pain Rating Scale (NPRS) is common when evaluating pain. We recently integrated an eye tracker with the NPRS (NPRSETI) as a mean to enable pain evaluation for patients with major motor disabilities. The current study evaluated the utility of the NPRSETI to aid in detecting feigned pain.

Method: Pain clinic outpatients (N = 90) were randomly assigned to either a simulation (i.e., instruction to feign pain above that which they experience) or control condition. They filled both the NPRS and NPRSETI (order was pseudo-randomized). The latter utilized a portable eye tracker (EyeLink Portable Duo, SR-Research) to assess gaze direction and additional eye movement measures of interest. Participants also performed a digit span task and filled a debriefing survey.

Results: As expected, simulators rated their pain as stronger than controls. There were no significant group differences in time spent in areas of interest (AOIs), such as the AOI of the instructions, pain scale, etc. However, the groups differed in their first fixations; simulators first fixated at their chosen pain ratings (~7–8) and later gazed at lower pain ratings (~5). Controls in contrast maintained their fixations around their genuine pain ratings (~5).

Discussion: The study's findings support the usability of the eye-tracker integrated NPRS. They also suggest that after their first fixations simulators gaze at the proximity of their true pain ratings. This provides initial support for the use of eye movement measures for the detection of feigned pain.

Conclusions: Preliminary findings support the feasibility of integrating an eye-tracker and its use as a supplementary method for the detection of feigned pain. The study should be considered preliminary and awaits further research and validation.

Keyword: Pain, Feigning, Eye tracking

P109. Preserving the ability to discriminate between left and right; a case study

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Aims: Historically, during awake brain surgeries the focus was on language and motor functions. Last years, other cognitive functions are monitored more and more. Left right orientation is a specific function related to the parietal lobe, and important for many daily activities. The aim of this study is to show that monitoring of this function during awake brain surgery is feasible.

Method: We describe a 55-year-old, lefthanded patient, diagnosed with a brain tumour in the right parietal lobe. During preoperative neuropsychological assessment different cognitive functions were assessed, including left right orientation. The latter was tested by items based on the Berger Right Left Discrimination Test (1). His test performance was faultless.

Results: During awake surgery, electric stimulation of the right inferior parietal lobe resulted in an impaired left right orientation. Our patient made mistakes and needed much more time to decide whether the presented stimulus indicated the left or right side. Five months after surgery, cognitive functions were tested again, he had no problems in discriminating left and right at that moment.

Discussion: the parietal lobe is related to many specific cognitive functions, one of them is left right orientation. In order to maintain the best quality of life in brain tumour patients, impairment in such functions should be prevented.

Conclusions: This case reports shows that monitoring of left right orientation during awake brain tumour surgery is feasible, so that this function can be preserved.

Keywords: Brain tumour, parietal lobe, left right orientation

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P110. Long-term neurocognitive sequelae of adult Acute Disseminated Encephalomyelitis (ADEM)

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Aims: ADEM constitutes a monophasic demyelinating disease, subsequent to viral or bacterial infection. It is less common in adults, compared to children, and follows a more severe course with less favorable cognitive outcome. The present case study presents the long-term neuropsychological profile of an adult post ADEM.

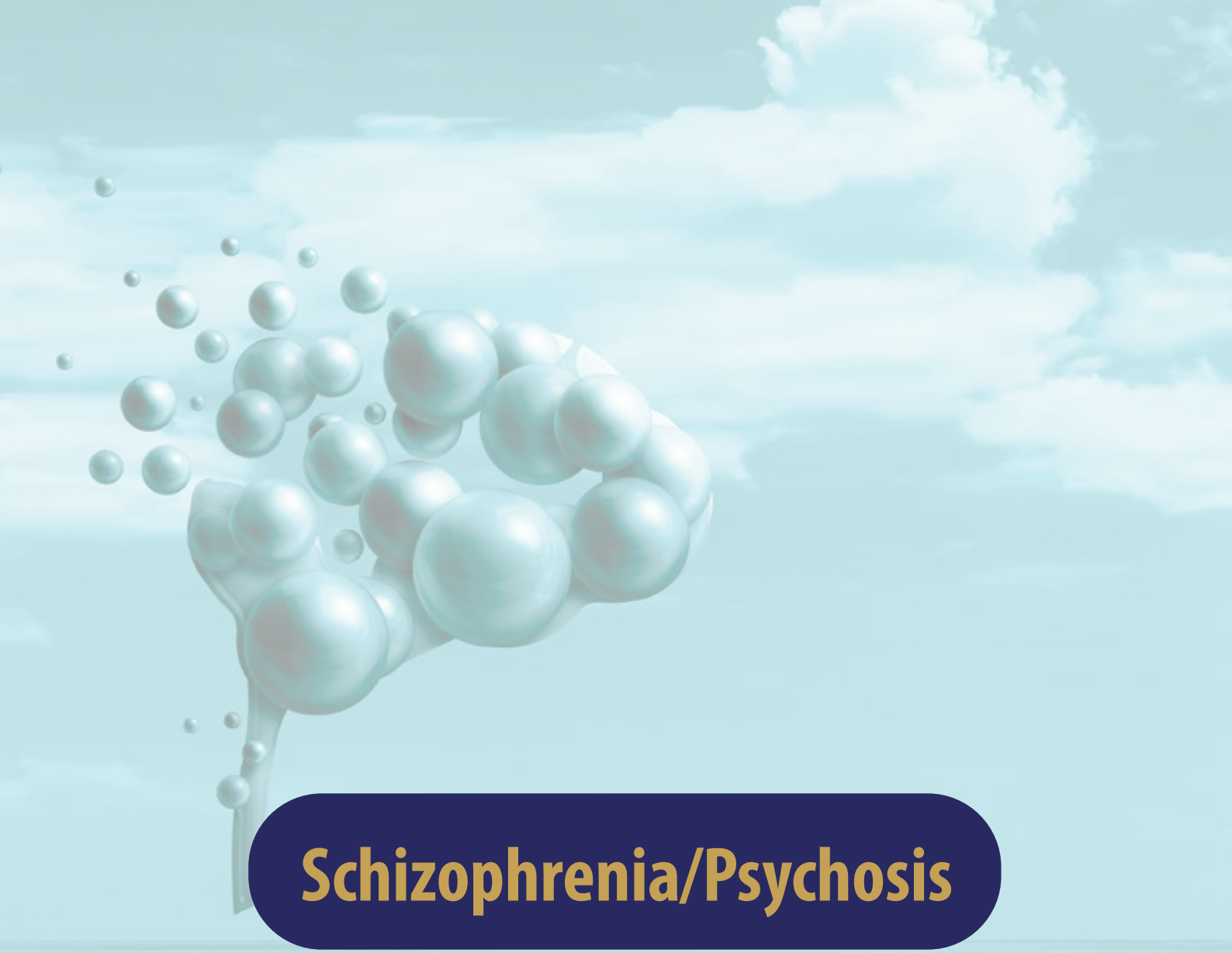
Method: A 37-year-old man with ADEM, was assessed after the acute phase of his symptom, with a comprehensive neuropsychological battery including tests of verbal and visual memory, executive functioning, information processing speed, visuospatial perception and language. A follow-up assessment was done 2.5 years later to explore the course of his cognitive deficits.

Results: The first neuropsychological assessment showed impaired verbal and visual memory. Executive functioning, information processing speed, visuospatial perception and language were in the normal range. Follow-up assessment, showed decline in verbal and delayed visual memory, while other cognitive function remained intact. Observational and qualitative data revealed lack of insight into his cognitive difficulties, while presenting inappropriate laughter during the assessment and increased religiosity.

Discussion: Our adult patient with ADEM presented impaired verbal and visual memory, which worsened at 2.5 year follow-up, and was accompanied by a lack of insight regarding his cognitive limitations. Bilateral temporal lesions could explain these deficits. His visuospatial skills, attention, executive functioning and language remained stable in the normal range throughout the years. Behavioral manifestations (lack of insight, laughter during the assessment, religiosity) may reflect orbitofrontal, temporal or basial ganglia lesions or may be characteristic of his personality.

Conclusions: The current case elucidates the long-term neuropsychological sequelae of adult ADEM. Deficits were circumscribed to verbal and visual memory, with further decline over time, and a lack of insight into his symptoms, while other cognitive domains remained intact. Yet he has adjusted to daily activities adequately and continues to be gainfully employed.

Keywords: ADEM, cognition, long-term



Schizophrenia/Psychosis

P111. Qualitative analysis of WAIS-III Similarities subtest in patients with Schizophrenia Spectrum Disorders

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Aims: The aim of our study was to compare the differences in concept formation between patients with schizophrenia spectrum disorder (SSD) and healthy controls.

Method: The sample consisted of 106 participants: 55 healthy controls and 51 SSD patients matched by demographic variables (patients – 28 men / 23 women, mean age 37.53 yrs, education 13.31 yrs; controls – 23 men / 32 women, mean age 39.78 yrs, education 13.14 yrs). We used WAIS-III Similarities subtest, where we analyzed the errors made by both groups. The errors were coded into three error categories: in-set, out-of-set and other errors.

Results: Comparing proportional rate of errors between groups showed, that SSD patients do not statistically differ from healthy controls in terms of errors they make. However, the effect sizes showed a certain tendency for SSD patients to have more variability in their errors compared to healthy controls.

Discussion: This may be an indication of manifestation of disease heterogeneity. Thinking style of SSD patients is more dependent on clinical picture and associated cognitive deficits. Conclusions: Participants in control group displayed a better ability targeting their thought processes as well as finding commonalities in verbal comparisons.

Keywords: qualitative analysis, Similarities subtest, schizophrenia spectrum disorder

P112. Logical and emotional cognitive processing between four schizotypal dimensions

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Aims: To compare cold (based on logic) with hot (based on emotional components) cognitive processes in groups with high schizotypal personality traits, as assessed with the four-factor model of schizotypy.

Method: Two hundred and forty-seven participants were allocated into one of four schizotypal (cognitive-perceptual, paranoid, negative, disorganized) or control groups according to their Schizotypal Personality Questionnaire scores. Participants were administered tasks assessing working memory, complex selective attention, decision making, response inhibition and fluid intelligence as well as their affective analogues. Between group comparisons were examined with repeated measures analyses of covariance after reducing the outcome measures of each task into one composite variable.

Results: Negative schizotypes had lower performance compared with the cognitive-perceptual and control groups in working memory (p values <0.005), while disorganized schizotypes performed lower compared with controls (p <0.001) in the affective working memory task. Disorganized schizotypes also scored lower in the complex selective attention task compared with controls (p <0.001) while in complex affective selective attention, cognitive-perceptual schizotypes and controls outperformed negative schizotypes (p values <0.001). For response inhibition, all schizotypy groups and controls outperformed negative schizotypes (p values <0.005). Controls had higher emotional intelligence compared with all schizotypal groups (p values <0.005) except cognitive-perceptual schizotypes, who also outperformed negative schizotypes (p <0.001).

Discussion: Cold and hot cognitive processes are associated differently with the four schizotypal dimensions; the exception is emotional intelligence, which seems to be defective in all types of schizotypy. The findings also highlight the proximity of cognitive-perceptual schizotypy with healthy schizotypy.

Conclusions: The findings could further supplement early intervention programs for individuals at increased risk for schizophrenia-spectrum disorders.

Keywords: schizotypy, cognition, affective

P113. Overtime changes in cognitive functioning in acute and transient psychotic disorders compared with schizophrenia

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Aims: The goal of this study was to compare the cognitive trajectories of participants diagnosed with acute and transient psychotic disorders (ATPDs) and schizophrenia (SZ) over a 12-month follow-up period. We also explored how the two diagnostic groups differed with respect to their clinical characteristics.

Method: We included first-episode patients diagnosed with ATPD (n=21) or SZ (n=30). All participants completed clinical and neuropsychological assessments, which targeted three core cognitive domains (executive functioning, speed of processing and working memory). Mixed-model repeated-measures ANOVAs with time as the within-subjects factor and group as the between-subjects factor were run for each of the cognitive domain scores. Clinical characteristics were compared between groups using independent-sample t-tests or their non-parametric parallels.

Results: The participants showed significant improvements in all three cognitive domains by the 12-month follow-up. Executive functioning showed a more rapid rate of improvement in participants with ATPDs compared to those with SZ. The groups also differed in several clinical characteristics (including measures of functioning and symptomatology), with these differences becoming especially pronounced by the 12-month retest.

Discussion: This study is among the first longitudinal studies to compare the cognitive trajectories of participants diagnosed with ATPDs and SZ. Our findings support the idea that individuals with ATPDs show a more rapid rate of improvement, especially in executive functioning and some clinical measures. Apart from recruiting a larger sample, future studies should also control the effects of variables which could intervene with the expected cognitive trajectories, such as post-Covid conditions.

Conclusions: Our findings suggest that there are key cognitive and clinical differences between ATPDs and SZ.

Keywords: first-episode, psychosis, cognition

P114. Working Memory As A Stable Construct in Schizophrenia, Acute and Transient Psychotic Disorder and Controls: 1 Year Follow-up Study

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Aims: Working memory (WM) is essential for cognitive functioning and learning. Its impaired function was marked as a core deficit in schizophrenia, putting it at the centre of attention for potential rehabilitation of general cognition. WM was assessed shortly after the onset and in a one-year follow-up in a group of those with diagnoses of Schizophrenia or Acute and Transient Psychotic Disorder and a group of controls. The objective was to assess within and between group WM performance at two time points while considering a number of covariates in an attempt to examine the nature of WM deficits in the disorders and in relation to symptoms.

Method: The sample consisted of a total of 138 participants (69 healthy controls and 69 patients). Five tests (WAIS-III-DSp; WAIS-III-LNS; WMS-III-SS; TMT-B and Stroop test) composed the WM index (WMI). Repeated-measures ANCOVA with group as the between-subjects factor, time as the within-subjects factor, and education was employed as a covariate to test the hypotheses. Repeated-measures ANOVA then assessed the effects of time, group and their interaction. Repeated-measures correlation analysis was used to observe links between symptom severity and WM.

Results - Conclusions: WM performance showed consistent and significant deficits present in patients in the between-groups design, both at the onset and after one year. No substantial differences were identified in WM over a period of one year in each group. This supports the notion that WM is a stable construct over a year-long period in both groups. In patients, WM performance was linked to the duration of their education. No associations were found between WM performance and symptom severity. The findings are described in light of existing literature, where they are linked to the ever-growing research on the role of cognitive reserve and are discussed alongside their implications for future research.

Keywords: acute and transient psychotic disorder, schizophrenia, working memory

P115. Eye tracking profile of static facial affect in schizotypy.

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Aims: Facial Emotion recognition (FER) deficits have been reported in schizophrenia and have been linked to eye movement abnormalities and inefficient facial information processing. Schizotypy, a latent personality construct indicating proneness to schizophrenia, is characterised by milder FER deficits; however, less is known about its association with eye movement metrics. The aim of this study was to examine eye movement differences during a FER task, between a high and a low schizotypy group, using eye-tracking technology.

Method: Ninety-two healthy individuals were evaluated with the Schizotypal Personality Questionnaire (SPQ) and their gaze points were recorded using a portable eye-tracking device. The task included 36 trials of static faces depicting six emotions (neutral, happy, angry, sad, surprise, fear) which were presented for 0.5 sec each. The sample was divided into high and low schizotypal groups with a median split of the SPQ total score.

Results: Data were analyzed with 6 x 2 repeated measures ANCOVA (6 valences as the within subjects' factor x 2 groups as the between subjects' factor). There were significant main effects of valence on eyes and mouth areas of interest hit percentages (p values<0.05). A significant group x valence interaction (p=0.04) was found for scanpath fixation length: the high schizotypy group had increased scanpath fixation lengths for neutral and happy faces and decreased scanpath fixation lengths for sad and surprise faces compared to the low group. Discussion: High schizotypal traits are associated with differential scanpath patterns during FER. Scanpath disturbances are most apparent for faces depicting sadness and surprise, reflecting either reduced visual attention or social anxiety and withdrawal from facial stimuli with negative emotional content.

Conclusions: The findings suggest that abnormal scanpath fixation length may represent a trait marker of the schizophrenia spectrum.

Keywords: schizotypy, facial emotion recognition, eye tracking

TBI (Moderate-Severe; Adult)

P116. Virtual Reality and Video Gaming: do they benefit the rehabilitation of executive functions in adult patients with Traumatic Brain Injury? A systematic review, SWiM, and meta-analysis

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Aims: The present study explored the effectiveness of using Virtual Reality (VR) and Video Gaming (VG) in the rehabilitation of executive functioning of adults with Traumatic Brain Injury (TBI).

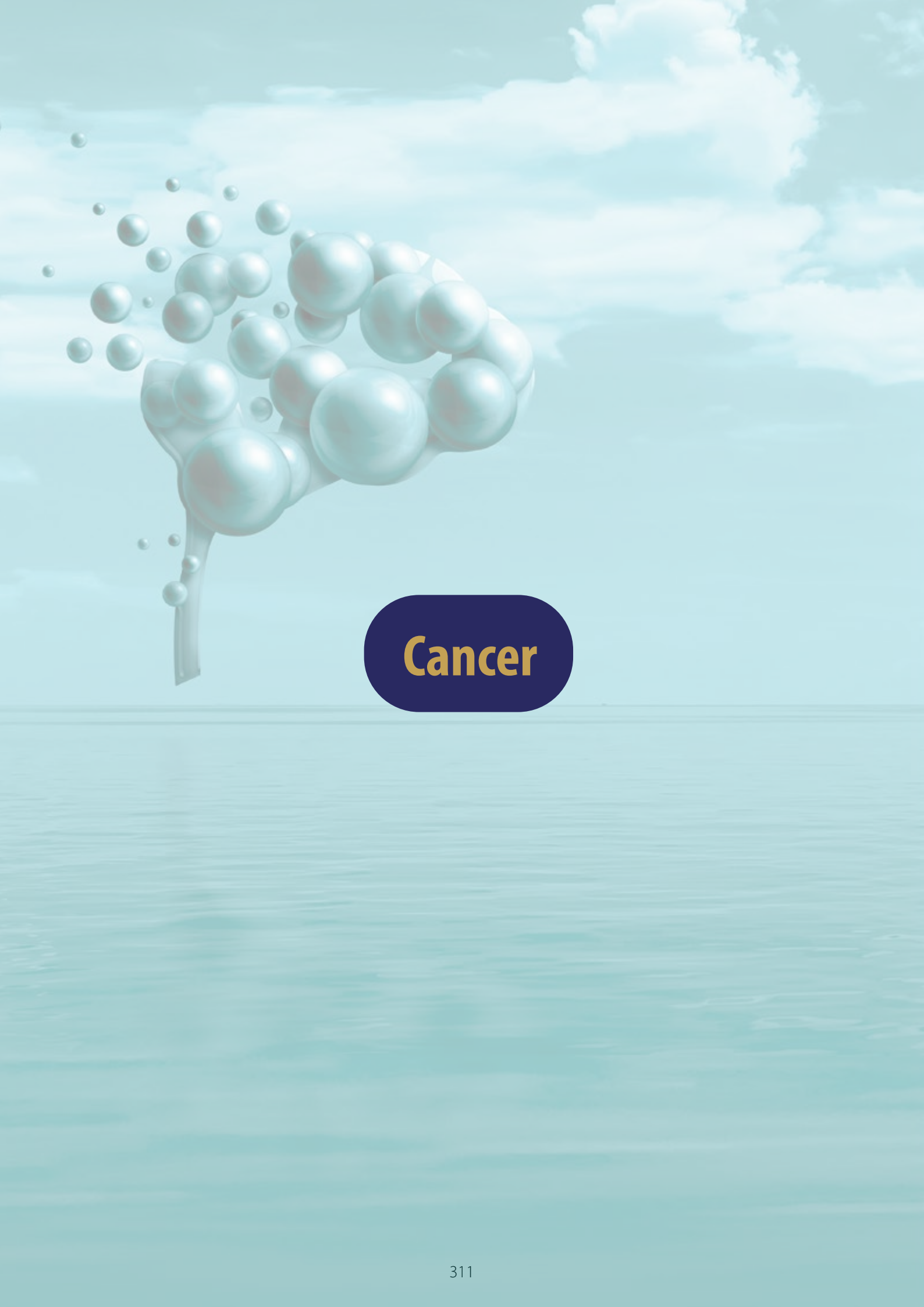
Method: The electronic search was carried out from 01/01/2005-31/01/2023 in the following databases: Google Scholar, PubMed, PubMed Central, Cochrane Central Register of Controlled Trials (CENTRAL), EMBASE and Research Gate.

Results: Six studies were included in the analysis. A meta-analysis was conducted for the VR intervention only for two executive function components: planning and problem solving. The results showed that conventional cognitive rehabilitation is more effective compared to cognitive rehabilitation via VR in both domains of executive functioning, problem solving: SMD fixed – effect size 0.73, 95% CI [0.39, 1.07] and overall effect size: $z = 4.18$, $p < 0.0001$, and planning: SMD fixed – effect size 0.79, 95% CI [0.22, 1.37] and overall effect size: $z = 2.70$, $p = 0.007$. For the remaining data, synthesis without meta-analysis (SWiM) was conducted. Results indicated that regarding cognitive flexibility conventional rehabilitation is more efficient as compared to VG, 95% CI 42.42 [32.62, 52.22]. With respect to working memory and inhibitory control, it seems that both groups benefit the same since 95% CI 0.51 [-2.69, 3.71] and 95% CI -0.10 [-1.00, 0.79].

Discussion: Non-virtual reality rehabilitation is more effective than VR for problem-solving and planning, based on our meta-analysis. According to SWiM analysis, VR improved cognitive flexibility but not working memory. Cognifit was better than PlayStation 3 for cognitive flexibility, but not for working memory.

Conclusions: Alternative and non-alternative rehabilitation methods may benefit TBI patients depending on the executive function component. It is recommended to rely to these results with caution, as new randomized controlled trials may change the strength and direction of the evidence.

Keywords: Traumatic Brain Injury, executive functions, rehabilitation



Cancer

P118. Language assessment in a late trilingual patient with left brain tumour: a case study

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Aims: Anatomical and functional correlates of multilingual processing are widely investigated (1); however, standard multilingual assessment methodologies are not available (2).
A patient-tailored language battery was built up for peri-operative assessment of a trilingual patient undergoing awake craniotomy for maximal safe resection of a primary brain tumour in left fronto-parietal areas.

Method: SB is a 44 years-old, right-handed, native speaker of German who acquired Russian at age 18 and Italian at age 34. Before and after surgery, SB completed a whole neuropsychological assessment and a trilingual battery (written and oral picture naming with nominal syntagms (determiner + nouns) and finite verbs; written nouns and verbs comprehension; written sentence comprehension). Grammatical and syntactic features of words were specifically tested since the investigated languages diverged significantly on grammatical and morphological grounds.
A trilingual picture naming task was used in the intraoperative mapping session.

Results: Different linguistic profiles emerged for Italian, German and Russian.

Discussion: Multilingual testing based on language-specific properties is suitable to the detect language deficits in each of the language spoken by the patient and ensures that each language is tested at a comparable level of difficulty; it also enhances the probability to identify language-specific cortical regions.

Conclusions: The accurate analysis of the multilingual profile is crucial in clinical and surgical management of neuro-oncological patients.

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P119. Associations between executive functioning, coping and mental distress in low-grade glioma patients

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Aims: patients with low-grade glioma (LGG), who are eligible for proton therapy, have a relatively favorable prognosis. However, an LGG can negatively influence cognitive functioning in patients. Particularly executive functioning (EF) is important to adapt to a new situation following the diagnosis of an LGG. It is hypothesized that impaired EF may interfere with the ability to develop and access adaptive coping strategies. In turn, patients would use more passive or avoidant strategies, which are related to mental distress in the general population and in patients with LGG. However, little is known about EF, coping and mental distress in patients with LGG. Therefore, the aim of this study is to analyze associations between EF, coping and mental distress in patients with LGG.

Method: 127 patients with LGG, eligible for proton therapy, were included. Assessment consisted of tests measuring objective EF (Zoo map, Trail Making Test, Controlled Oral Word Test) and questionnaires measuring EF complaints (DEX), coping (Utrecht Coping-List) and mental distress (Hospital Anxiety and Depression Scale). Associations were analyzed with Pearson and Spearman correlations.

Results: objective EF was not significantly related to coping or mental distress. However, a higher score on the DEX (indicating more EF complaints) was significantly related to higher levels of avoidant and passive coping and higher levels of anxiety and depressive complaints.

Discussion: worse objective EF is not related to active or passive coping and mental distress. EF complaints, however might be a better indicator of passive and avoidant coping and mental distress.

Conclusions: based on our results, patients with LGG and impaired objective EF might still be able to rely on adaptive coping strategies to cope with their diagnosis. Also, it is important to be aware of signs of mental distress in patients reporting high levels of EF complaints or passive or avoidant coping strategies.

Keywords: low-grade glioma, executive functioning, mental distress

P120. Phonemic Fluency in glioblastoma patients: a functional Lesion Network Mapping study

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Aims: Cognitive abilities are organized in widely distributed cortical networks whose pattern results crucial to understand the topological and hodological effects of a lesion (1). Here we investigated whether performance on Phonemic Fluency (PF), a task highly sensitive to language but also executive functions deficits (2), may be explained in terms of indirect loss of integrity in specific brain circuits. To do this, we examined lesion-derived functional connectivity in patients with glioblastomas, applying a Lesion Network Mapping approach.

Method: Eighteen glioblastoma patients (10 Left) underwent a preoperative assessment of PF and structural MRI sessions. Lesion masks of single patients were used as seeds to generate voxel-wise functional Lesion Network Maps (LNMs), based on the resting-state scans of a local database of 18 healthy individuals. Then, LNMs in each patient was split into positive and negative connectivity binary maps and then entered in the Support Vector Regression (SVR-LNM) analysis along with the PF scores, to identify lesion-derived functional brain circuits (i.e., those circuits indirectly altered by the lesion) significantly associated with performance.

Results: SVR analysis revealed two lesion-derived functional brain circuits significantly associated with poor fluency performance. The former included the left middle frontal gyrus, left insula and bilateral caudate nucleus, which were functionally coupled with brain lesions. The latter included the bilateral precuneus and posterior cingulate cortex, extending to medial temporal cortex, which were anti-coupled with brain lesions.

Discussion: The topography of LNMs highlights two major networks associated with altered PF performance in brain tumors: a frontal one, which can be related to the executive task component, and a medial parieto-temporal one, which may subserve more lexical aspects of PF.

Conclusions: These results provide important implications for tumor management, to prevent functional disconnections related to linguistic and executive deficits during tumor surgery.

Keyword: Lesion Network Mapping, Phonemic Fluency, Glioblastoma

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P121. Fatigue in patients with low-grade glioma: associations with processing speed and complex attention

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Aims: Fatigue is a frequent consequence of low-grade glioma (LGG), but the nature is still barely understood. Mental fatigue might be related to cognitive impairment such as mental slowness and decreased attention. Therefore, the aim of the present study was twofold: (1) to investigate two major facets of fatigue in patients with LGG separately, namely mental and physical fatigue, and (2) to examine the relationship between fatigue and information processing speed and complex attention in this group.

Method: 124 patients with LGG, eligible for proton therapy, were included before the start of radiation therapy. Different facets of fatigue were measured with a multidimensional fatigue scale, the Dutch Multifactor Fatigue Scale (DMFS). The Vienna Test System was used to examine simple information processing speed, response inhibition, and divided attention. Descriptive statistics and between group comparisons were performed.

Results: 41.1% of patients with LGG reported severe mental fatigue, 25% reported severe physical fatigue. No significant differences were found in mean performance on simple information processing speed, response inhibition and divided attention between severely mental fatigued patients and non-severely mental fatigued patients. However, the percentage of patients with impaired divided attention was significantly higher in the severely mental fatigued group compared to the non-severely mental fatigued group.

Discussion: Mental fatigue was identified as the most prevalent fatigue type in patients with LGG. Furthermore, a relationship between impaired divided attention and severe mental fatigue was found. This implies that patients may develop mental fatigue due to increased cognitive efforts to compensate for attentional deficits.

Conclusions: These insights increase our understanding of one of the most prevalent and bothersome effects of LGG. Moreover, the results stress the importance of neuropsychological assessment in this patient group before the start of adjuvant treatment, to timely offer individual rehabilitation.

Keywords: glioma, fatigue, attention

P122. IDEAL Monitoring of musical skills during awake craniotomy

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Aims: The purpose of awake brain surgery is to perform a maximum resection as well as to preserve cognitive functions, quality of life and personal autonomy. Over the years, next to language and sensorimotor functions, other cognitive functions, including music, have entered the operation theatre. Music to express oneself and as a window for emotions is important for human beings. We set out to gather knowledge from experience from others through published studies and case-reports, and lessons learned from own experience, in monitoring musical abilities during awake brain surgery.

Method: According to the IDEAL framework for surgical innovations (Idea, Development, Exploration, Assessment and Long-term study) we aim to present future recommendation based on a systematic literature search (PRISMA) in combination with three case reports (n=3). The systematic search was conducted using PubMed up to June 2021.

Results: The literature search resulted in 39 articles leading to 11 included publications. Similarities and differences (e.g. patient oriented, fMRI dedicated to music, pre/post-operative testing, instrument, production of music) were evaluated. Next, the three cases, an opera singer, an organ player and a guitar player, are critically evaluated and combined with the results from the systematic review. Together, this fulfills the first stage of the IDEAL framework.

Discussion: We plead for structured procedures including individual tailored tasks. Moreover, we suggest an international database to collect cases in whom musical abilities are monitored, to fuel cognitive neuroscience to further study how music is represented in our brain. By embracing these recommendations, we can both improve clinical care and unravel music in the brain.

Conclusions: Based on our findings, in order to preserve the musical abilities of a patient, tailoring to the musicality of that patient is the key and we formulated six recommendations to do so accordingly.

Keywords: Musical Monitoring, Awake Brain Craniotomy, Cognitive Monitoring

Language and Speech Functions/Aphasia

P123. Time perception for visual stimuli is impaired in dyslexia but deficits in visual processing may not be the culprits

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Aims: It is known that dyslexics underperform controls in time perception tasks using visual stimuli. However, it remains undetermined whether this deficit is secondary to problems in visual, time-unrelated domains, such as luminance contrasts and/or motion processing.

Method: To address this gap, we asked adults with dyslexia and matched controls to perform an interval comparison task involving five different types of visual stimuli with different levels of challenge regarding luminance contrasts and motion.

Results: Results showed poorer time discrimination in adults with dyslexia, but this group-related disadvantage did not change according to stimulus type. Complementary analyses of oculomotor behaviour during the task suggested that the poorer timing performance of dyslexics may relate to attention and/or engagement with the task.

Discussion - Conclusions: Our findings strengthen the evidence in favour of time perception deficits in dyslexia, but they do not support the hypothesis that these are secondary to visual problems.

Keywords: dyslexia, visual time perception, visual processing deficits

P124. Cognitive monitoring in glioma patients with preoperative language deficits

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Aims: Cognitive monitoring during awake glioma surgery provides the opportunity to increase the extent of resection while preserving cognitive functions. The presence of preoperative language deficits is often seen as a contraindication for awake surgery since the ability to communicate with the patient is essential. However, it is risky to assume that language deficits are definite and the possibility to preserve other cognitive functions should not be overlooked. This study investigates to what extend cognitive functions can be monitored in the presence of preoperative language deficits.

Method: Data of 186 consecutive glioma patients were collected through a single-centre study. Patients underwent awake brain surgery for a low-grade (WHO I/II) glioma or high-grade (WHO III/IV) glioma. Preoperative language deficits were determined based on performances on the Boston Naming Test and Token Test (N=51). Intraoperative procedures were performed as part of clinical care.

Results: In 96 percent of all patients, it was possible to use at least one intraoperative language test. In those cases, a functional boundary of language functions was found in 90 percent. Other non-language functions, such as working memory, inhibition and motor functions, provided functional boundaries in 25-85 percent of patients. Postoperatively, cognitive functioning was stabilized or improved in a large number of patients.

Discussion: This study confirms the applicability of awake surgery in the presence of language deficits. It shows to be suitable in nearly all patients, resulting in a 90 percent success rate of finding functional boundaries. In both low- and high-grade glioma patients, language abilities can be preserved 3 – 6 months after surgery.

Conclusions: By increasing the applicability of awake surgery we aim to maintain quality of life. We conclude that preoperative language deficits do not prevent from monitoring language functions as well as other cognitive functions during awake glioma surgery.

Keywords: Preoperative language deficits, glioma surgery, cognitive monitoring

Learning Disabilities/ Academic Skills

P125. Both individual and group-based neuropsychological interventions for dyslexia result in concrete changes in working habits in young adults

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Aims: This study aimed to evaluate whether neuropsychological interventions result in behavioral changes in everyday functioning in young adults with dyslexia. We investigated whether psychoeducation and restructuring the environment, as a part of the intervention, result in positive changes and whether concrete new strategies and methods in study or working habits are picked up for use.

Method: 120 dyslexic adults (18–35 years) were randomized into individual intervention, group intervention, or wait-list control group. The intervention consisted of 12 sessions and focused on strategy learning (e.g. reading, writing, memory), supporting self-esteem, using psychoeducation, and learning to use dyslexia-related aids. The amount of knowledge participants had on dyslexia, their use of dyslexia-related aids and concrete changes made in their study or working habits were assessed at baseline, at five months (after the intervention or wait-list control time), at ten months, and via mailed inquiry 15 months post interventions.

Results: Participants' knowledge of dyslexia and the use of compensatory aids increased in the interventions compared to the wait-list control group ($p < 0.001$). Also, new strategies and methods were picked up for use during interventions more than during the control period ($p < 0.001$). At 15 months post-interventions, 76.4 % of the participants reported still using the strategies and methods they had picked up for use during the intervention.

Discussion: Both interventions resulted in concrete changes in study and working habits among the participants as well as in increased use of dyslexia related aids and increased knowledge on one´s learning disorder. The observed changes were not evident in the control group. 15 months post-intervention, over three-fourths of the participants reported still using the adopted strategies.

Conclusions: A structured and relatively short neuropsychological intervention for adults with dyslexia can lead to positive behavioral changes that can last up to over a year post-intervention.

Keywords: dyslexia, learning disabilities, intervention

P126. Assistive technology and individual arrangements in secondary and tertiary education: Results from an online survey for students with learning disabilities

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Aims: Learning disabilities are associated with a higher risk of education dropout. Assistive technology (AT) and the opportunity for individual arrangements (IA) in studies can alleviate the impairment caused by learning disabilities. This study aimed to gather information via an online survey about the use of AT and IA among students in secondary or tertiary education.

Method: An online survey was conducted in 2021 to gather responses about AT and IA from students who had difficulties in learning. Participants were recruited via social media, newsletters, websites and educational institutions around Finland.

Results: 100 responders (15-55 years, 74% women) out of 238 reported having a diagnosed learning disability (e.g., dyscalculia, dyslexia, ADHD). 87% described using at least one AT to facilitate their studies (e.g., audiobooks, calendar, immersive reader) and 63% reported receiving IA in their current studies (e.g., more time to complete exams or assignments, small group teaching). AT was less often ($p < .001$) and IA more often ($p < .001$) used among students in secondary education than in tertiary education. 67% of the respondents indicated a lack of information as the main reason for not using more AT. 25% didn't have the knowledge or courage to ask for IA.

Discussion: Most of the responders with learning disabilities reported using at least some AT or IA in their studies. AT was more commonly used in tertiary and IA in secondary education. However, two-thirds reported a need to have more information about AT and some hesitated to ask for supportive arrangements in their studies.

Conclusions: Educational institutions should provide more information for students with learning disabilities about the benefits of AT and IA and encourage students to apply for the necessary arrangements.

Keywords: learning disability, assistive technology, students

P127. Positive changes in psychosocial well-being during a group intervention for adults with learning disabilities

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Aims: Learning disabilities often co-occur with mental health problems which, especially when they occur together, can marginalize people from society. New approaches are needed to support adults with learning disabilities who currently receive only few services from the society. This study investigates a professional-led peer group intervention's potential to support adults seeking support for learning related problems.

Method: 70 subjects (16-52 years, 73 % women) with neuropsychologically verified problems in learning were included. Subjects participated in an intervention focusing on either learning disabilities (LP, 10 weekly sessions) or on learning disabilities and psychological well-being (LPP, 12 weekly sessions) according to self-reported complaints of poor learning and/or mental health. Interventions were led by psychologists and contained psychoeducation, peer discussions and exercises. Self-reported self-esteem (RSES), resilience (RS), quality of life (EuroHIS-8) and psychological distress (CORE-10) were measured at two time points (baseline and post-intervention).

Results: The LPP group reported lower psychosocial well-being than the LP group in all scales at all time points. For both groups the post-intervention scores in self-esteem, resilience and quality of life were higher and in psychological distress lower compared to baseline ($p<.05$).

Discussion: Participants in both interventions reported improved psychosocial well-being at the end of the interventions, possibly reflecting advantages of the group-based support.

Conclusions: Professional-led peer group interventions for adults with learning disabilities show potential in supporting the psychosocial well-being of the participants.

Keywords: Learning disabilities, group intervention, psychosocial well-being

Mood & Anxiety Disorders

P128. Do depressed patients really underestimate their cognitive performance?

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Aims: Research has indicated that depressed patients report more severe cognitive deficits than are detectable by neuropsychological tests. Currently, two main explanations are discussed. First, patients with depression may underestimate their cognitive performance. Second, questionnaires typically target everyday life, whereas neuropsychological testing takes place in an artificial environment under specific conditions. Thus, it is possible that cognitive deficits of depressed patients primarily occur under everyday-life conditions. The aim of the present study is to investigate the validity of self-reports in patients with major depression in order to better understand the salient deficits in self-reports.

Method: We investigated 58 patients with major depression and 28 heathy control participants. We administered the "Screen for Cognitive Impairment in Psychiatry" (SCIP) to assess cognitive performance in a test setting and the newly developed "Self-Perception of Cognitive Performance scale" to ask for the self-assessed cognitive performance in everyday life and in a test situation.

Results: Depressed patients showed an inferior neuropsychological test performance and reported much more everyday-life related cognitive problems compared to healthy participants. When asked more specifically for their cognitive performance in the test-situation (compared to others) and in everyday-life (compared to the test situation), depressed patients reported only by trend more problems than healthy participants.

Discussion: When asked specifically, depressive patients did neither over-report cognitive deficits for the test situation nor for everyday life. By contrast, when asked more generally for their cognitive performance in everyday life, they report extreme deficits as already shown in former studies. Thus, it seems possible that a negatively biased self-perception only occurs if patients are asked to report general experiences.

Conclusions: These results have important implications for the assessment of subjective cognitive deficits of depressed patients and shed light on the negative effects of general versus more specific recall of autobiographical information.

P129. The Relationship of Post-Stroke Depression and Self-Discrepancy: Comparison of a Visualized Single-Item Measure with a Self-report Questionnaire

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Aims: Post-stroke depression (PSD) has been reported to be associated with self-discrepancy, i.e., self-perceived changes of self-concept. As economic instruments in this population are preferred, a novel single-item measure was compared with an established questionnaire.

Method: Three years after stroke, n = 121 survivors were interviewed via telephone. Self-discrepancy was assessed by 1) the Head Injury Sematic Differential Scale-III (HISDS-IIIDiff) assessing premorbid and current self-concept with 18 items each, and 2) the single-item Inclusion of Other in the Self Scale (IOSS) incorporating a visualization aid. Depressive symptoms (PHQ-9), disability (Barthel-Index), social support (FSozU-K14), and self-efficacy (GSES) were assessed as relevant covariates of PSD. Bivariate correlations and a two-step multiple linear regression were used to examine associations and the additional predictive value of the two self-discrepancy measures for PSD.

Results: The HISDS-IIIDiff and the IOSS showed a significant and large correlation ($r=.51$, $p<.001$). Both measures correlated similarly with depressive symptoms ($rHISDS=.45$, $rIOSS=.54$), disability ($rHISDS=-.37$, $rIOSS=-.32$), and self-efficacy ($rHISDS=-.34$, $rIOSS=-.39$; all $p<.001$). Only the IOSS correlated significantly with social support ($rHISDS=-.16$, $p=.079$; $rIOSS=-.38$, $p<.001$). Multiple regression confirmed age, disability, self-efficacy, and social support to predict depressive symptoms (all $p<.001$, $R^2=.47$). Including both self-discrepancy measures into the model increased explained variance ($\Delta R^2=.06$, $p<.001$), yet only the IOSS was a significant predictor ($pHISDS=.092$; $pIOSS<.05$)

Discussion: Self-discrepancy is closely related to PSD and associated characteristics. The effects are stronger when self-discrepancy is assessed by the single-item IOSS compared to the HISDS-III which has to be completed twice and consists of 36 items.

Conclusions: The results indicate the relevance of self-discrepancy in the pathogenesis of PSD and suggest that the IOSS may be a valid and economic measure. Further longitudinal evaluation is needed to investigate the predictive value of the IOSS.

Keywords: Self-concept, depression, stroke

P130. Cognitive performance, mental fatigue and autonomic response following sustained mental activity in clinical burnout

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Aims: To investigate the effects of sustained mental activity on perceptions of mental fatigue, cognitive performance and autonomic response in patients with clinical burnout as compared to a healthy control group.

Method: Patients with clinical burnout (n = 30) and healthy control participants (n = 30) completed a 3-hour test session, in which they were administered a set of neuropsychological tests before and after an effortful cognitive task with concurrent sound exposure. Perceptions of mental fatigue and task demands (mental effort and concentration difficulties) were assessed repeatedly over the course of the test session. Heart rate variability was recorded to index autonomic response.

Results: In comparison with controls, perceived mental fatigue increased earlier in the session for the clinical burnout group and did not recover following a short rest period. Throughout the session, patients rated the tasks as more demanding and showed less improvement on some of the neuropsychological tasks, mainly those involving simultaneous demands on attention and processing speed, inhibition and working memory. While autonomic responses were initially comparable, the patient group expressed lower heart rate variability than controls after extended testing and exposure.

Discussion: Patients with clinical burnout are adversely affected by sustained mental activity, as reflected by subjective ratings, aspects of cognitive performance and autonomic response. Tasks placing simultaneous demands on cognitive control and processing speed seem the most susceptible to cognitive fatigability. Further investigation of the role of autonomic regulation in relation to cognitive symptoms in clinical burnout is warranted.

Conclusions: These findings highlight the importance of considering mental fatigue and its relation to cognitive performance in clinical burnout.

Keywords: clinical burnout, cognition, mental fatigue

Movement and Movement Disorders

P131. Effect of cognitive reserve on cognition in Parkinson's disease

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Aims: Cognitive reserve (CR) explains differences in cognitive performance for similar levels of brain pathology, and can have a protective effect against cognitive decline in neurodegenerative disorders through more efficient use of brain networks. Using machine learning analysis, we aimed to investigate the effect of CR in Parkinson's disease (PD).

Method: Clinical, neuropsychological, and demographic data of 517 PD patients were analyzed to identify predictive variables of cognitive performance. Years of education were used as proxy for CR.

Results: Our results showed that among other variables such as age, disease duration, and clinical features of PD, education had the highest importance values in feature selection, and more years of education were the most reliable predictor of better cognitive performance.

Discussion: Higher levels of reserve have a beneficial effect on cognition. We might be able to effectively predict cognitive performance in patients diagnosed with PD via educational attainment.

Conclusions: The assessment of cognitive reserve may provide an effective tool for predicting cognitive performance in PD.

Keywords: cognitive reserve, Parkinson's disease, education

P132. A Theater-Based Intervention in Parkinson's Disease: Preliminary Results

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Aims: The efficacy of interventions based on art therapies for patients with neurodegenerative diseases is limited due to a lack of studies. To fulfill this gap of knowledge, we investigated the impact of theatrical activities on well-being, mood, and cognition in patients with Parkinson's disease (PD).

Method: 17 subjects with a diagnosis of PD participated ina three-month theater-based intervention that included the participation in viewing 5 theater performances and 4 workshops on the fundamentals of theatrical arts. Participants were assessed before and after the intervention with neuropsychological tests for memory and executive functions, one scale for well-being (The Parkinson's Disease Questionnaire, PDQ-39), and one for mood (Hospital Anxiety and Depression Scale, HADS). Additionally, before and after each workshop session, participants were assessed with a self-rating scale for mood (Profile of Mood States).

Results: The scores between pre- and post-assessments were analyzed. At post-test, participants showed: 1) reduced scores in the emotional well-being subscale of the PDQ-39, 2) better scores for cued recall in the long-term memory test, and 3) reduced anxiety and depression as measured by the two subscales of HADS. Self-ratings of mood after the workshops suggested a reduction of the emotional burden.

Discussion: The differences found between pre- and post-assessments suggest that the participation in a three-month theatrical program could benefit PD patients' emotional well-being and decrease anxiety and depression. Additionally, this intervention may enhance the efficiency of memory retrieval.

Conclusions: Theatrical activities could be an additional therapy for patients with PD since they can enhance the patient's quality of life, their mood, and their cognition. Future research should investigate the efficacy of theater-based interventions for people with PD in comparison to other emotional and cognitive therapies.

Keywords: Theater-Based Intervention, Parkinson's Disease

P133. Cognition in early onset ataxia and dystonia

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Aims: Early onset ataxia (EOA) and Early Onset Dystonia (EOD) are movement disorders developing before the age of 25, resulting from dysfunction of networks involving cerebellar and basal ganglia, also important for cognition. EOA and EOD sometimes co-occur, but in that case the primary phenotype is determined. A pending question is whether primary EOA and EOD may have different profiles of cognitive impairment. We investigated whether cognitive functions were impaired in patients with either primary subtype EOA or EOD and whether these profiles were different.

Method: The sample consisted of 26 EOA and 26 EOD patients with varying etiology but similar disease duration and severity, and 26 healthy controls, all matched on age and gender, who underwent neuropsychological testing for verbal intelligence, (working)memory, attention and cognitive speed, executive functions, emotion recognition and language.

Results: EOA and EOD patients both performed significantly worse than healthy controls on tests of verbal intelligence, working memory and executive functions, but in the EOA group also attention and cognitive speed and emotion recognition were impaired. Compared to EOD, EOA patients performed worse on attention and cognitive speed and verbal intelligence.

Discussion: Our results suggest that lower verbal IQ scores, deficits in working memory, executive functions and emotion recognition are part of the cognitive profile EOA patients. EOD patients scored similarly to healthy controls on the emotion recognition test and the test for attention and cognitive speed, while EOA patients did not.

Conclusions: Our results show similar cognitive deficits in both patient groups, but more pronounced deficits in the patient with primary EOA phenotype. This suggests that more severe cerebellar network dysfunction also relates to more severe cognitive impairment.

Keywords: dystonia, ataxia, cognitive profile

P134. Cortical motor representations, inhibition and sensory processing in Tourette Syndrome

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Aims: Recent research has supported a mechanistic link between cortical tuning of functional representations, GABA concentrations and somatosensation (1). Evidence from movement disorders, such as Focal Hand Dystonia, have supported this link with evidence of abnormal GABA concentrations, cortical representations and processing of external sensory stimuli. However, the relationship between GABA inhibition, cortical mapping, and somatosensation has not yet been investigated in Tourette Syndrome (TS), a movement disorder characterized by disinhibition and disordered sensory processing.

This study aims to investigate cortical sensory and motor mapping using fMRI and their relationships to MRS concentrations of GABA and behavioural tasks assessing somatosensation and motor functioning.

Method: We used 7T and 3T fMRI to investigate representations of the face and digits in motor and sensory cortices of those with TS and in healthy controls (HC). sLASER 7T MRS was conducted to acquire GABA concentrations in a sensorimotor voxel. Behavioural testing included auditory-paced tapping and psychophysical sensory tasks. Measures of urge and tic severity were also collected in TS participants.

Results: We predict that cortical representations will be related to GABA concentrations and sensory and motor functioning in both TS and HC. For TS, there will be a trend of sensorimotor GABA disinhibition and less specificity of cortical maps. In turn, these will be related to altered performance in somatosensory and motor tasks.

Discussion and conclusions: fMRI cortical mapping is a novel research area in TS. This and any relationship between these factors in TS may provide a new avenue for understanding the disordered sensory processing that causes significant discomfort in individuals with TS.

Keywords: Tourette Syndrome, neuroimaging

References

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P133. Can cognitive tests differentiate Progressive Supranuclear Palsy from Parkinson's disease II: Visuospatial Working Memory and Social Cognition

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Aims: Progressive Supranuclear Palsy (PSP) is a neurodegenerative disease with clinical signs that are very similar to those reported in the idiopathic Parkinson disease (PD). As a result, PSP is often mistaken as PD during the early stages of the pathology. Existing research suggests both visuospatial working memory (VSWM) and the ability to quickly and accurately discriminate emotional expressions are disturbed in PSP. This study examined the extent to which people with PSP and PD have distinct problems with VSWM and social cognition.

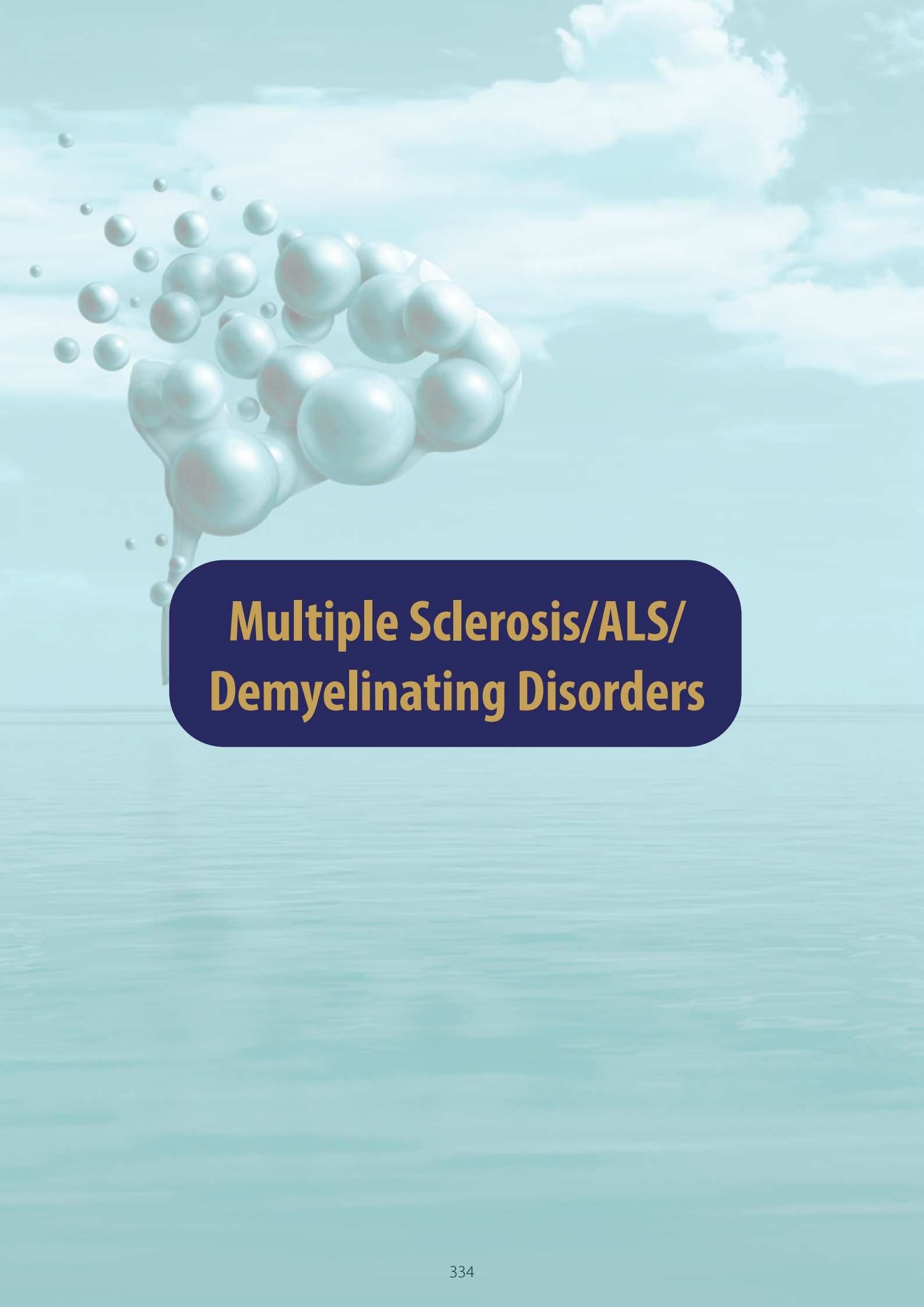
Method: Emotional face recognition was tested using a computer based task that required rapid categorisation of emotional faces under different fixation conditions. VSWM was assessed using a continuous response task that allowed us to estimate the precision of spatial and colour memory, the probability of guessing and probability of misbinding. Saccadic and smooth pursuit eye movements were also assessed.

Results: The PSP group were significantly impaired in both emotion recognition and VSWM compared to PD and AMC groups. The deficit in social cognition was most pronounced for negative emotions and when faces were presented for a very short duration, but not affected by fixation position. The VSWM memory deficit was expressed as a reduction in memory precision and increased guessing for both visual feature and spatial location in PSP, relative to PD and age matched controls.

Discussion: The data emotional face recognition task confirm a specific deficit of social cognition in PSP that differentiated PSP from Parkinsons's disease. People with PSP were also relatively impaired on VSWM, but here there was considerable heterogeneity in individual performance
which may limit the utility of VSWM as a diagnostic tool.

Conclusions: PSP is associated deficits of visuospatial working memory and social cognition, and the latter may have potential for differential diagnosis of PSP and PD

Keywords: Memory, Face, Neurodegeneration



Multiple Sclerosis/ALS/ Demyelinating Disorders

P136.Out of Mind but Not Out of Sight: Assessing a Postulated Theory of Mind in Multiple Sclerosis

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Despite considerable progress in the understanding of the neuroscientific substrates of social cognition in multiple sclerosis (MS) populations, the nature of cognitive impairment comprising the patient assumed theory of mind (ToM) remains obscure and relatively under-explored. In light of metanalytic evidence, an impairment in ToM is relatively frequent at onset or in early MS, it exists outside the realm of other cognitive deficits, is subdomain-specific and is heavily dependent upon lesion location and shared neurocircuitry. Affective, as opposed to cognitive, components of ToM rely on a broader network being more susceptible to MS-type neuropathy. The data discern the level of interdependence and differential or non-differential compromise between cognitive and affective domains of ToM as well as their relation to those non-social cognitive abilities which remain intact. The early manifestations of ToM deterioration should be considered further as they constitute a clinical parameter intrinsically linked to neurobiological disintegration irrespective of disease progression. Additionally, the establishment of meaningful dissociations of ToM impairment from other forms of cognitive deterioration is deemed necessary to determine a ToM-specific symptom profile in MS. At the absence of psychometrically sound assessment tools to evaluate ToM -related skills in MS, the development of a standardized neuropsychological test battery, also allowing for differential assessment between subcomponents, is deemed necessary diagnostically and can pave the way for screening social neuropsychological competence in MS.

Keywords: social cognition, theory of mind, multiple sclerosis, neuropsychological impairment

P137. Cognitive, Energetic, Behavioural and Affective (CEBA) Profile as a Guide for Neuropsychological Treatment Choice in Multiple Sclerosis: Protocol for a Multicenter Prospective Cohort Study

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Aims: The main aim is to identify Cognitive, Energetic, Behavioural and Affective (CEBA) profiles in Multiple Sclerosis (MS). When CEBA profiles have been determined, the next step is to develop a feasible screening tool used to match people with MS (pwMS) with a specific CEBA profile to existing neuropsychological treatment.

Method: The MS-CEBA study is an observational, prospective, multicenter cohort study consisting of three phases. Phase 1 focuses on identification of CEBA profiles in a large sample of pwMS (n=300). Phase 2 focuses on validating these CEBA profiles through replication of results in a new sample (n=100). After CEBA profiles have been determined, Phase 3 focuses on developing a feasible screening tool which combines CEBA profile with subjective burden in order to select from available neuropsychological treatment options. Primary outcome measure is CEBA status, determined through neuropsychological assessment consisting of tests and questionnaires regarding the CEBA domains. Subjective burden will be assessed using a structured interview. Inclusion criteria include MS diagnosis, sufficient ability in the Dutch language, and age 18-70.

Results: The study was launched in January 2023. Recruitment will start mid-2023 and continue until the end of 2026. Identification of multiple CEBA profiles is expected, from which a maximum of four will be selected. It is considered likely that multiple CEBA symptoms will be prominent within CEBA profiles, in which subjective burden will be used to help select from neuropsychological treatment options.

Discussion/Conclusions: The MS-CEBA study is the first large scale study to investigate over the whole range of CEBA symptoms whether and how symptoms cluster, and thus if profiles can be identified. If so, a feasible screening tool allowing quick identification of CEBA profiles among pwMS will contribute to timely matching pwMS with specific CEBA profiles to suitable, existing neuropsychological treatment. This will improve societal participation among pwMS.

Keywords: multiple sclerosis; societal participation; neuropsychological treatment

P138. Validation Study of the Reading the Mind in the Eyes Test and the Ekman's Faces Test in a sample of Portuguese patients with Multiple Sclerosis: preliminary results

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Aims: Cognitive dysfunction in multiple sclerosis (MS) is characterized by a multidomain deficit. Recently, there has been an increased interest in the study of social cognition in MS. We used the Reading the Mind in the Eyes Test (RMET) and the Ekman's Faces Test (EFT) to assess the ability to recognize and understand distinct facial expressions and emotions. Our aim was to conduct a preliminary validation study of the RMET and EFT in patients with MS, through the analysis of their diagnostic acuity, targeting the future establishment of cut-off points.

Method: 70 participants (20 controls and 50 MS patients) were included, matched according to age and education. The diagnostic acuity of the tests was evaluated trough ROC analysis. For each of the tests, the cut-off points providing the highest Youden value were selected, representing a maximization of sensitivity and specificity.

Results: Mann-Whitney analysis showed differences between groups in the EFT (p=.003; RMET: p=.162). For EFT, an AUC=.720 (95% IC=.574-.866), p=.004 was obtained. The sensitivity and specificity values of the EFT were calculated, obtaining, respectively, 88% and 48%. The test revealed a diagnostic acuity of 68% for patients with MS.

Discussion: Previous studies showed clear deficits in RMET for patients with relapsing-remitting MS. The clinical heterogeneity of our sample (both relapsing and progressive forms) denotes a possible explanation for the absence of significant differences between groups. On the other hand, few studies to date have demonstrated the usefulness of the EFT in MS patients.

Conclusions: RMET did not allow to distinguish MS patients from controls. The EFT showed good sensitivity values, but weak specificity. Further division into relapsing and progressive forms along with a larger sample of healthy controls will be required for the establishment of cut-off points that are of great use in both clinical and research practices.

Keywords: social cognition, emotional recognition, multiple sclerosis

P139. Effects of cognitive exhaustion on plan- versus rule-based strategies to movement-selection in patients with Multiple Sclerosis

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Aims: Successful movement-selection is a prerequisite when people interact with objects. In recent years, our group investigated rule- and plan-based movement-selection approaches that were applied to achieve the same motor output. Findings suggest that the rule-based movement-selection strategy is more efficient than the plan-based approach and elicits stable responses across different conditions. The plan-based approach, however, varies with conditions of stress or increasing task difficulty. The aim of the current study was to investigate whether patients with Multiple Sclerosis (PwMS) would benefit from rule-based approaches to movement-selection, especially under conditions of mental exhaustion.

Method: In our current study, 30 PwMS and 30 matched healthy subjects underwent a straining three-hour cognitive-load manipulation and a short relaxation intervention in two separate sessions. After the respective intervention, participants did a movement-selection experiment, where they either used prospective planning or an instructed if-then rule to choose an adequate grip and comfortably rotate a dowel. Balanced integration scores, a combined measure of response times and error rates, were applied to quantify performance in the movement-selection experiment.

Results: We found a main effect of strategy, suggesting better performance when participants used the rule-based approach when looking at the whole sample and at both conditions. When considering healthy ubjects and patients separately, results showed that the rule-based efficiency advantage vanished after the cognitive load manipulation for PwMS.

Discussion: Healthy participants may benefit from a rule-based approach when it comes to movement-selection, also under conditions of cognitive load. PwMS may generally profit from rule-based approaches, however, this advantage apparently disappears when they are mentally exhausted.
Conclusions: Rule-based strategies may have the potential to facilitate movement-selection. To recommend rule-based interventions for neurorehabilitation it is necessary to unravel the specific circumstances for the in- and decrease of the rule-based efficiency advantage in future research with different neurologic populations.

Keywords: Multiple Sclerosis, Fatigue, movement-selection

P140. Neuropsychological functioning in Susac's Syndrome

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Aims: Susac's Syndrome (SS) is a rare, autoimmune, neurological disease characterized by a clinical triad of branch retinal artery occlusion, sensorineural hearing loss and encephalopathy. Neuropsychological functioning in SS is little researched and until today, the prevalence and nature of cognitive deficits in SS remain unclear as the current literature focuses solely on nonsystematic and anecdotal data. Therefore, this study aims to better understand neurocognitive dysfunction in SS.

Method: Patients with SS were enrolled at the University Hospital of Ghent by their treating neurologist. The cognitive functioning and emotional well-being of each patient was evaluated by a thorough neuropsychological test battery. Thirteen patients with SS were included for data analysis with a mean age of 39.5 (SD = 11.1).

Results: According to age-, gender- and education matched data, all patients had normal neuropsychological test results on the subtests included in the cognitive battery. Scores on an individual level seem to show an interindividual variability. In addition, they seem to experience a low physical and mental well-being. They reported higher scores on anxiety, depression, somatization, insufficiency of thoughts and behavior, distrust, sleeping problems and psychoneuroticism.

Discussion: Being only the second study to investigate neuropsychological functioning in this rare neurological disease with such an extensive neurocognitive test battery, our results suggest that neuropsychological involvement in SS is rather limited on a group level.

Conclusions: Future studies should investigate the neuropsychological implications of SS over a longer period of time and in a larger group. Furthermore, it should include patients with different types of educational level. Future neurological consultation should consider implementing screening for emotional well-being and cognitive problems.

Keywords: Susac's Syndrome, Cognitive functioning, Neuropsychology

Neuropsychological Rehabilitation

P141. Game-supported cognitive strategy training for slowed information processing speed after acquired brain injury: a randomised controlled trial

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Aims: Acquired brain injury (ABI) often results in slowed information processing speed (IPS), which can greatly affect daily functioning and quality of life. As a potential solution, serious gaming has been proposed as a supplement to cognitive rehabilitation. However, current digital platforms used in cognitive rehabilitation mainly focus on restoring cognitive function, and their effectiveness in transferring skills to real-life situations is limited. This study aims to evaluate the effectiveness of a game-supported cognitive strategy training program for individuals with ABI.

Method: The study design is a randomized controlled trial that compares an 8-week game-supported cognitive strategy training program (Karman Line – Tempo module) with an 8-week computerized cognitive function training program (CogniPlus™ training). The study includes 30 participants with ABI (ages 16 to 75) and data is collected at baseline, post-treatment, and 3-month follow-up. The primary outcome measure is the objective assessment of compensatory strategy use in an untrained task, and the secondary outcome is the attainment of treatment goals as assessed by goal attainment scaling (GAS). Other study parameters include self-rating questionnaires evaluating compensatory strategy use in everyday life, daily life participation, subjective motivation, mental fatigue, and insight and reported severity of slowed IPS.

Results: The data will be analyzed using a 2x2 repeated measure analysis of variance, regression analysis, and path analysis.

Discussion: This study is the first to explore the use of a compensatory approach in serious gaming combined with scientifically validated cognitive training as an intervention for slowed IPS in ABI. The study outcomes measure the generalization of the intervention to everyday life, specifically, the level of activities and participation, as well as improvement on neuropsychological tests.

Conclusions: Our findings have the potential to enhance the treatment of slowed IPS in cognitive rehabilitation and provide valuable insight into the utilization of digital platforms in cognitive training.

Keywords: Acquired brain injury, serious gaming, cognitive rehabilitation

P142. Immersive virtual reality-based rehabilitation program improves declarative memory in post-covid condition patients

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Aims: Post-COVID-19 condition (PCC) patients suffer memory, processing speed, and executive function deficits (1). Immersive Virtual Reality (IVR) is the representation of scenes or images of items generated by a computer program that offers the appearance of realism despite being a simulation of an artificial world (2). Using these interactive simulations, IVR technology facilitates the transfer of abilities learned in a virtual environment to the real world and has been helpful in the rehabilitation of cognitive problems (3). Our objective was to assess the effect of a multimodal IVR program on memory in a sample of PCC individuals.

Method: 24 individuals with PCC were assigned to an experimental (n= 13; 9 females, mean age= 49.85; SD= 7.55 years) or waiting list (n= 11; 10 females, mean age= 49.91; SD= 4.55) group. The experimental group received a 60-minute, twice-weekly, 8-week IVR-based multimodal rehabilitation program to stimulate cognition, emotion, and physical condition. Before and after the intervention, each participant's declarative memory was tested using the Rey Auditory Verbal Learning Test (RAVLT). The Wilcoxon signed-rank test was used to compare the change between the pre- and post-test scores of the two groups. The alpha level was set at p=0.05. All analyses were performed using Stata Statistical Software.

Results: The groups had comparable age, sex, and level of education. RAVLT Sum recall (mean diff= 14.752, Z= -3.008; p=.002; d=1.31), RAVLT immediate recall (mean diff= 7.026; Z= -1.985; p=.047; d=0.781), RAVLT delayed recall (mean diff= 4.120, Z= -2.893; p=.003; d=1.550), and RAVLT recognition (mean diff= 3.239, Z=-2.742; p=.005; d=1.401) difference scores between pre- and post-intervention were significantly higher in the experimental group compared to the waiting list control group.

Conclusions: The IVR multimodal rehabilitation approach enhanced PCS patients' declarative memory, allowing for the generalization of strategies learned throughout therapy.

Keywords: Post-COVID-19 condition, Immersive Virtual Reality, Memory

P143. Ecological computer-assisted therapy of the dysexecutive syndrome in adult patients with non-progressive acquired brain injury. A pilot study on efficacy of a new therapeutic application

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Aims: The dysexecutive syndrome frequently occurs as a result of an acquired brain injury (ABI). It severely interferes with a patient's ability to function independently. The aim of this equivalence trial study was to compare the efficacy of two computer-assisted therapy programs for executive dysfunctions in patients with acquired brain injuries.

Method: Patients with ABI (N=30) were assigned to two equal parallel groups and trained using either a newly developed application ExeSystem (designed to help improve the ability to manage and control one's own behavior by performing tasks imitating natural, everyday situations; innovative therapy group, IG) or a combination of two commercial applications RehaCom and CogniPlus (conventional therapy group, CG). The therapy lasted for three weeks, during 45-minute daily sessions. Pre- and post-therapy assessment was performed with the use of a battery of neuropsychological tests and scales selected with special consideration for their ecological validity.

Results: Data indicated comparable efficacy of both therapy programs in improving daily functioning, executive attention, as well as planning and problem-solving. However, irrespective of the therapy program, patients did not improve in memory tests. The IG group obtained higher results in social competence measures ($p = .028$), which was the only advantage of therapy with the experimental application. Patients generally positively evaluated ($p < .01$) their interactions with computer programs.

Discussion: Our study suggests that the executive dysfunction therapy with ExeSystem is at least as effective as the one with the use of existing commercial software for neuropsychological rehabilitation. However, despite the implementation of a more ecological and comprehensive approach to the content of the new application, the benefits of this approach in our pilot study were limited.

Conclusions: The new application ExeSystem, which uses an ecological approach to the therapy of the dysexecutive syndrome in patients with ABI, showed sufficient preliminary efficacy.

Keywords: brain injury, dysexecutive syndrome, rehabilitation

P144. The effects of group intervention on executive function and self-concept in adolescents

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Aims: The first aim was to describe an intervention model developed for adolescents with deficits in executive function (EF) and attention. It combined approaches from multilevel group intervention applied for children (called EXAT; Rantanen, Vierikko & Nieminen, 2018) and cognitive behavioral therapy and cognitive training for adults with ADHD (Virta et al., 2008; 2010). Second aim was to examine the effects of group intervention on adolescents' EF and self-concept.

Method: Group intervention consisted of 16 sessions (á 90-minutes) for adolescents, and 2-4 sessions for parents. Intervention model was piloted at the Psychology Clinic at Tampere University. Participants were from two intervention groups (n = 8) of adolescents (13-16 years) referred to neuropsychological group intervention due to clinically significant EF deficits. Intervention effects on EF were assessed with the Behavior Rating Inventory of Executive Function (BRIEF) completed by participants and their parents, and on self-concept with the Piers-Harris 2. Non-parametric tests were used for the group comparisons and the intervention effects.

Results: After intervention, parents reported statistically significant decrease in EF subscales Shifting ($p = .04$), Emotional Control ($p = .046$), Initiate ($p = .021$), and Behavioral Regulation Index ($p = .03$). In adolescents' self-reports, there were no changes in either EF or self-concept. However, the individual variation in ratings were large before and after intervention both in adolescents and parents.

Discussion: Results were variable regarding effects of intervention in both groups. Despite limited number of participants, the results of this study are promising, and group intervention model developed for adolescents with EF deficit seem feasible.

Conclusions: This study highlights the need of individually planned goals and tailored intervention for adolescents. The group intervention should promote understanding and personal management skills of EF deficits along with focusing on supporting realistic self-concept.

Keywords: adolescents, executive function, group intervention

P145. Cognitive Fatigue and Fatigability in Post COVID-19

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Aims: Individuals affected by Post COVID report symptoms of cognitive exhaustion that substantially limit their quality of life and ability to work. We aimed to investigate a potential relationship between subjective (fatigue) and objective (fatigability) measures of exhaustion.

Method: 38 Post COVID patients underwent a protocol in inpatient neurorehabilitation, performing tasks simulating the load of a workday. As a measure of cognitive fatigability, we assessed the subtest alertness (WAF, Vienna Test System) at three time points: T1 = 8.30 am, T2 = 11:30 am, T3 = 03:00 pm. We measured cognitive fatigue using the cognitive subscale of the Fatigue Scale for Motor and Cognitive Functions (FSMC).

Results: We found alertness to be significantly reduced at T2 and T3 compared to T1. While at T1, most patients showed normative reaction times, in T2 and T3 clinically apparent cases increased in numbers, and dropouts occurred due to exertion intolerance including reports of e.g. intense head ache. The FSMC cognitive subscale did not correlate with the alertness measures at any time point, nor with the difference between time points as a measure of performance decrease in alertness.

Discussion: In order to reveal clinically relevant fatigability measures it appears useful to apply exertion with pre and post measures. However, our data suggests that subjective measures of cognitive fatigue and objective measures of fatigability as operationalized in our study do not correlate.

Conclusions: Our Post COVID data appears consistent with proposed fatigue and fatigability models derived from data in Multiple Sclerosis patients, suggesting that fatigue and fatigability are separate constructs. Simulating the load of a workday appears to be a feasible approach to evaluate cognitive exertion in Post COVID. However, future studies should develop approaches that may allow for more gradual increases of exertion in order to avoid complete drop outs.

Keywords: Post COVID, fatigue, fatigability

Neurostimulation/ Neuromodulation

P146. Integrated wearable neurofeedback and VR system for empowerment of focusing skills: a feasibility and proof-of-concept study

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Aims: The potential of virtual reality (VR) for supporting neurofeedback-based rehabilitation/empowerment protocols has been quite debated, though systematic research is still limited (1,2). Learning is thought to be fostered by immersivity of VR, which improves engagement and motivation. Lately, the increased availability of wearable brain-sensing devices has renewed the attention on VR-neurofeedback applications. We here report feasibility testing of a low-budget VR-neurofeedback system aimed at empowering focusing skills via gamification.

Method: Ten volunteers completed an intensive protocol including seven daily sessions of practice with the integrated VR-neurofeedback system. The system data-collection unit was a Muse headband - a wearable EEG-neurofeedback device. EEG-data was conveyed and streamed wirelessly to a real-time classifier implemented in the Neuromore software, which provided processed inputs to the VR gaming environment developed in Unity. During training, participants wore a visor and played an archery game where they had to hit a spinning target. Target rotation changed based on practicers' beta activity. By focusing, participants could control the target and make aiming easier. User experience and performance were measured via self-report, behavioural and physiological metrics.

Results: The system was globally rated as highly usable. Performance and perceived benefit were positively correlated with practice. Benefit was positively correlated with focusing and enjoyment during practice, and relaxation after practice sessions. At the end of training, alpha power showed a slight increase over posterior areas, while beta power decreased over frontal ones.

Discussion: Findings suggest that the prototype allows for a rich and positive experience, even in naïve people. Also, they show that even brief periods of practice may activate implicit learning mechanisms supporting performance improvement, paired with consistent modulation of neural activity.

Conclusions: Low-budget VR-neurofeedback solution might represent a valuable and accessible way to further the development of novel engaging solutions for neurocognitive empowerment.

Keywords: VR, neurofeedback, neuroempowerment, wearables

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P147. Exploring the effects of rhythmic and arrhythmic median nerve stimulation to guide future therapeutic treatments for tic disorders

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Aims: Rhythmic median nerve stimulation (MNS) has been proposed as a non-invasive, portable alternative to current treatments for Tourette syndrome (TS)1. It was hypothesised that the reduction in tics observed during rhythmic MNS might be dependent on entrainment of mu-alpha sensorimotor oscillations linked to movement suppression. Rhythmic 12Hz MNS produces entrainment, whereas arrhythmic MNS does not1,2. However, emerging work suggests arrhythmic 12Hz MNS also elicits a reduction in tics, contrary to the entrainment hypothesis3. This study aimed to investigate the effects of rhythmic and arrhythmic MNS and determine which stimulation pattern would result in the largest reduction of tics and is therefore optimal for therapeutic interventions.

Method: Thirty participants with TS or chronic tic disorder were randomly allocated to receive either rhythmic or arrhythmic 10Hz MNS. Participants were blind to their condition. Three six-minute blocks involved a repeated sequence of two minutes MNS followed by one minute no stimulation. Participants continuously rated their urge-to-tic using a slider device and tic frequency and intensity were monitored via video recordings.

Results: Preliminary results show no significant differences between rhythmic and arrhythmic MNS, consistent with previous research3. Our results suggest a reduction in urge-to-tic and tic frequency during MNS which we expect to reach significance in the completed data set. We do not expect therapeutic differences between rhythmic and arrhythmic MNS.

Discussion: These preliminary results support previous data suggesting the clinical benefit of MNS is not dependent on cortical entrainment3. The therapeutic mechanism could instead be related to a reduction in excess noise in the motor cortex in TS. Results include the possibility of a placebo effect, so further study with appropriate control conditions (e.g. sham MNS) should be conducted.

Conclusions: This study supports MNS as a promising therapeutic option regardless of the pattern of stimulation.

Keywords: Tourette syndrome, MNS

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P148. Effects of Transcranial direct current stimulation on cognitive functioning in patients with fibromyalgia: a randomized sham-controlled study

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Aims: The main objective of this work is to evaluate the efficacy of transcranial direct current stimulation (tDCS) on different targets to improve cognitive functioning in patients with fibromyalgia (FM).

Method: A protocol consisting of 15 tDCS sessions (20 minutes/session), distributed in 5 consecutive days over 3 weeks, was applied to a sample of 130 women with FM. Using a randomized double-blind, sham-controlled design, we assessed the effects of active and sham tDCS stimulation over three cortical targets (the primary motor cortex, the dorsolateral prefrontal cortex and the operculo-insular cortex) on different measures of working memory and subjective cognitive complaints. These measures were obtained in baseline, after treatment and at 6-month follow-up.

Results: No treatment effects were found for any of the cognitive measures, except for an improvement in a simple working memory task score. This effect resulted from both active and sham tDCS stimulation, with no differences between cortical targets. No group effect nor group*treatment interaction were found significant.

Discussion: Results disagree with some studies that have found improvement in cognitive functioning of FM patients associated to tDCS stimulation. These studies, unlike this one, applied tDCS in combination with cognitive training so studies comparing the effects of tDCS with and without simultaneous cognitive training in FM patients are needed.

Conclusions: Active tDCS is not superior to sham stimulation in improving cognitive functioning in patients with FM.

Keywords: tDCS, cognition, fibromyalgia

P149. Procedure to assess plasticity in healthy and clinical samples

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Aims: To validate the use of single-pulse Transcranial Magnetic Stimulation (sTMS) and Theta-Burst Stimulation (TBS) in combination with electromyography (EMG) to assess brain plasticity (BP) in healthy and clinical samples.

Method: Three volunteers underwent two experimental conditions to assess BP before and after applying two TBS protocols. 50 motor evoked potentials (MEP) were collected from each participant at baseline by using sTMS and EMG, and 25 MEP were registered at 5, 10, 15, 20, 25, and 30 minutes after receiving either iTBS (increase of cortical excitability) or cTBS (decrease). Averages for each 50/25 MEPs block and a general average for all post-stimulation MEPs were obtained.

Results: All three participants responded to each condition as expected (i.e., increase in the general post-iTBS average compared to baseline data; decrease in post-cTBS average). Two participants showed increasing (iTBS) and decreasing (cTBS) trends following stimulation, with maximum pre-post differences observed 30 minutes after iTBS and 25-30 minutes after cTBS. The third participant exhibited unimodal and inverted unimodal curves in response to iTBS and cTBS, respectively, with maximum differences occurring at 15 minutes post-iTBS and 10 minutes post-cTBS.

Discussion: Overall, the procedure has been found to be effective. While the post-TBS general averages fulfilled expectations for all assessed participants, some fluctuations were observed at certain time points. Additionally, significant differences in within-subject and between-subject averages were found at baseline in the two conditions, consistent with previous studies' results.

Conclusions: The combination of sTMS, TBS, and EMG has proven to be a valuable tool for modulating, inducing changes, and assessing brain plasticity within-subjects, making it well-suited for research settings. Moreover, the specific procedure presented here may enable a more thorough investigation of the post-TBS curve effect in each individual.

Keywords: brain plasticity, non-invasive brain stimulation, transcranial magnetic stimulation


Other

P150. "I am feeling better, but I am still not well" - exploring the lived experience of the recovery process in people previously diagnosed with stress-related exhaustion disorder

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Aims: Previous studies have shown remaining symptoms up to ten years for patients with exhaustion disorder (ED). The aim of this study is twofold, to increase the knowledge about how people with ED experience the recovery process by examining barriers and facilitators for recovery as well as identify recovery behaviours experienced as helpful during the different stages of the recovery process.

Method: The current study is part of the Rehabilitation for Improved Cognition project, a longitudinal randomized controlled clinical study examining the effects of cognitive rehabilitation for patients with ED. 38 participants previously diagnosed with ED partook in semi-structured interviews 6-10 years after completion of treatment. The interviews were analyzed with thematic analysis.

Results: Four main themes resulted from the analysis;" A long and rocky road", "To know myself and how I walk the road", "Recovery is important at every step of the road" and "The journey never ends". The majority of the participants were still affected by their previous period of ill-health by remaining symptoms such as cognitive deficits and stress sensitivity. Many of them were still struggling to find and keep a balance in their lives.

Discussion and conclusions: Recovery after stress-related ED is long with remaining cognitive symptoms years after treatment completion. It is of outmost importance to learn more about ED and to investigate treatment strategies that can support cognitive function, in order to reduce the long-term impact of ED.

Keywords: clinical burnout, cognitive ability, long-term effects

P151. Associations between psychological distress and COVID-19 disease course: a retrospective cohort study of 3084 cases in Belgium.

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Aims: Previous research showed that psychological distress has a negative impact on the course of viral infections. For COVID-19, the same association was observed in small samples of specific segments of the population. This study presents a more refined analysis of this association, measuring a broader spectrum of psychological distress in a large sample (n=3084) of the Flemish population.

Method: Several types of psychological distress (state, trait and health anxiety, depression, intra- and interpersonal stress) are registered throughout three periods: one year before the contamination, one week before the contamination and during the contamination. In doing so, validated scales such as DASS-21 and IIP-32 are used. Furthermore, the COVID-19 course is registered in several ways: number of symptoms, number of days sick leave and number of days the symptoms have lasted. Also, different control variables such as vaccination status, medical and psychological history are taken into account.

Results: Statistical analysis shows that all types of psychological distress are positively correlated with the severity of the COVID-19 course. Anxiety during the contamination shows the strongest correlation, but psychological distress one year before the onset of COVID-19 was still significantly associated with the worsening of the disease course.

Discussion: As the assessment of the latter type of distress happened before the onset of the COVID-19 disease course, retrospective bias resulting in artificial associations between self-reported stress and COVID-19 severity is unlikely to have impacted the observations. In view of possible future pandemics, it is important to focus on stress and anxiety reduction in the general population. It is also advisable to minimize the use of stress-inducing messages to encourage the population to adhere to the measures issued.

Conclusions : Both psychological distress prior to the contamination and during the contamination have had an adverse impact on the course of COVID-19.

Keywords: Psychoneuroimmunology, Psychological Distress, COVID-19

P152. How neuropsychological testing supports functional decline for disability benefits: 3 case studies of various etiologies

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Aims: Functional decline is common after damage to the Central Nervous System. Through the illustration of three cases of different etiologies—autoimmune encephalitis, multiple sclerosis, traumatic brain injury-we will discuss the utility of neuropsychological test performance for the documentation of functional decline in the context of disability benefits application.

Method: A thorough neuropsychological evaluation was conducted to all three cases. Supplementary IADL scales and self-awareness scales were administered. Additional interviews with their caregivers were conducted and supplementary information about disability benefits were gathered.

Results: Patients who had cognitive deficits were not fully aware of them. Patients who were aware of their cognitive deficits applied for disability benefits, otherwise not. Patients who applied for disability benefits without documentation of their cognitive deficits didn't get disability benefits.

Discussion: When no caregiver is available and self awareness is doubtful, neuropsychological test results should be used to conclude for restrictions on functioning. Peers may not fully realize the impact cognitive deficits have on functioning.

Conclusions: Patients with cognitive deficits should be supported to seek for disability benefits. Their case can be strengthened by neuropsychological test results. Caution should be made to self awareness issues. The severity of cognitive deficits and their impact on daily functioning should be taken more seriously under consideration by the national committee for disability benefits commission.

Keywords: cognitive deficits, self-awareness, disability benefits

P153. Feasibility of a novel blended-care intervention for fatigue after acquired brain injury: a pilot study of the Tied by Tiredness intervention

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Aims: Evidence-based treatments for fatigue after acquired brain injury are scarce and personalized treatment is needed to tackle the multiple involved factors. A promising approach to foster personalization is Experience Sampling Methodology (ESM), consisting of repeated measurements of fatigue and related factors in daily life. In this study, the feasibility and usability of a novel six-week ESM-intervention was investigated.

Method: Ten individuals with brain injury used a mHealth application that sent a 28-item questionnaire 8 times per day, for three consecutive days each week. Momentary fatigue, activities, mood, worrying, and social context were assessed. Subsequently, participants received weekly personalized feedback based on their own data.

Results: 56.3% of ESM-questionnaires (568/1008) were responded to, allowing for detailed insights in individual fatigue patterns. No statistically significant decrease in response rate was found over the course of treatment. Qualitative feedback from participants revealed increased insight in factors underlying fatigue, and no problems with the duration of treatment or difficulties using the app. However, due to technical issues, two participants could not finish the intervention.

Discussion: Data presented in this study provide support for the feasibility and usability of this Ecological Momentary Intervention with personalized feedback in an acquired brain injury population.

Conclusions: This intervention embraces technological advances while also accommodating preferences expressed by patients of having real, reciprocal human interactions with their therapist. A major strength of this study is that the intervention is 'personalized by design'.

Keywords: fatigue after acquired brain injury, personalized feedback intervention, experience sampling method

P154. Charles S. Myers, M.D., F.R.S., C.B.E. (1873–1946), Pioneer Experimental Psychologist: A Sesquicentennial Tribute

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Aims: This year marks the 150th anniversary of the birth of Charles Samuel Myers (1873–1946), an eminent scientist in the history of British psychology and founder of the first laboratory of experimental psychology in England. Accordingly, the aim of the present study is to highlight his academic life and research.

Method: To this end, we carried out a search in Medline using keywords Charles Myers, experimental psychology, shell shock, and synaesthesia.

Results: Myers was psychologist, psychiatrist and philanthropist. He is credited for contributing to the development of clinical psychology and mental health services in the United Kingdom. He pioneered the study of group dynamics and with his innovative ideas revolutionized the field of industrial psychology by placing emphasis on the employees' condition. He was one of the key founding members of the British Psychological Society and served as its first Secretary.

Discussion: Myers was one of the first psychologists to study the social and cultural factors that influence human behavior. He introduced the concept of shell shock to describe the mental effects of war on soldiers. He developed a new understanding of psychological trauma and its impact on soldiers returning from World War One, and challenged prevailing views on the nature of war-related problems of mental health, thus paving the way to modern treatments for post-traumatic stress disorder. Myers also became interested in synaesthesia, a condition in which stimulation of one sensory modality leads to a spontaneous heterologous sensory perception. He published primarily on color-music synaesthesia ('chromaesthesia'), or the experience of colors in response to musical stimuli, and conducted a series of pioneering experiments in the early 20th century to investigate the condition.

Conclusions: Charles Myers deserves to be remembered for the distinguishing marks he left on the diverse fields of psychology and clinical neuroscience that he delved into.

Keywords: experimental psychology, shell shock, synaesthesia

P155. Longing for Touch and Quality of Life during the COVID-19 pandemic

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Aims: To combat the spread of the coronavirus disease-2019 (COVID-19), regulations have been introduced to limit physical interactions. This could induce a longing for touch in the general population and subsequently impact Social, Psychological, Physical and Environmental quality of life (QoL). The aim of this study was to investigate the potential association between COVID-19 regulations, longing for touch and QoL.

Method: A total of 1978 participants from different countries completed an online survey, including questions about their general wellbeing and the desire to be touched.
Results: In our sample, 83% of participants reported a longing for touch. Longing for touch was subsequently associated with a lower Physical, Psychological and Social QoL. No association was found with Environmental QoL. Both longing for touch and the duration of the regulations were significantly negatively associated with social QoL.

Discussion: This is the first study with a large community sample to show that touch not only has a positive influence on our wellbeing, but that when there is a lack of touch, this has negative consequences, which further emphasizes the importance of touch for QoL in general. As well as longing for touch, the current study also investigated the association between the duration and severity of the COVID-19 regulations and QoL. The duration of the regulations was only associated with social QoL. Interestingly, there was no relation between the severity of the regulations and scores on this domain. This seems to suggest that the duration of social restrictions plays a more important role than the type of restriction itself.

Conclusions: These findings highlight the importance of touch for QoL and suggest that the COVID-19 regulations and especially the duration of these restrictions have concurrent negative consequences for the wellbeing of the general population.

Keywords: Longing for touch, Quality of Life, COVID-19

P156. The relationship between neurotransmission-related amino acid blood concentrations and neuropsychological performance following acute exercise

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Background: Amino acid neurotransmitters, including glutamate, phenylalanine, tyrosine, alanine, and glycine, underlie the majority of the excitatory and inhibitory neurotransmission in the nervous system, and acute exercise has been shown to modulate their concentrations.

Aims: We aimed to determine whether any correlation exists between the above-mentioned amino acid blood concentrations and neuropsychological performance after an acute exercise intervention.

Method: Sixty basketball players were randomly assigned to one of two experimental conditions: exercise or inactive resting. All participants underwent a comprehensive neuropsychological assessment and blood samples were taken on a Guthrie card before and after the end of the experimental conditions.

Results: Amino acid blood concentrations were significantly elevated, and cognitive performance significantly improved post-exercise on specific neuropsychological assessments. Significant intervention x group interaction effects were apparent for Trail Making Test part-B [$F(1,58) = 20.46$, $p < .0001$, $\eta 2 = .26$] and Digit Span Backwards [$F(1,58) = 15.47$, $p < .0001$, $\eta 2 = .21$] neuropsychological assessments. Additionally, regression analysis indicated that tyrosine accounted for 38.0 % of the variance in the Trail Making Test part-A test.

Discussion: The results of this study are in line with previous studies indicating that acute exercise has a beneficial effect on attentional performance and visual memory. The role of tyrosine as a catecholamine depletion reverser and the enhanced energy metabolism of glucose, due to forced exercise, could partially explain these results.

Conclusions: These results suggest that elevated blood concentrations of neurotransmission-related amino acids are associated with improved neuropsychological performance after a single bout of high-intensity exercise.

Keywords: amino acids, exercise, cognition

P157. Disgust processing in Anorexia Nervosa: effects on body representation

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Aims: When something disgusting is near our body, we are usually not comfortable, and the reaction is to put distance between us and the disgusting thing. In some conditions, reactions to disgusting stimuli are enhanced. For example, studies have shown disgust processing is core feature of obsessive-compulsive disorder. In anorexia nervosa (AN), evidence is rare and inconclusive, and mostly focused on disgust in relation to food. However, disgust drivers vary, and also include body-related self-disgust, which may be central in AN. Here, we assessed if disgust triggers affect body representation in AN, focusing on motor imagery.

Method: Twenty-two affected women and twenty-two controls participated in our experiment, which consisted of a traditional Hand Laterality Task, and two emotionally charged versions with pictures showing hands partially covered by faeces (body product driver of disgust) and with the index finger amputated (body violation driver). Performance was scored in terms of accuracy and reaction time for the effect of biomechanical constraints. We also measured the level of disgust sensitivity through a self-report questionnaire.

Results: Participants with AN are overall less accurate and take more time to respond compared with controls. Both controls and participants with AN were faster and more accurate in recognizing disgust-driving stimuli rather than traditional stimuli. No interaction between group and effects of biomechanical constraints, which would have suggested a specific effect of disgust drivers on body representation in AN, was observed. At the questionnaire, participants with AN reported significantly higher sensitivity to disgust triggers.

Discussion: Participants with AN were as sensitive to disgust body-related triggers as controls at the experimental task, despite a higher sensitivity to disgust at questionnaire.

Conclusions: Rather than disgust being processed differently, its role the pathology of AN may depend on the level of processing required, and on how much awareness the process involved requires.

Keywords : disgust, motor imagery, anorexia nervosa.

P158. Sensory Processing Sensitivity is associated with a heightened sensory sensitivity across modalities and a greater interoceptive awareness

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Aims: Heightened levels of sensory sensitivity are reported in neurotypical and clinical populations and associated with feelings of overstimulation and a reduced quality of life (Ward, 2019). Normal variations in subjective self-reported sensory sensitivity are described in the Sensory Processing Sensitivity (SPS) framework (Aron et al., 1997). SPS is a personality trait (Highly Sensitive Personality; HSP) that is driven by a neurobiological sensitivity and characterized by a greater depth of information processing. Approximately 30% of the individuals score high on this trait. This study aimed to test whether HSP is associated with a heightened sensitivity to different kinds of sensory (e.g., sounds, lights) and internal (e.g., interoceptive awareness) stimuli and how this relates to hypersensitivities described in neurodiverse populations such as autism.

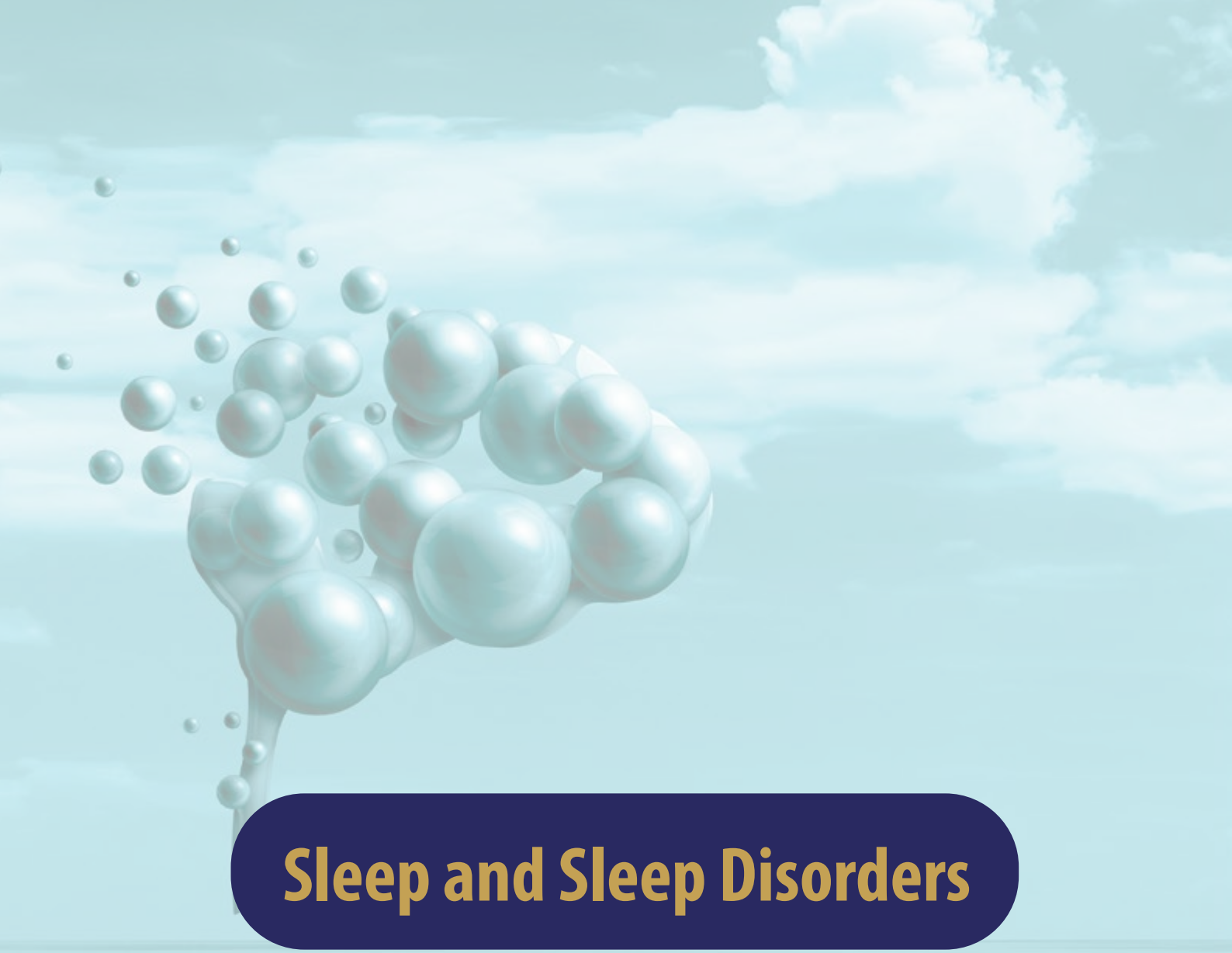
Method: 691 neurotypical participants (Mage= 28 years; range: 17-68) completed the Sensory Processing Sensitivity Questionnaire, Multimodal Evaluation of Sensory Sensitivity, and Multidimensional Assessment of Interoceptive Awareness.

Results: Higher scores on SPS were positively associated ($r>.30$, $p<.001$) with hypersensitivities for external stimuli across all sensory modalities (i.e., multisensory, visual, auditive, tactile, olfactory, gustative, temperature and vestibular) and a higher interoceptive awareness (i.e., awareness of bodily sensations, mind-body integration, emotional states, and ability to regulate these sensations).

Discussion: Results are in line with, but never empirically tested, the SPS framework. Hypersensitivities towards multiple modalities are also reported in autism research. Based on hypersensitivities only, it might be that some people with HSP are misdiagnosed with high functioning autism. However, in contrast to SPS, individuals with autism show also hyposensitivities towards sensory and social stimuli and are less aware of the mind-body integration and its link to emotional states (Masataka, 2017).

Conclusions: In this study, we showed for the first time that individuals scoring high on SPS report a heightened sensitivity across all modalities and a greater interoceptive awareness.

Keywords: Sensory Processing Sensitivity, multisensory, interoceptive awareness



Sleep and Sleep Disorders

P159. Sleep quality in post-COVID condition individuals: relation with emotional, cognitive and functional variables

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Aims: Previous literature has demonstrated that individuals with post-COVID-19 condition (PCC) refer a poorer sleep quality (1–3). The aim of this study was to assess the sleep quality of PCC subjects, and which variables could influence it that had previously been related to sleep quality.

Method: We included 368 individuals with PCC and 123 healthy controls (HC) from the NAUTILUS Project (NCT05307549 and NCT05307575). We collected sociodemographic data, previous comorbidites and COVID-19 symptoms. We assessed sleep quality (Pittsburgh Sleep Quality Index, PSQI), anxiety (Generalized Anxiety Disorder, GAD-7), depression (Patient Health Questionnaire, PHQ-9), global cognition (Montreal Cognitive Assessment MoCA), everyday memory failures (Memory Failures of Everyday Questionnaire, MFE-30), fatigue (Chadler Fatigue Questionnaire, CFQ), quality of life (European Questionnaire of 5 Dimensions, EuroQoL-D5), physical activity (International Physical Activity Questionnaires, IPAQ) and Mediterranean diet adherence (PREDIMED).

Results: Of the 368 PCC subjects, 203 were non-hospitalized (mean age 47.16, standard deviation 9.46), 83 were hospitalized (53.51 ± 8.76) and 82 stayed in the ICU (52.93 ± 8.48). We found statistical significant differences in the PSQI total score between PCC and HC ($p<0.0001$). Differences remain significant despite the severity of the PCC. We also found positive correlations between PSQI PCC individuals and PHQ-9 ($r=0.469$), GAD-7 ($r=0.277$), MFE-30 ($r=0.371$), CFQ ($r=0.402$), and negative correlations between PSQI and MoCA ($r=-0.247$) and PREDIMED ($r=-0.182$) ($p<0.05$ for all of them).

Discussion: These results indicate that worse sleep quality could be related with poorer cognitive performance and less Mediterranean diet adherence, but also implicates higher levels of depression, anxiety, fatigue (both mental and physical) and more everyday memory failures complaints.

Conclusions: Further research should focus on the sleep pattern of individuals with PCC to identify whether minimizing emotional and behavioral sequelae can improve sleep quality.

Keywords: sleep quality, COVID-19.

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P160. Psychosocial Predictors of Sleep Disturbances during the COVID-19 pandemic in a Greek Sample

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Aims: On March 11th, 2020, the World Health Organization declared COVID-19 a global pandemic, following unsuccessfully contained outbreaks of the SARS-CoV-19 in China. Measures were immediately implemented in the form of restrictions and quarantines across the world. Responding rapidly, on March 22, the Greek government announced various spread management strategies in order to prevent the virus' potential of rapid transmission. This cross-sectional study aimed to investigate the impact of those measures on sleep health in a Greek adult sample.

Method: An online questionnaire collected data during the second national lockdown (February to May 2021) from 650 participants (Mage: 33.13, SD: 12.2; 71.5% female).

Results: 60% of responders scored below the clinical cut-off on the RU-SATED, indicating they experienced poor sleep health. Better sleep health was reported with increased age and years of education. On the other hand, higher trauma-related distress, depression, anxiety and stress symptomatology were related to poorer sleep health. No gender differences were observed, and degree of compliance to pandemic restrictions did not influence sleep practices. Hierarchical regression analysis indicated difficulty in securing enough/healthy food, testing positive for COVID-19, experiencing an increase in verbal arguments/conflicts at home and an increase in responsibilities were the strongest predictors of poor sleep hygiene.

Discussion: These findings are interpreted in the context of others that show a similar relationship between deteriorating mental health, covid-related stressors and sleep hygiene during the pandemic.

Conclusions: The above findings highlight the importance of maintaining good sleep hygiene as a pillar of general physical and mental health.

Keywords: COVID-19, depression, anxiety, sleep.

P161. Sleep pattern trajectories in older individuals and incident Mild Cognitive Impairment and dementia onset: results from the HELIAD study

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Aims: In this study, we explored the trajectories of sleep patterns and their relationship to consequent conversion to MCI or dementia in a sample of older adults.

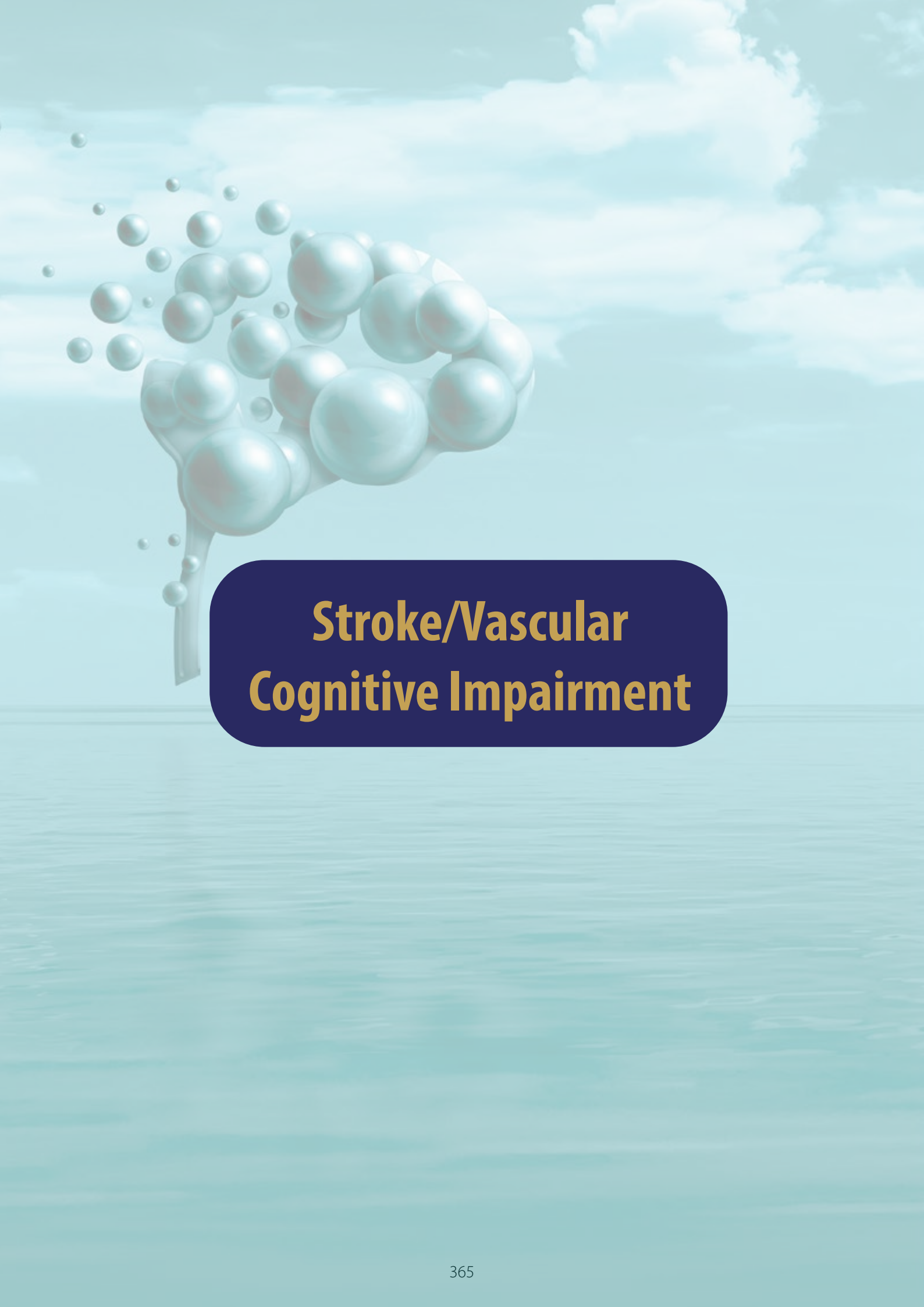
Method: A total of 1948 participants (>65 years old) in a population-based, longitudinal study (HELIAD), provided information regarding their sleep patterns (i.e., sleep quality, adequacy, disturbances) at baseline and at three-year follow-up, via the Sleep Scale from the Medical Outcomes Study. Total sleep duration was determined by asking participants how many hours on average they sleep each night.

Results: At baseline 1607 participants [mean age=73.31 (5.19) years; mean education level=8.17 (4.86) years; women, n=964] were cognitively healthy, 238 were diagnosed with MCI and 103 with dementia. Baseline participants with dementia had longer sleep duration compared to healthy individuals (p<.001); no group differences emerged relative to MCI participants. At follow-up (N=902), 673 remained healthy, 163 converted to MCI and 66 to dementia. Baseline differences between initially healthy participants who converted to MCI at follow-up and those who remained healthy at follow-up, revealed shorter sleep duration at baseline among the converted group relative to the consistently healthy group (p=.043). Baseline healthy participants who converted to dementia at follow-up had reduced sleep adequacy (p=.035) at baseline, compared to their consistently healthy counterparts. Adjusted generalized estimating equations analyses revealed that only for the MCI participants at follow-up, sleep quality dropped by 1.754 units yearly (p=.040) and sleep disturbances showed an annual increase of 1.035 units (p=.022).

Discussion: Sleep pattern alterations differentiate those with MCI or dementia relative to cognitively healthy peers, but also predate conversion to these disorders among cognitively healthy older adults.

Conclusions: Longitudinal investigations may further clarify the role of sleep in cognitive health among older individuals, and whether sleep problems are a risk factor and/or an early sign of MCI and/or dementia onset.

Keyword: sleep quality, sleep patterns, dementia, mild cognitive impairment, longitudinal study



Stroke/Vascular Cognitive Impairment

P162. Targeting phonology or semantics during alexia rehabilitation improves reading aloud response times and accuracy in individuals with chronic left hemisphere stroke

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Aims: Millions of people are living with aphasia, which impairs multiple aspects of language, including reading. Reading deficits in aphasia are prevalent and severely limit autonomy and reduce quality of life. There is currently no one standard approach to treating reading deficits, likely because of the variability in stroke lesion distribution leading to differences in cognitive sources of impairment. We investigated outcomes following a tailored reading treatment targeting primarily one information processing component (phonology or semantics).

Method: We modified two effective anomia treatments to target reading by focusing on written materials throughout treatment and using reading outcomes (reading aloud accuracy and response times (RT)) to measure treatment success. Four participants with a single chronic left-hemisphere stroke (Mage=59, SD=11.63, MWAB, AQ=66.93, SD=25.44) each received 60 hours of either phono-motor treatment (PMT)(1), aimed at rebuilding and strengthening damaged phonological neural networks, or Semantic Feature Analysis (SFA), which retrains word knowledge through co-activation of semantic information.

Results: Improved reading aloud accuracy from baseline to after treatment was evident in 3 of 4 participants illustrated by a significant interaction of assessment time by participant. Changes in RT varied (decreased after SFA and increased after PMT) and likely reflected individual reading strategies. For example, patient 1 showed longer RT during follow-up than baseline, which may represent increased focus on ortho-phonological parsing following PMT. In contrast, patient 4 had faster RT at follow-up, which may represent decreased reliance on letter-by-letter reading. For this patient, stimulus length had a significant effect on RT during baseline, but not follow-up testing.

Discussion: Our preliminary data indicate that treatments targeting specific information processing components can be be effectively tailored to improve reading. In our study, one participant failed to improve, possibly due to a larger lesion. In addition to accuracy, we observed that analyzing RT can clarify individual reading strategies.

Keywords: Alexia, Stroke, Aphasia

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P163. Neuropsychology at the stroke unit – Must have?

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Aims: The Montreal Cognitive Assessment (MoCA) has become internationally established for the initial, rapid assessment of cognitive impairment following stroke. However, it underestimates the cognitive deficits of acute stroke patients. At the same time, standardized neuropsychological testing is usually only used in the post-acute phase or rehabilitation. As the aim of this study, we wanted to record how many patients are neuropsychologically impaired not only on the stroke unit, but above all during the course, but score normal on the MoCa.

Method: 31 patients after stroke were assessed between day one and day three on the stroke unit with the MoCA and a standardized neuropsychological examination (in 3 blocks of 30min) to compare the results and test their prognostic validity in a follow-up after six weeks.

Results: The MoCA assessed 17 of the 31 patients as normal and 14 as impaired. In the neuropsychological testing, all patients who were deficient according to MoCA showed deficits, and 15 patients who were supposedly not deficient showed moderate to severe neuropsychological deficits. At the follow-up examination, 75% of the patients assessed as inconspicuous according to MoCA showed persistent cognitive impairment, and 91.7% of the patients who were initially deficient in the MoCA also showed relevant deficits in neuropsychological follow-up.

Discussion: The MoCA is not sensitive enough to identify cognitive deficits. An extension by standardized neuropsychological procedures is needed, especially in the executive and memory functions.

Conclusions: Adequate assessment of cognitive performance in the stroke unit cannot be achieved with a screening procedure such as the MoCa alone but must be supplemented by standardized neuropsychological diagnostics. Neuropsychology at the stroke unit – Must have!

Keywords: Stroke Unit, neuropsychological assessment, MoCA

P164. Testing the Coping Hypothesis: Associations of Processing Speed and Attention with Mental Fatigue in Patients with Subarachnoid Hemorrhage

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Aims: This study investigates whether there are deficits in processing speed and attention in the subacute stage after subarachnoid hemorrhage (SAH). In case deficits are found, we aim to find out whether they are related to mental fatigue and subjective complaints.

Method: Neuropsychological assessment was performed five months post-SAH. Processing speed was assessed using the Trailmaking Test Part A (TMT-A) and Reaction Time tasks S1 (RTs1) and S2 (RTs2) of the Vienna Test System (VTS). Attention was assessed using the Trailmaking Test Part B (TMT-B) and Reaction Time task S3 (RTs3) and Determination Test (DT) of the VTS. 3 items of the Checklist for Cognitive and Emotional Consequences following stroke (CLCE-24) were used to measure subjective complaints in processing speed and attention. Mental fatigue was measured using the Dutch Multifactor Fatigue Scale (DMFS).

Results: 79 SAH patients were included. SAH patients scored significantly worse compared to the control group on all measures of processing speed and attention ($p < .05$). Worse performance on tests of processing speed and attention were related to increased mental fatigue. Worse performance on the RTs1, RTs2 and DT were related to more subjective complaints. A strong correlation between mental fatigue and subjective complaints was found ($r = .691$).

Discussion: These findings are in line with the coping hypothesis, which postulates that in order to compensate for reduced processing speed or attention, patients need to use more mental effort. This mental effort could subjectively be experienced by the patient as mental fatigue or as cognitive complaints.

Conclusions: For clinical practice, it is important to thoroughly assess processing speed and attention in order to alter interventions to the patients' individual needs and to ultimately improve mental fatigue and cognitive complaints.

Keywords: subarachnoid hemorrhage, information processing speed, mental fatigue

P165. Adapting to challenges: coping styles and distress in subarachnoid hemorrhage recovery

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Aims: To investigate the relationships between coping style, cognitive complaints, cognitive performance, and psychological factors 6 months post-SAH. Second, to investigate the influence of coping style on the prevalence of cognitive complaints 1-year after subarachnoid hemorrhage (SAH) and. Second,

Method: Coping style was assessed 6 months post-SAH with the Utrecht Coping List in 56 SAH patients. Coping profiles were divided into active (n = 24, 43%) versus passive/avoidant coping style (n = 32, 57%). The Checklist for Cognitive and Emotional Consequences following stroke was used to assess cognitive complaints 6 months (subacute stage) and 1-year (chronic stage) post-SAH. Furthermore, we examined cognitive performance (processing speed, memory, attention, executive functioning), mood, anxiety, and mental fatigue 6 months post-SAH.

Results: In the subacute stage post-SAH, patients with passive/avoidant coping had significantly higher depression ($p = 0.03$), anxiety ($p = 0.002$) and mental fatigue scores ($p = 0.03$) as compared to patients with active coping. No differences were found for cognitive deficits and cognitive complaints. In the chronic stage, however, SAH patients with passive/avoidant coping reported more cognitive complaints ($p = 0.03$) than patients with active coping. Also, number of cognitive complaints increased significantly between 6 months and 1-year post-SAH, only in the passive/avoidant group ($p = 0.01$).

Discussion: SAH patients with passive/avoidant coping report more symptoms of depression, anxiety, and mental fatigue in the subacute stage post-SAH as compared to SAH patients with active coping style. Interestingly, only in the chronic stage, patients with passive/avoidant coping reported more cognitive complaints. Also, SAH patients with passive/avoidant coping report more cognitive complaints over time.

Conclusions: The use of passive/avoidant coping styles could be related to the development of long-lasting complaints after SAH. Intervention programs that target reduction of these complaints should therefore take into account coping style of patients.

Keywords: stroke, coping, cognition

P166. The association of personality traits with poststroke fatigue in daily life: An exploratory experience sampling method and cross-sectional study

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Aims: Fatigue is a frequently occurring and persistent symptom after stroke. Many biological, psychosocial, and behavioral factors have been associated with poststroke fatigue, but research into associations with personality traits is relatively sparse. In this study, we explored whether personality traits were related to poststroke fatigue measured with conventional fatigue questionnaires as well as experience sampling methodology (ESM).

Method: Twenty-four individuals with stroke completed 10 daily questionnaires about momentary (here-and-now) fatigue for six consecutive days using the mHealth ESM application PsyMateTM. Further, they completed questionnaires assessing personality (NEO-FFI and LOR-T) and fatigue (FSS).

Results: Results showed that higher extraversion (ß=-.44, SE=.12, p=.001; 95% CI=-.67-.19) and optimism (ß=-.18, SE=.06, p=.007; 95% CI=-.30-.05) were associated with lower momentary fatigue. No association was found between neuroticism and momentary fatigue, but higher neuroticism (r=0.531, p=.008, 95% CI=.160-.759; r=.574, p=.003, 95% CI=.245-.767) was associated with higher scores on the retrospective FSS scales.

Discussion: This study aimed to investigate the relationship between poststroke fatigue in daily life and personality traits. We conclude that personality traits differentially influence poststroke fatigue, but this also depends on the way fatigue is measured (with retrospective or with momentary measures).

Conclusions: When functional gains are not in line with expected gains during the rehabilitation treatment of fatigue, it may be appropriate to take into account how person characteristics are related to momentary fatigue.

Keywords: poststroke fatigue, experience sampling method, personality traits

P167. Dyadic coping after stroke – A sorrow shared is a sorrow halved?

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Aims: Many stroke survivors suffer from chronic impairments that interfere with everyday life. These changes pose a challenge not only to the patients, but also to their partners who are confronted with taking over new tasks and roles (e.g., in care and support). When in a relationship, chronic illness requires coping reactions from both partners, so-called dyadic coping. According to the developmental-contextual model by Berg and Upchurch dyadic coping unfolds as a consequence of illness appraisal processes and determines both partners' illness adjustment. Successful dyadic coping usually correlates with positive relationship and individual outcomes. The present study aims to investigate longitudinal associations between stroke appraisal, dyadic coping, and adjustment in couples after stroke.

Method: A sample of 17 couples (stroke survivor and partner) participated in a survey 4 (t1), 12 (t2), and 18 months (t3) after the stroke. The perceived centrality of the stroke to one's life (Centrality of Event Scale) was assessed at t1, dyadic coping (Dyadic Coping Inventory) at t2, and quality of life (WHOQOL BREF) at t3. An actor-partner interdependence model (APIM) examined the longitudinal associations of these variables intra- and interpersonally.

Results: The higher the patients perceived the event centrality at t1, the more dyadic coping they reported at t2. Results for partners demonstrated a trend in the opposite direction. A positive association between dyadic coping and higher physical and psychological quality of life at t3 emerged only for partners, but not for patients.

Discussion: For partners of stroke patients, perceiving joint coping efforts significantly affects their quality of life, whereas patients' well-being might rather depend on other factors in this phase of recovery.

Conclusions: A dyadic perspective on coping after stroke allows to better understand illness adjustment processes and may present a relevant target for (couple) interventions.

Keywords: stroke, dyadic coping, APIM

P168. Using routine clinical brain imaging for lesion symptom mapping of domain-specific cognitive impairments in stroke

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Aims: This large-scale lesion-symptom mapping study set out to investigate the necessary neuro-anatomical sub-strates of 5 cognitive domains frequently affected post stroke: Language, Attention, Praxis, Number, and Memory. This study aimed to demonstrate the validity of using routine clinical brain imaging and standard bedside cognitive screening data from a large, real-world patient cohort for lesion-symptom mapping.

Method: Behavioural cognitive screening data from the Oxford Cognitive Screen and routine clinical neuroimaging from 573 acute patients was used in voxel-based lesion-symptom mapping analyses. Patients were classed as impaired or not on each of the subtests within 5 cognitive domains.

Results: Distinct patterns of lesion damage were associated with different domains. Language functions were associated with damage to left hemisphere fronto-temporal areas. Visuo-spatial functions were associated with damage to posterior occipital areas (Visual Field) and the right temporo-parietal region (Visual Neglect). Different memory impairments were linked to distinct voxel clusters within the left insular and opercular cortices. Deficits which were not associated with localised voxels (e.g. executive function, praxis) represent distributed, bilateral functions.

Discussion: The standardised, brief Oxford Cognitive Screen was able to reliably differentiate distinct neural correlates critically involved in supporting domain-specific cognitive abilities.

Conclusions: By demonstrating and replicating known brain anatomy correlates within real-life clinical cohorts using routinely collected scans and standard bedside screens, we open up VLSM techniques to a wealth of clinically relevant studies which can capitalise on using existing clinical data.

Keywords: Stroke, Cognition, LesionMapping

P169. The Novel Subtask-Specific Cognitive Impairments Predictive of Depression Severity Six-Months Post Stroke

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Aims: Domain-specific cognitive impairments are associated with depression amongst stroke survivors (1). It remains unclear whether specific subcomponents of cognitive domains (e.g., recognition, picture naming) predict depression. This study investigated which task-specific cognitive impairments predict depression severity.

Method: OCS-Recovery participants (N = 385) completed the Oxford Cognitive Screen (OCS) and the Hospital Anxiety and Depression Scale (HADS) six-months post-stroke. Multiple linear regression was performed to predict depression severity from impairments on the 5 OCS cognitive domains, which were further disaggregated to specific tasks within such domains where an association was found (10 OCS tasks).

Results: Only memory impairments (B = 1.09, p = .039, R2 = .08) and spatial attention impairments (B = 1.09, p = .032, R2 = .08) were mildly associated with depression severity. Language, executive function, numeracy, and praxis were not significantly associated with depression severity. When disaggregating memory domain subtasks, only episodic recognition impairments, and not orientation or verbal recognition impairments, significantly predicted depression severity (B = 1.78, p = .015, R2 = .02). Participants with episodic recognition memory impairments had significantly higher HADS-D scores (M = 7.22, SD = 3.96), than those without (M = 5.18, SD = 4.52), t(53.57) = -2.87, p = .005. In the domain of attention, visuo-spatial neglect asymmetries did not predict depression severity (ps > .05), though overall accuracy performance did (B = 1.95, p < .001, R2 = .04). Participants with spatial selective attention impairments were significantly more depressed (M = 6.56, SD = 4.29) than those without (M = 4.90, SD = 3.88), t(228.96) = -3.64, p < .001).

Discussion: These exploratory analyses suggest the importance of considering episodic recognition and selective attention impairments when developing accessible depression interventions for stroke survivors.

Conclusions: Domain-specific associations in memory and attention were most associated with depression severity 6 months post-stroke.

Keyword: Stroke, Cognitive Impairment, Depression

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P170. Long-term cognitive outcome of working-age stroke patients

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Aims: The purpose of this study was to specify long-term cognitive changes of young stroke patients after the spontaneous recovery.

Method: A total of 20 working-age patients (Mage = 47,7, SD = 6,33) with relatively mild unilateral ischemic stroke and 17 matched control subjects participated in the study. Their cognitive status was assessed with several validated tests of attention (Trail Making Test, Bourdon-Wiersma Dot Cancellation Test), memory (WAIS-III Digit Span, Auditory Verbal Learning Test, Rey-Osterrieth Complex Figure) and executive abilities (Verbal Fluency, 5-Point Test) and with two novel tests developed to assess working memory (Comparisons Test) and processing speed (Circles Counting Test).

Results: The patients performance on average of 2,3 years post-stroke (SD = 1,26) was significantly lower in several tests assessing attention and verbal memory compared to control subjects. Analysis of individual patient profiles showed that in about one third of the patients the results were at least 1,5 SD below the mean of the control group in ≥ 4 different test performances.

Discussion: The study indicates that long-term cognitive outcome for most younger patients with relatively mild stroke is rather favorable although some of them might have more permanent cognitive dysfunction that is more likely to go unnoticed in healthcare. Cognitive impairment in turn might result in poor functional and emotional outcome as the daily life of younger adults is usually more demanding. The results are similar to those found in several previous studies although comparable extensive neuropsychological studies assessing the cognition after optimal time frame are lacking.

Conclusions: The study draws attention to the necessity of a more thorough neuropsychological assessment of younger patients with relatively mild stroke.

Keywords: young stroke, neuropsychological assessement, long-term cognitive outcome

P175. Social cognitive ability of mindreading in patients with stroke at subacute phase

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Aims: The aim of this study was to examine the effect of stroke on social cognitive ability of mindreading in particularly the understanding of another individual's feelings, and intentions from eyes.

Method: A total of 22 inpatients admitted to the "THESEUS" Rehabilitation Center examined after an ischemic stroke event at subacute phase (13 right brain-damaged, 9 left brain-damaged) and compared with a matched group of healthy controls (HC, N = 20). The assessment of mindreading ability was conducted using The Reading the Mind in the Eyes Test (RMET) which captures the ability to identify mental states from gaze. Global cognitive status was evaluated with the Montreal Cognitive Assessment (MoCA).

Results: One-way Anova analysis showed that the stroke patients performed significantly worse on the RMET than HC. In contrast, there didn't exist any significant differences between RBD and LBD patients in their mindreading ability. RMET showed significant correlation with MoCA. Older age and low level of education were predictors of worse performance on the RMET.

Discussion: This study indicates that ischemic stroke at subacute phase has a negative effect on the mindreading of gaze displayed mental states and suggest that mindreading impairments manifest independently from the side of the brain damage. Furthermore, global cognitive status and demographic factors are related with these social cognitive difficulties.

Conclusions: Mindreading impairments are present in the subacute stroke, which may contribute to social cognitive deficits of patients with negative affect of their functioning. Assessment and rehabilitation of social cognition functions needs to be a key component of neuropsychological protocols in stroke patients at subacute phase.

Keywords: mindreading, social cognition, stroke

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