WEDNESDAY, JULY 18, 2018

CE Workshop. From neurons to neighborhoods: Bridging science and humanity in search for modifiable markers of aging and dementia

Presenter: Melissa Lamar

9:00–12:00

M. LAMAR. From neurons to neighborhoods: Bridging science and humanity in search for modifiable markers of aging and dementia.
Recent reports suggest declines in the age-specific risk of Alzheimer's disease (AD) in higher-income Western countries. Despite this, investigators believe that worldwide trends of increasing mid-life modifiable risk factors (e.g., vascular risk factors), coupled with the growth of the world's oldest age groups may nonetheless lead to an increase in dementia risk. Thus, the need for pre-clinical markers of AD and related dementias, and a greater understanding of modifiable factors associated with such markers, must continue if we are to successfully combat pathological aging. This CE course will take a 'neurons to neighborhood' approach to addressing these issues given that where people live, as well as how people live, impacts their experience and expression of brain-behavior profiles.
Beginning with an overview of early predictors of pathological brain aging to more recent developments in neuroimaging signatures of disease, this CE course will outline the implications of mixed pathologies associated with dementia including AD and vascular dementia (VaD) as a means to inform the search for preclinical markers in asymptomatic individuals. From there, cognitive phenotypes associated with these neuroimaging markers in preclinical samples, as well as lifestyle and community-based, i.e., neighborhood associates will be discussed.
Attendees of this workshop will come away with 1) an appreciation for the changing demographics of aging and dementia globally, 2) findings to date regarding neuroimaging markers of preclinical stages of disease, as well as the cognitive associates to these markers, and 3) a greater understanding of the role of individual lifestyle and community-based factors on these brain-behavior relationships. Given that the world is both 'thoroughly globalized as well as startlingly unequal' (Isaac Chotiner, Slate Magazine), it is the goal of this workshop to provide a springboard for discussions regarding future research investigating modifiable individual and/or community-based factors as intervention targets to ensure successful aging across diverse populations.
Correspondence: *Melissa Lamar, Rush Alzheimer's Disease Center, Rush University Medical Center, Chicago, USA. E-mail: melissa_lamar@rush.edu*
Keywords: aging, neuroimaging, cognition

CE Workshop. Preschool Neuropsychological Development, Assessment, and Cultural Considerations

Presenter: Amy K. Heffelfinger

9:00–12:00

A.K. HEFFELFINGER. Preschool Neuropsychological Development, Assessment, and Cultural Considerations.
The neural systems underlying neuropsychological functions develop prenatally, throughout childhood, and into adulthood. The preschool period is both a time of rapid development and vulnerability. In the first years of life many neurological, medical, and genetic disorders onset, psychosocial and environmental stressors are hugely impactful, and positive relationships, education and interventions can influence neural system development. This talk will update the participants on neuropsychological development in the preschool years. The second half will describe procedures and interpretation techniques for conducting preschool assessments. Throughout, discussion will include cultural, family, psychosocial and ethical factors that influence development as well as considerations for testing.
Correspondence: *Amy Heffelfinger, Neurology, Medical College of Wisconsin, Milwaukee, USA. E-mail: aheffelfinger@mcw.edu*

CE Workshop. Advances in epilepsy treatment and understanding of neurobehavioral comorbidities

Presenters: Ivan Rektor, Bruce Hermann

9:00–12:00

I. REKTOR, B. HERMANN. Advances in epilepsy treatment and understanding of neurobehavioral comorbidities.
The course will first overview issues pertinent to the treatment of drug-resistant epilepsies beginning with discussion of the major indications for epilepsy

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surgery and the relevant preoperative investigations including ictal video-EEG, advanced MRI, metabolic techniques (e.g., PET, ictal and interictal SPECT) and neuropsychological assessment. Interventions meant to be curative will be reviewed (e.g., lesionectomy, amydalo-hippocampectomy, topectomy, cortectomy, lobectomy, multilobar resection, hemispherectomy) as well as palliative methods (e.g., vagal nerve stimulation, deep brain stimulation [anterior nucleus of thalamus, centrum medianum thalami], responsive brain stimulation (cortex)). Other interventions, currently under active development and investigation, including radiosurgery and thermolesioning using inserted depth electrodes will be discussed. Intracerebral targets for chronic electrical stimulation under investigation will be reviewed as well as non-invasive brain stimulation techniques and the outcomes for these interventions. The course will then turn to the neurobehavioral comorbidities of the epilepsies including anomalies in cognition, behavior, and brain structure and their interrelationships. The emphasis will be on the natural history of these complications of epilepsy in children and adults taking a lifespan perspective with emphasis on the status of patients at the time of diagnosis and prospective change over time.

By the end of the workshop, participants will be able to (1) List the indications for epilepsy surgery and the procedures for the presurgical evaluation; (2) Discuss the neurostimulation techniques used in pharmacoresistent epilepsy; (3) Describe the major neurobehavioral comorbidities of epilepsy; (4) Explain the timing and progression of neurobehavioral comorbidities in children with epilepsy as well as adults with chronic epilepsy.

Correspondence: *Bruce Hermann, Centre of Neuroscience and Epilepsy Centre at St. Anne's Hospital, Masaryk University and Central European Institute of Technology (CEITEC), Brno, Czech Republic. E-mail: hermann@neurology.wisc.edu*

Keywords: epilepsy, cognition, treatment

Lunch Break

12:00–13:00

Plenary Keynote Address. What does neuroscience tell us about free will?

Presenter: John-Dylan Haynes

13:00–14:00

J.D. HAYNES. What does neuroscience tell us about free will?

There has been a long debate as to whether neuroscience poses a challenge to the notion of free will. This debate was sparked by the groundbreaking work of Benjamin Libet, which showed that when people make what they believe to be free choices, these choices are often preceded by choice-related brain signals. These findings have been taken to suggest that a person's "decision" has actually already been initiated or even finalized by unconscious brain signals by the time the awareness of the decision arises. Following up on Libet's work, we have used functional magnetic resonance imaging (fMRI), shifted classification analyses, and real-time EEG to show that the outcomes of free choices can be predicted several seconds *before* a person believes to be making up their mind. In fact, it appears that choice-predictive brain-signals may be taking place even before a person begins to think about their upcoming choice. An interesting question is whether the onset of the choice-predictive brain signals constitutes a point of no return beyond which a person cannot avoid making a decision. Thus far, our work suggests that people can override choice-predictive brain signals until a very late stage of processing. Taken together, our results suggest that choice-predictive brain signals are present, but that people can control the outcome of a decision until a very late stage. Thus, many previous approaches to linking free will with neuroscience are misguided: Instead of relying on demonstrations that free choices can be predicted from prior brain activity, the debate should focus on how the decision is implemented by neural processes.

Correspondence: *John-Dylan Haynes, Bernstein Center for Computational Neuroscience, Charité - Universitätsmedizin Berlin, Berlin, Germany. E-mail: haynes@bccn-berlin.de*

Keywords: Free will, Executive Functions, Neuroimaging

Symposium 1. Rare and Unusual Disorders: Presentation and Progress Over Time

Chair: Barbara A Wilson

14:10–15:40

B.A. WILSON. Rare and Unusual Disorders: Presentation and Progress Over Time.

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Symposium Summary: In January 2018, a special issue of the journal Neuropsychological Rehabilitation was published on Rare and Unusual Disorders. This symposium follows on from the cases described in that issue. Three papers are follow ups of people reported in the special issue while one is a new disorder. First is Louise, diagnosed with Alexander's Disease, a childhood dementia, at the age of five years. She is still alive at the age of 40 making her the longest lived person diagnosed with this condition. The Reversible Cerebral Vasoconstriction Syndrome is an angiopathy characteristically signalled by severe thunderclap headaches. The condition usually resolves within a few weeks. It is believed it resolves without residual neurological or cognitive sequelae unless there has been intracranial bleeding. However, the woman described did not have haemorrhagic complications during the course of her illness, yet she had persistent and significant cognitive impairment despite the fact that neuroimaging showed that the condition had resolved. Further neuropsychological assessment shows her recovery has not been uniform. The third talk describes a man with Akinetic Mutism who rarely spoke but when he did his speech was grammatical and not dysarthric. Since publication earlier this year, he started speaking normally for a while until an infection reduced his spoken output once more. The final presentation reports on an unreported rare disorder, Evans Syndrome, a haematological autoimmune disease in which the body makes antibodies that destroy platelets and red and white blood cells. A 44 year old man is described who was diagnosed with ES in 2007 following a 5 year history of symptomology. This would appear to be the first detailed neuropsychological assessment of someone with this condition. These cases show how people can fall between the cracks' when we do not have complete knowledge of the full spectrum of symptoms associated with their condition.

Correspondence: *Barbara Wilson, Neuropsychology, Raphael Hospital, Tonbridge, UK. E-mail: barbara.wilson00@gmail.com*

B.A. WILSON. Probably the longest lived patient on record with Alexander's Disease.

Alexander's Disease or Alexander's Leukodystrophy (AL), is essentially a childhood dementia. It is a rare genetic disorder characterised by abnormal protein deposits. These deposits are found mainly in astrocyte cells. The disease is inherited in an autosomal dominant pattern. The affected gene is the glial fibrillary acidic protein or GFAP gene.

The most common classification system suggests there are three main subtypes of AL: the infantile form with onset between birth and two years of age; a juvenile form with an onset between 2 and 12 years; and an adult form with an onset after 12 years of age. The infantile form is the most common and is usually fatal within the first decade of life. One paper from Japan, however, reports the long term survival of a patient with the infantile form of the disease who is still alive at the age of 25 years and 7 months (Wakabayashi et al 2005). Onset in adulthood is the least common.

We report the case of LD, a 40 year old woman diagnosed at Great Ormond Street Hospital (GOSH) with AL at the age of 5 years (juvenile form). Genetic testing in July 2016 confirmed that the diagnosis was correct. We believe her to be the longest lived patient with AL on record. LD has been assessed neuropsychologically over a number of years. Between the ages of five and 16 years she was assessed at GOSH and found to have mild special educational needs. Since the age of 35 she has been assessed once a year at the Raphael Hospital. Initially she had some speech, smiled frequently and could write her name. Over the years she has steadily declined but remains physically well. Although a more detailed paper about LD was published when she was 38 years old, she is now two years older and, at the age of 40 years is still alive. We suggest the expected life span of AL be extended.

Correspondence: *Barbara A. Wilson, Neuropsychology, The Raphael Hospital, Tonbridge, UK. E-mail: barbara.wilson00@gmail.com*

Keywords: Alexander's Disease, Dementia, decline over time

M. PERDICES, G. HERKES. Reversible cerebral vasoconstriction syndrome: long-term neuropsychological outcome.

Reversible cerebral vasoconstriction syndrome (RCVS) is an angiopathy often heralded by severe thunderclap headaches and characterised by segmental vasoconstriction of cerebral arteries. Initially there may be transient focal neurological signs, but RCVS usually resolves within three months of onset. If strokes occur, there may also be persistent neurological and/or cognitive deficits. We report the case of RH, a 34 year-old woman who presented with a history of sudden onset thunderclap headache, nausea, vomiting and neck stiffness. Neurological examination was normal. Magnetic resonance angiography showed irregular narrowing of the left anterior and middle cerebral arteries. The vascular abnormalities resolved within a few days of intravenous administration of verapamil. Neuropsychological evaluation 16 months later revealed significant deficits in autobiographical memory, verbal and non-verbal new learning and

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active delayed recall, cognitive flexibility, abstraction and (to a lesser extent) immediate attention span and information processing speed. RH's case was unusual because: (i) the "trigger" for RCVS (surgical repair of a nasal sinus) had not been previously reported; and (ii) despite there being no haemorrhagic events and no subsequent radiological abnormalities, she had significant residual cognitive impairment. To further add to the puzzle, follow-up neuropsychological evaluation 10 months later demonstrated significant improvement in verbal memory, of such magnitude that RH had noticed positive changes in her day-to-day life. There was, however, a severe impairment of planning that had not been evident on the first assessment. Moreover, there had been no new neuropathology that could have accounted for this development. Otherwise, RH's neuropsychological profile had remained stable. To date, persistent neuropsychological deficits have not been recognised as a feature of RCVS. Their prevalence and natural history following RCVS remains unknown.

Correspondence: *Michael Perdices, Neurology, Royal North Shore Hospital, Sydney, Australia. E-mail: michaelperdices@gmail.com*

Keywords: angiopathy, cognitive dysfunction, long-term outcome

N.U. MISTRY, B.A. WILSON, A.E. ROSE. The ups and downs of recovery in a man with akinetic mutism.

Background and aims: Akinetic Mutism (AM) is a rare syndrome characterised by reduced motor function including facial expressions, gestures and speech output but with some degree of alertness following damage to the frontal lobe and, or frontal subcortical circuits. Since a previous publication about David, a man with AM, he has shown some recovery followed by a period of deterioration. The aim is to document this pattern of improvement and deterioration.

Method: This study discusses the case of David, a 73 year old man with AM following a stroke affecting the middle cerebral artery. Bilateral brain damage was evident from a CT scan at the time, with old ischaemic infarcts affecting the right frontal lobe, the left occipital lobe and the left parietal lobe. David presented as alert, awake and was not paralysed. His communicative engagement was limited, he spoke very little but when he did speak, he was able to use appropriate articulation, grammar and intonation. We report on assessments from speech and language therapy and neuropsychology carried out since the previous publication.

Results: Since publication, David recovered to such an extent that he was no longer in the AM state. His spoke frequently, initiated conversation, responded to questions and sang along to songs. During the latter part of 2017, David then declined, he spoke little although he was alert, awake and was not paralysed. There were no clinical signs to suggest that he had suffered another stroke and he appeared to regress to the AM diagnosis.

Conclusion: Based on speech and language therapy and neuropsychology assessments carried out with David, we discuss the diagnosis and the recovery of AM for this case since the last published paper alongside the challenges in assessing such patients.

Correspondence: *Nimisha U. Mistry, Speech and Language Therapy, The Raphael Hospital, Tonbridge, UK. E-mail: SALT2@raphaelhospital.co.uk*

Keywords: Akinetic mutism, Neurological recovery, Stroke

A.E. ROSE, B.A. WILSON. Evans Syndrome: A description and a case study.

Background and Aim: Evans syndrome (ES) was first described in 1951 by Robert Evans. ES is a rare haematological autoimmune disease in which the body makes antibodies that destroy platelets and red and white blood cells. Individuals with ES can present with deficits in all three of these blood cells at any one time, or may only have deficits in one or two of them. The exact pathophysiology is unknown, however it is noticed that regular relapses of the condition can occur. There has been rare documented evidence of an association with ES and inflammation of the central nervous system (e.g. Simon et al., 2013), thus suggesting relevance for hematology and neurology alike.

Method: DV is a 44 year old man who was diagnosed with ES in 2007 following a 5 year history of symptomology. In July 2010 DV had a relapse and subsequently contracted meningitis and a stroke in the hypothalamic region. DV has been regularly assessed since 2012.

Results: Initial assessment highlighted significant decline in IQ compared to pre-morbid predictors. He had intact comprehension and perceptual abilities and was able to communicate using gestural responses. In 2014 he developed pneumonia and was admitted to hospital. On his return his cognitive profile had further deteriorated and his ability to communicate was inconsistent and he was less responsive.

Conclusions: As far as we are aware, this is the first neuropsychological investigation of a man with ES. As a result of DV's propensity to immune deficiencies and resulting infections cognitive deterioration has occurred impacting on his

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communication ability and responsiveness to his environment.

Correspondence: *Anita E. Rose, Neuropsychology, The Raphael Hospital, Tonbridge, UK. E-mail: draerose@btinternet.com*

Keywords: Evans Syndrome, Neuropsychological Outcome, Cognitive Screening

Symposium 2. Cognitive effects of cancer and cancer treatment

Sponsored by the Cognition and Cancer Task Force (CCTF)

Chairs: Sanne B Schagen, Jeffrey S Wefel

14:10–15:40

S.B. SCHAGEN, J.S. WEFEL. Cognitive effects of cancer and cancer treatment.

Symposium Summary: Long-term cancer survivors are steadily increasing and many patients develop cognitive dysfunction that can result in diminished functional independence. In this symposium that focuses on cognitive functioning in cancer patients, we will summarize the knowledge on the incidence, risk factors and causes of cognitive dysfunction in patients with adult-onset central nervous system (CNS) and non-CNS cancer and in survivors of childhood cancer. We will discuss the phenotypic cognitive profiles and potential mediators and moderators of cognitive outcomes. Developments in the understanding of the neural mechanisms underlying cancer therapy–associated neurotoxicity will be highlighted and interventions will be discussed. Knowledge gaps and future directions will be presented. Attention will be paid to the role research cooperative groups hold to advance our understanding of cancer and cancer therapy-associated cognitive dysfunction – an understanding that forms the basis of preserving/enhancing cognition.

This symposium is organized by the International Cognition and Cancer Task Force (ICCTF). The mission of ICCTF is to advance the understanding of the impact of cancer and cancer-related treatment on cognitive functioning. Members of ICCTF conduct research to help elucidate the nature of the cognitive sequelae associated with cancer and cancer therapies, the mechanisms that underlie these changes, and to develop and test interventions to prevent/manage these undesired toxicities. A goal of ICCTF is to serve as a resource for information about research and clinical resources for cancer patients. By way of creating recommendations, ICCTF endeavors to increase the homogeneity of study methodology. This will help ensure minimal levels of acceptability in design and facilitate between-study comparisons. This should help patients and professionals to determine accurate estimates of incidence, severity, individual risk factors, causes and interventions for cognitive dysfunction.

Correspondence: *Sanne B. Schagen, Psychosocial research and Epidemiology, Netherlands Cancer Institute, Amsterdam, the Netherlands. E-mail: s.schagen@nki.nl*

J.S. WEFEL. Neurocognitive functioning in patients with brain tumors.

Although primary brain tumors are rare, accounting for only 1.4% of all cancer, brain metastases are estimated to occur in greater than 15% of all cancer patients. Primary and metastatic brain tumors, and their treatments, carry with them significant morbidity and mortality. Recent improvement in survival time has underscored the importance on efforts focused on improved survivorship.

Patients with brain tumor present with multiple symptoms most commonly cognitive dysfunction, headache, seizure, and neurologic deficit. Both tumor and treatment side effects contribute to cognitive dysfunction. Cognitive and neurobehavioral issues are the most disturbing to survivors and caregivers, present the largest barrier to competitive employment, are associated with reductions in quality of life and functional independence, and are associated with reduced survival time.

In this symposium we will discuss the neuropsychological correlates of lesion location, volume, and momentum; the ability of preoperative neuropsychological data to predict postoperative outcomes; the prognostic significance of cognitive and emotional function for survival; cognitive phenotypes of molecularly defined glioma subtypes; the impact of therapies on cognitive function and risk factors for treatment related cognitive decline; and interventions to prevent and ameliorate cognitive dysfunction in patients with CNS tumor.

Correspondence: *Sanne B. Schagen, Section of Neuropsychology. Departments of Neuro-Oncology and Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, USA. E-mail: s.schagen@nki.nl*

S.B. SCHAGEN. Neurocognitive functioning in patients with non-CNS tumors.

With the growing community of cancer survivors and the increasingly chronic nature of several

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common cancers, the management of symptoms related to cancer and cancer treatment has become an important part of survivorship care. The last decade has seen a surge in research showing that non-central nervous system cancer and its treatment can be associated with cognitive decline in a number of patients.

In this presentation research will be presented on the incidence, nature and severity of this cognitive decline. It will be demonstrated that cognitive decline may occur early or later in the disease and treatment course, with studies showing cognitive changes in cancer patients even before the start of any therapy, differentially explained by cancer pathogenesis, inflammatory cytokine levels and fatigue. Evidence will be presented that systemic therapy (mostly chemotherapy and to a lesser extent endocrine therapy) can influence cognitive functioning in a dose- and regimen-specific manner, independent of the effects of being diagnosed and treated for cancer and the distress that accompanies this. Results from preclinical studies will be discussed showing that cytostatic agents from different classes can impact neural progenitor cells, post-mitotic oligodendrocytes, upregulate neural activity and increase synaptic death in cultured neurons. And lastly, several preclinical studies have now provided evidence that (in the lab) pharmacological interventions may be able to prevent cognitive impairment and brain changes induced by cytostatic agents. These studies will be discussed as well as the currently available cognitive and behavioral interventions for cancer patients confronted with cognitive decline.

Correspondence: *Sanne B. Schagen, Psychosocial research and Epidemiology, Netherlands Cancer Institute, Amsterdam, the Netherlands. E-mail: s.schagen@nki.nl*

K. KRULL. Neurocognitive functioning in survivors of childhood acute lymphoblastic leukemia (ALL).

Treatment for childhood ALL has advanced such that more than 95% of those children newly diagnosed are expected to be long-term survivors. Improved survival has led to the recognition of late effects of cancer therapy, including impaired neurocognitive function. Cranial irradiation, intrathecal methotrexate, high-dose intravenous methotrexate and corticosteroids are known risk factors, though sex, age at diagnosis, health behaviors and chronic health conditions moderate/mediate the impact of these factors.

Data will be presented on phenotypic outcomes in long-term survivors of childhood ALL treated on traditional and contemporary chemotherapy-only protocols, and patterns of change through adolescence and adulthood will be displayed. Cerebrospinal fluid biomarkers will be presented to elucidate mechanisms of central nervous system (CNS) injury resulting in neurocognitive morbidity and neuroimaging outcomes. Data demonstrating the impact of sleep disorders, cardiopulmonary and endocrine conditions will also be presented.

Longitudinal evaluation of the sources of variability in CNS outcomes in long-term survivors of childhood ALL reveals that patterns of neurocognitive problems evolve over time, and risk factors contribute differentially based on sex and stage of survivorship. These multifactorial influences need to be considered in planning and implementing interventions to improve neurocognitive outcomes. Interventions may include aerobic exercise, cognitive training, pharmaceuticals, neural stimulation or improving health behaviors, among others. Examples from randomized clinical trials involving preventative and recovery-based interventions will be presented.

Correspondence: *Sanne B. Schagen, Department of Epidemiology and Cancer Control, Department of Psychology, St. Jude Children's Research Hospital, Memphis, USA. E-mail: s.schagen@nki.nl*

M.B. DE RUITER. Neuroimaging of neurocognitive dysfunction in adult-onset cancer.

Neurocognitive dysfunction occurs both in patients with central nervous system (CNS) cancer as well as patients with non-CNS cancer. The underlying neural basis for cancer- and treatment related neurocognitive dysfunction has been the focus of neuroimaging studies. In this presentation I will highlight neuroimaging studies in patients with adult-onset cancers. In non-CNS cancer, earlier work predominantly focused on side effects of chemotherapy in long-term cancer survivors, and is now complemented by prospective studies, studies assessing other types of systemic treatment, and studies assessing neural aspects of neurocognitive dysfunction in cancer patients not exposed to (systemic) treatments. In CNS cancer (both primary brain tumors as well as brain metastases), neuroimaging is indispensable for diagnostic purposes and for monitoring treatment response and side effects of treatment. More recent studies have begun to characterize more comprehensively injury to healthy brain tissue due to tumor activity and tumor treatment, and its relation to neurocognitive dysfunction.

A wide arsenal of neuroimaging techniques is used to study the brain basis of neurocognitive dysfunction. The field is dominated by studies employing MRI techniques that allow the

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characterization of various aspects of brain structure and function. Rapid advancements in post-processing algorithms have promoted a clear shift from a *localization view* to a *network connectivity view* of the brain. Combined with advanced prediction models (e.g., based on machine learning) this connectivity approach does not only allow us to more fully understand the neural basis of neurocognitive dysfunction in cancer patients and survivors, but might also aid in identifying subgroups of patients at risk for neurocognitive dysfunction due to specific treatments, and patients who will most likely benefit from therapeutic interventions to ameliorate or prevent neurocognitive dysfunction.

Correspondence: *Sanne B. Schagen, Psychosocial research and Epidemiology, Netherlands Cancer Institute, Amsterdam, the Netherlands. E-mail: s.schagen@nki.nl*

Paper Session 1. Executive functioning: Interface with memory and self-regulation

Moderator: Mervi Jehkonen

14:10–15:40

E.S. HALLOWELL, E. DUPREY, T. YU, S.W. LIEBEL, A.W. BARTON, A. OSHRI, G.H. BRODY, L.H. SWEET. The moderating effect of supportive parenting on the relations between poverty and executive functioning in young adulthood.

Objective: Low socioeconomic status (SES) during childhood has been associated with poor cognitive (e.g., executive functions), psychosocial, and health-related outcomes across the lifespan. Parenting behaviors may mitigate this effect. The present study examined the hypothesis that the effect of childhood SES risk on adult executive functioning is attenuated by supportive parenting behaviors throughout childhood.

Participants and Methods: 112 African Americans from the United States (53.6% female) were recruited for participation in a longitudinal study (ages 11-25). An SES risk index of six dichotomous variables (e.g., family poverty status, perceived adequacy of income) and supportive parenting behaviors (the Consistent Discipline and Monitoring Parenting scale and Ineffective Arguing Inventory) were assessed by parental report (ages 11-17). Adult executive functioning abilities across several tasks (i.e., Trail Making Test, Digit Span, N-Back, Flanker, and Unstructured Task) were assessed at age 25.

Results: Pearson correlations indicated that SES risk was negatively associated with both supportive parenting (r = -.293, p< .01) and executive functioning (r = -.201, p < .05). A multiple regression model on EF revealed a significant interaction between SES-risk and supportive parenting (F [1, 106] = 4.084, p = .046, DR^2 = .035; B = -.550, 95% CI = .010, 1.089), controlling for gender and education. SES-risk was associated with lower EF among young adults who did not receive supportive parenting (simple slope = -.873, 95% CI = -1.594, -.153, p = .018), but not among those who received high levels of supportive parenting (simple slope = .227, 95% CI = -.596, 1.049, p = .586).

Conclusions: Results suggest that supportive parenting behaviors may mitigate the negative effect of SES-risk on adult executive functioning. The present findings inform preventive interventions on the utility of parenting to protect impoverished youth from reduced executive functioning.

Correspondence: *Emily S. Hallowell, Psychology, University of Georgia, Athens, USA. E-mail: emily.hallowell@uga.edu*

Keywords: executive functioning, chronic stress, cognitive

E. MASSICOTTE, C. ROULEAU, C. GINGRAS, S.M. DESCHÊNES, P. JACKSON. Impulsivity and inhibition interact with BMI to predict food craving increased following induced acute stress.

Objective: Stress is known to have a deleterious effect on executive functions, food craving and food intake; which can, in turn, increase obesity. However, the mechanisms underlying this effect remain poorly understood. The goal of this study was thus to understand which variables are implicated in the impact of induced acute stress on food craving and food intake.

Participants and Methods: 30 adults with BMI ranging from 19 to 39,5 and aged between 19 and 34 years were submitted to the Trier Social Stress Test (TSST). Executive functions (inhibition, flexibility) and food craving were assessed before and after the induced stress. Food craving induction and food intake protocols were administered after stress induction, followed by self-reported impulsivity. A stepwise logistic regression was performed to predict food intake, and moderation analyzes were performed to test moderation of the relationship between stress induction and food craving induction by BMI and executive functions.

Results: Food intake following stress induction was significantly predicted by food craving post induction and flexibility post-TSST (R^2 = 0,44; p <

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0,01), with higher food craving and lower flexibility leading to greater food intake. BMI was found to moderate the relationship between stress induction and food craving induction, and both inhibition and impulsivity were found to moderate this effect of BMI. Specifically, stress increased significantly food craving following induction only if BMI was high and inhibition capacity was low, or if BMI was high and impulsivity was high.
Conclusions: Those results highlight the importance of stress, food craving, executive functions and the interaction between these variables in the clinical understanding of obesity. They also suggest that research avenues for intervention such as stress management and cognitive remediation, for instance targeting the improvement of executive functions, could be useful to increase control of food intake.
Correspondence: *Elsa Massicotte, Université Laval, Quebec, Canada. E-mail: elsa.massicotte.1@ulaval.ca*

O.F.A. BUENO, S. BATISTELA, I.S.S. TUDESCO, S.A.P. BOLOGNANI, N.M.F. SOUSA. Paired associates and working memory in amnesic patients.
Objective: To verify if working memory (WM) components affect the performance on easy and hard word paired associates. **Participants and Methods:** 15 amnesic patients with mixed etiologies divided in two subgroups: NUL subgroup (n=7, who had 0 raw score in delayed Logical Memory) and MOR subgroup (n=8, who remembered at least 1 item in delayed Logical Memory). Random Number Generation (RNG), a brief and effective task to clinically assess changes in the prefrontal cortex was used to evaluate the central executive (CE) component because it requires attention, inhibitory control, concentration, selection of stimuli, ability to abstract, planning, flexibility and self-control. The MOR subgroup showed a better performance in RNG than NUL. Episodic buffer (WM capacity), assessed by a complex task (OSPAN) was impaired in both subgroups compared to controls, and did not differ from each other. Pairs of words were read; immediately and 20 min after the first word of each pair was presented and the word that makes up the pair had to be remembered. The word pairs were either semantically related (easy pairs) or unrelated (hard pairs). **Results:** As expected, the capacity of amnesic patients of both subgroups to make associations between unrelated word was impaired. But lesser performance was also observed in immediate recall of easy pairs, in which the relationship between the two words was already established. **Conclusions:** Episodic buffer impairment seems to increase amnesic's difficulty of forming episodic memory associations, but CE impairment has little, if any, additional effect on this difficulty. These results support the notion that MTL is crucially necessary to bind together unrelated items and related items to context.
Correspondence: *Silmara Batistela, Universidade Federal de São Paulo and Universidade Federal do ABC, São Paulo and São Bernardo, Brazil. E-mail: batistela.sil@gmail.com*
Keywords: Amnesia, Working Memory, Associative episodic memory

R. SZCZEPANOWSKI, E. CICHOŃ, P. KRUK. Memory load does not affect metacognitive processes in suppressing unwanted contents: evidence from think/no-think paradigm.
Objective: In the context of processing intrusions, the main goal of individual is to suppress such undesired contents by keeping them out of consciousness. According to the metacognitive view of suppression, control and monitoring processes that manage memory and attention are needed to reduce the availability of unwanted contents to consciousness. When the mechanisms of control are weakened, there should be an increase of monitoring to the undesirable level leading to more frequent experiences of intrusions. To explore this idea, we investigated suppression mechanisms under a think/no-think paradigm with emotional words and then manipulated control processes with memory load.
Participants: Twenty six undergraduates from SWPS University, Faculty in Wroclaw, volunteered in this study.
Methods: To measure suppression, the think/no-think experiment with emotional words was employed. The effects of memory load on suppression were manipulated with the administration of a secondary task aimed at disrupting performance of the selected working memory components. In addition, several measures of metacognition were taken based on confidence ratings and subjective reports.
Results: The results were analyzed using a three-way mixed ANOVA design that indicated strong effects of suppression as forgetting worked more effectively for suppressed words as compared to conscious recollection of the words. The results of stronger forgetting were also indicated for the emotional words. However, memory load did not affect metacognitive functioning under any experimental conditions.
Conclusions: The outcomes from the think/no think experiment strongly suggest that memory load does not influence the effectiveness of metacognitive mechanisms underlying suppression of

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intrusions. Our research also implies that metacognitive control and monitoring represent adaptive faculties resistant to influences from other cognitive processes.

Correspondence: *Remigiusz Szczepanowski, Faculty of Psychology in Wroclaw, SWPS University of Social Sciences and Humanities, Wroclaw, Poland. E-mail: rszczepanowski@swps.edu.pl*

Keywords: suppression, metacognition, think/no-think paradigm

S. WONG, M. IRISH, J.R. HODGES, O. PIGUET, F. KUMFOR. Executive dysfunction in dementia syndromes: insights from tests of planning and reasoning.

Objective: The prefrontal cortex plays a central role in executive functions. Early and prominent atrophy of the prefrontal cortex is evident in behavioural-variant frontotemporal dementia (bvFTD), whereas patients with Alzheimer's disease (AD) show predominant medial temporal and parietal lobe atrophy. Despite these divergent patterns of regional atrophy, previous studies have demonstrated similar impairments on several tests of executive function (e.g., mental flexibility, fluency) in these syndromes. Measures of planning and reasoning purportedly assess dorsolateral prefrontal cortex functions, yet profiles of performance on these commonly used clinical tests have not been directly compared in bvFTD and AD.

Participants and Methods: In this study, 16 bvFTD and 8 AD patients and 15 age-matched healthy controls completed a battery of executive function tests, including the Modified 6 Elements Test, Zoo Map Test and Tower Test.

Results: Compared to controls, both patient groups showed impaired performance across the three summary scores. In contrast, subscores assessing discrete aspects of task performance (e.g. time, errors, rule breaks) revealed more perseverative responses and rule breaks in bvFTD patients. Further, both bvFTD and AD patients benefited from the provision of an externally imposed strategy on the Zoo Map Test.

Conclusions: Our findings therefore indicate that, although both bvFTD and AD patients show impaired overall performance on tests of planning and reasoning, analysis of subscores revealed distinct mechanisms for these reductions in performance. From a clinical perspective, our findings highlight the value in incorporating these executive measures to identify potential management strategies to circumvent deficits in planning and reasoning.

Correspondence: *Stephanie Wong, University of Sydney, Sydney, Australia. E-mail: stephanie.wong@sydney.edu.au*

Keywords: dementia, other cortical, dementia, Alzheimer's disease, executive abilities, abnormal

Paper Session 2. Behavioral and compensation strategies: Toward improving cognitive functioning among older adults with and without dementia

Moderator: Tomas Nikolai

14:10–15:40

M.A. FERNANDES, M. MEADE. Enhancing Memory using Drawing as an Encoding Tool in Healthy Aging Adults, and in Patients with Dementia.

Objective: In our recent research, we explored whether drawing pictures of to-be-learned information enhanced memory, and found it to be a reliable, replicable encoding strategy to boost performance in younger adults. In the current study we examined whether healthy older adults, and patients with dementia, might also benefit from drawing as an encoding tool. Our prediction was that drawing would serve as a particularly effective form of environmental support at encoding as it encourages a more detailed perceptual representation.

Participants and Methods: Patients with mild to moderate dementia and age-matched control participants were presented 30 nouns, one at a time, and asked to either draw a picture or repeatedly write out the word. Following this encoding phase, memory was assessed by a free recall test for all words, then a recognition test.

Results. While healthy aging adults recalled more words overall, both groups remembered more words that had been drawn than written at encoding. The dementia group recalled twice as many drawn than written words though this effect size was significantly larger in healthy aging adults. Overall recognition scores did not differ across the groups. Again both groups recognized more of the drawn than written words, though the magnitude of this difference was larger for the healthy aging group.

Conclusions. We suggest that incorporating visuo-perceptual information into the memory trace, by drawing pictures during initial encoding, increases reliance of the memorial representation on visual sensory brain regions, which are relatively intact in healthy aging and in patients with dementia, relative

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to simply writing out words. Overall, results indicate that drawing is a highly valuable form of environmental support that can significantly improve memory performance, and is a simple means of enhancing retention that is effective even in patients with dementia.

Correspondence: *Myra A. Fernandes, Psychology, University of Waterloo, Waterloo, Canada. E-mail: mafernan@uwaterloo.ca*

Keywords: memory, dementia, aging

C. PADGETT, M. SUMMERS, R. MARRIS, J. VICKERS. Physical Activity, APOEe4 Status and Cognitive Function in Later Life.

Objective: There is evidence that higher level of physical activity reduces late-life cognitive decline, including risk of developing Alzheimer's Disease. There is also evidence that possession of the APOEe4 allele is associated with greater risk of Alzheimer's disease. It is unclear whether either of these factors are associated with differences in the cognitive function of healthy older adults, or whether these factors interact. This study aimed to explore the individual and interactive effects of physical activity and APOE status in relation to cognitive function of healthy older adults, to determine whether either is associated with poorer cognitive function in this population.

Participants and Methods: Participants were screened for dementia, and other neuropsychiatric conditions. A total of 200 participants (m = 61, f = 139), who were aged over 55 years old, completed a battery of cognitive tasks measuring executive function, short and long term memory and learning. Participants also completed a self-report measure of current physical activity and were categorised as having high or low activity levels. Participants were also genotyped for APOE status and categorised as e4 carrier or non-carrier.

Results: There were no significant differences on demographic measures (including body mass), or estimated FSIQ. A series of 2 x 2 ANCOVAs (controlling for age) were undertaken, and these revealed no significant differences for physical activity level, APOE status, or interaction between physical activity and APOE.

Conclusions: It appears that in healthy older participants, neither physical activity or APOE status influence cognitive function. However, future research should use objective measures of physical activity rather than self-report, and the interaction between physical activity and APOE should also be explore further in mild cognitive impairment and dementia.

Correspondence: *Christine Padgett, Medicine (Psychology), University of Tasmania, Hobart, Australia. E-mail: Christine.Padgett@utas.edu.au*

Keywords: Aging, normal, genetic neuropsychology, physical activity

N.L. FRANKENMOLEN, L. FASOTTI, R.P.C. KESSELS, J.M. OOSTERMAN. Memory strategy use and the effect of strategy training in older adults with subjective memory complaints.

Objective: Subjective memory complaints (SMC) are common among older adults. It is unclear to what extent adults with SMC spontaneously use memory strategies to compensate for their memory problems, which mechanisms underlie strategy use and whether adults with SMC benefit from strategy training in their daily life memory functioning.

Participants and methods: In several studies, we recruited 83 adults (18-85 years) without SMC and 60 older adults (50-87 years) with SMC. Assessments included measures of Executive Functioning (EF), Cognitive Reserve (CR), memory functioning in daily life, strategy use and memory performance. In a Randomized Controlled Trial (RCT), older adults with SMC received 7 sessions of memory strategy training (N=28) or control memory training (N=26). Assessments were performed at baseline, after training and at 6-months follow-up.

Results: Across the lifespan, CR was the strongest predictor of spontaneous strategy use, whereas only limited effects of age and EF were found. In older adults we found that older adults with SMC used more strategies than those without. Results from the RCT showed that memory functioning in daily life increased more after strategy training than after restorative training, up to 6-months after training, whereas no beneficial effect was found on objective memory performance. Furthermore, an increase in strategy use in daily life was the strongest predictor for subjective memory improvement after training. CR did not moderate the effect of strategy training.

Conclusions: Although older adults with SMC tend to compensate for their memory complaints with the use of memory strategies, they still benefit from strategy training aimed at increasing and optimizing their strategy use. Further research on the role of CR is required.

Correspondence: *Nikita L. Frankenmolen, Centre for Cognition, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, the Netherlands. E-mail: n.frankenmolen@donders.ru.nl*

Keywords: Aging, Cognitive reserve, Subjective cognitive impairment

K. DOSHI, S. HENDERSON, K. WONG, J. TENG, Z. HASSIRIM, J. LIM. Evaluating the

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impact of mindfulness training on attention and memory among older adults diagnosed with mild cognitive impairment: a randomized controlled trial.

Objective: Mindfulness-based training (MBT) has shown significant promise as an intervention to halt and even reversing age-related cognitive impairment. We conducted a three-armed randomized controlled trial to evaluate the impact of MBT on neuropsychological outcomes of older adults diagnosed with mild cognitive impairment.

Participants and Methods: 63 participants diagnosed with MCI were randomized to one of the following three arms: (i) an 8-week MBT program, (ii) an 8-week cognitive rehabilitation therapy program (CRT; active control), and (iii) a no intervention arm (passive control). Assessors, blind to participant group assignment, administered the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) evaluating the cognitive domains of attention, immediate and delayed memory one month prior to and following the 8-week intervention period. Generalized linear modeling was performed to evaluate for pre- and post- intervention changes within and between each arm of the trial.

Results: Repeated measures within-subject analysis demonstrated a significant improvement over time across groups on the domains for delayed memory, ($F(1,48) = 4.74$, $p = .034$, $\eta p2 = 0.09$) [Pre:M=88.94 (SD=21.25); Post:M=92.69 (SD= 24.0)] and attention, ($F(1,47) = 7.53$, $p = .009$, $\eta p2 = 0.138$) [Pre:M=92.20 (SD=18.75); Post:M=96.52(SD= 18.98). Paired samples T-test analysis indicated that participants who received MBT performed significantly better on the delayed memory domain ($T(19) = -2.41$, $p = .026$, Cohen's $d = 0.27$), [Pre:M=82.75 (SD=23.51); Post:M=89.35(SD= 24.61)]. No significant difference in performance on cognitive tests were reported for participants assigned to the CRT and no intervention arm.

Conclusions: Among older adults diagnosed with MCI, mindfulness-based training does promote improvements in their ability to attend to, retain and retrieve information.

Correspondence: *Stacey Henderson, Neurology, Singapore General Hospital, Singapore, Singapore. E-mail: stacey.lee.henderson@sgh.com.sg*

Keywords: mild cognitive impairment, mindfulness-based training, delayed memory

Afternoon Coffee Break

15:40–16:00

Welcome Ceremony

16:00–16:30

Presidential Address. What does the science of childhood brain disorders teach us about the evolution of the human social brain?

Presenter: Keith O. Yeates

16:30–17:30

K.O. YEATES. What does the science of childhood brain disorders teach us about the evolution of the human social brain?

The human brain may have evolved largely in response to the adaptive demands associated with being a highly-social animal. Human development also is heavily influenced by social interaction, and social development has critical implications for children's functioning at home, in school, and in the community. Human development occurs over an extended period, allowing for increased flexibility and adaptability as a species but also potentially increasing the vulnerability of young organisms to disruptive influences on development, such as acquired brain disorder. This presentation will review current models of social competence and their applicability to pediatric brain disorder, and summarize current research regarding the social outcomes of a variety of pediatric brain disorders, including traumatic brain injury, stroke, and brain tumors. The evidence will be used to argue that we may be able to draw important inferences about the evolutionary history of the human social brain by examining breakdowns in social function and their neural substrates.

Correspondence: *Keith O. Yeates, University of Calgary, Calgary, Canada. E-mail: kyeates@ucalgary.ca*

Keywords: Pediatric, Social

Welcome Cocktail

17:30–18:30

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Paper Session 3. Subjective cognitive complaints among healthy older adults: Neuroimaging and neuropsychiatric correlates

Moderator: Emilia Łojek

7:40–8:35

L. OHLHAUSER, A. PARKER, C. SMART, J. GAWRYLUK. Microstructural White Matter Metrics in Individuals with Subjective Cognitive Decline.

Introduction: Recently, a group earlier along the cognitive continuum between normal aging and mild cognitive impairment, who are at risk for Alzheimer's disease (AD) has been identified. Individuals with subjective cognitive decline (SCD) are older adults who present with self and informant reports of cognitive decline, despite performing within normal limits on clinical neuropsychological testing. The current study examined differences in white matter integrity, as measured by diffusion tensor imaging (DTI), between individuals with SCD and healthy controls (HC).

Methods: Data were retrieved from the Alzheimer's Disease Neuroimaging Initiative database, from the screening time point. 30 individuals with SCD (F=20, mean age=72.9 years, SD=4.8) and 44 similarly aged HC (F=25, mean age=72.5 years, SD=6.4) were included. DTI data were acquired from 3T GE MRI scanners with 41 diffusion-weighted images (b=1000 s/mm^2). All analyses were performed using FMRIB Software Library. Diffusion data were corrected for eddy current distortions. Fractional anisotropy (FA) and mean diffusivity (MD) maps were created and input into Tract-Based Spatial Statistics. Individuals with SCD were compared to HC with voxelwise statistical analysis using Randomise with threshold free cluster enhancement.

Results: Results revealed significantly (p<0.05) lower FA and higher MD in individuals with SCD relative to HC in widespread regions including the corpus callosum, internal and external capsules, corona radiata and superior and inferior longitudinal fasciculi. Ancillary analyses examine the relationship between white matter integrity and tests of memory and executive function.

Conclusions: The identification of decreased white matter integrity in individuals with SCD compared to HC is a major step in characterizing SCD. It is imperative to detect changes in the brain prior to the development of AD symptoms so that preventative, neuroprotective measures can be instituted as soon as possible.

Correspondence: *Jodie Gawryluk, Psychology, University of Victoria, Victoria, Canada. E-mail: gawryluk@uvic.ca*

Keywords: subjective cognitive decline, mild cognitive impairment, neuroimaging, structural connectivity

M. ABRAHAMOVA, S. KRAKOVSKA, E. SMOLEJOVA, A. SVINGEROVA, S. GERGELY, M. JAKUBEK, P. BRANDOBUROVÁ. Subjective memory assessment and its relationships to cognitive functioning and negative affectivity in older age.

Objective: Subjective memory complaints in older adults are an important indicator of non-normative cognitive decline. Objective of the study is to analyze the relationships between subjective memory complaints and (1) objective performance on neuropsychological tests; (2) severity of depression and anxiety; (3) selected demographic characteristics.

Participants and Methods: 113 participants without history of mental illness, aged 65 – 89, participated in the study. Multifactorial memory questionnaire (MMQ) (Troyer, Ritch, 2002) was used for subjective assessment of memory performance. MMQ was developed to assess dimensions of memory applicable to clinical assessment and intervention, and includes three scales (Contentment, Ability and Strategy). Participants underwent complex examination by neuropsychological battery spanning across all relevant cognitive domains. Self-report measures of depression (PHQ-9) and anxiety (GAD-7) were also administered.

Results: The reliability of the Slovak version of MMQ was found satisfactory (exceeding 0,80 for all three sub-scales). Significant correlations were found between all three scales of the MMQ and the Stroop test (r = -0,20 to -0,33); and the MMQ scales Ability and Strategy and the Digit Span Backwards test (r = 0,20 to 0,27). Correlations were found between two MMQ scales (Contentment and Ability) and questionnaires assessing depression (PHQ-9) and anxiety (GAD-7) (r =0,33 to 0,50); and between MMQ Strategy scale and GAD-7 (r =0,20). We did not find gender, age and education differences in MMQ sub-scales.

Conclusions: Based on the results, MMQ scores were more closely related to negative affectivity than to cognitive performance. Relationship between subjective memory assessment and its role in the early diagnosis in dementia needs to be analyzed in the clinical population. The utility and limits of self-

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assessment of memory in older age are further discussed.

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Correspondence: *Miroslava Abrahámová, Department of Psychology, Faculty of Arts of the Comenius University in Bratislava, Bratislava, Slovakia. E-mail: miabra@gmx.com*

Keywords: memory complaints, negative affectivity, aging, normal

N. CEDRES, A. MACHADO, Y. MOLINA, P. DIAZ-GALVAN, J. HERNANDEZ-CABRERA, J. BARROSO, E. WESTMAN, D. FERREIRA. Subjective cognitive complaints above and below the age of 60: differential associations with neuroimaging and other clinical features.

Objective: Subjective cognitive complaints in cognitively normal individuals have emerged as a relevant predictor of Alzheimer's disease, mostly, in clinical cohorts. In community-based cohorts, complaints may be related to other factors and prevalent neurodegenerative diseases. We investigated the multivariate and multidimensional association of subjective cognitive complaints with different neuroimaging measures and an extensive number of demographic, clinical, cognitive in a large community-based cohort.

Participants and Methods: Nine complaints were scored in 416 individuals spanning from 33 to 86 years of age. Their association with the neuroimaging markers, demographic, clinical and cognitive measures was investigated with orthogonal partial least squares (OPLS) and multiple linear regression.

Results: Complaints were suggestive of greater WMH load in individuals reporting changes in personality, interest, and drive; and of greater global brain atrophy and smaller total intracranial volume in individuals 60 years reporting difficulties in activities of daily living. In individuals <60 years, complaints were associated with lower cognition. More complaints were also independently associated with increased depressive symptomatology.

Conclusions: Our findings indicate that a higher number of subjective cognitive complaints is associated with older age, greater depressive symptomatology, and subclinical changes in personality, interest, and drive (BDRS subscale). Important age-dependent interactions with global brain atrophy and the WMH load were revealed. We propose that depressive symptomatology in strictly healthy individuals may be a symptom of an unspecific neurodegenerative disease, mostly catalyzed by subjective cognitive complaints. Screening should be done in the community for the triad subjective cognitive complaints, depressive symptomatology, and subclinical reduced cognition (<60 years) / activities of daily living (≥60 years).

Correspondence: *Nira Cedres, Division of Clinical Geriatrics; Center for Alzheimer Research; Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, 14186 Stockholm (Sweden), Stockholm, Sweden. E-mail: niracefu@gmail.com*

Keywords: subjective cognitive complaints, brain atrophy, white matter hipointensities

Paper Session 4. Multiple sclerosis

Moderator: Jana Blahova Dusankova

7:40–8:35

J. MOTYL, L. KADRNOZKOVA, J. BLAHOVA DUSANKOVA, T. UHER, T. NIKOLAI, D. HORAKOVA. Association between evolution of cognitive performance and BDI, MSNQ and BAI in MS patients.

Objectives: To analyse evolution of differences in anxiety, depression and subjective cognitive impairment in two groups of people with MS - with confirmed cognitive decline and in people with confirmed cognitive improvement.

Participants and Methods: 1237 patients (70% females, mean age: 38.3±9, median EDSS: 2, median years of education: 14) after the first demyelinating event suggestive of MS or with clinically definitive MS from the Grant Quantitative (GQ) study who underwent BICAMS battery, PASAT, BDI, MSNQ and BAI at 3 different time points over the 2-years follow-up. 2 groups of patients (with confirmed cognitive decline or improvement over the 2-years - detected in accordance with the procedures of CTT as described by Lord & Novick and Dudek) were selected in each test of the BICAMS battery.

Results: Of the total 1237 patients, 37(3%), 44(3.6%), 261(21.1%) demonstrated cognitive decline on SDMT, CVLT-II or BVMT-R (in the same order) and 28(2.3%), 77(6.2%), 32(2.6%) demonstrated cognitive improvement.

Patients with confirmed decline in SDMT differed significantly from patients with confirmed cognitive improvement: on BDI: $t(62)=2.4$, $p=0.021$; MSNQ: $t(63)=3.3$, $p=0.01$; at the 'Year 2' and on MSNQ: $t(63)=3.1$, $p=0.03$; at the 'Year 1' time point. No difference was observed for BAI and no difference was observed for BDI, MSNQ at the baseline. No differences in results of BDI, MSNQ and BAI were

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observed with the 2 memory tests used (CVLT-II, BVMT-R).

Conclusions: People who faced information processing speed decrease over the 2-years follow-up differed significantly in the reported scores of depression and subjective cognitive impairment at the end of the 2-years period from people who experienced the improvement during the same time. This illustrates how closely cognitive decline or improvement in processing speed is interconnected with patients' depressive symptoms.

The project was supported by the Czech Ministry of Education project Progres Q27/LF1.

Correspondence: *Jiri Motyl, Department of Neurology and Center of Clinical Neuroscience, First Faculty of Medicine, Charles University and General University Hospital in Prague, Prague, Czech Republic. E-mail: jiri.motyl@vfn.cz*

Keywords: multiple sclerosis, information processing speed, depression

C.A. HONAN, H. FRANCIS, K. AHUJA, E. LIM. An examination of cognitive fatigue in multiple sclerosis (MS): Perceptions, performance, and kynurenine biomarkers.

Objective: The concept of cognitive fatigue and how it is appraised in people with MS is poorly understood. This study aimed to examine the relationship between self-reported fatigue and changes in cognitive performance over a single testing session to further our understanding of MS-related cognitive fatigue. The relationship that self-reported fatigue and cognitive performance may have with a potential new biomarker of cognitive functioning in MS, nicotinamide adenine dinucleotide (NAD), was also examined.

Participants and Methods: Forty-seven participants with MS and 36-matched healthy control participants completed the Modified Fatigue Impact Scale (mFIS) and were assessed twice using the Brief Repeatable Neuropsychological Battery (BRNB) and Conners Continuous Performance Test (CPT) over a 2.5 hour testing session. A visual analogue scale for fatigue (VAS-F) was administered at baseline, and immediately following the first and second CPT administration. Blood samples were taken from participants and analysed for kynurenine pathway metabolites, including NAD.

Results: MS participants reported higher levels of fatigue and performed more poorly on most cognitive tests than healthy participants. Practice effects were evident on most BRNB tests over the session with no group-interaction present. However, whereas CPT performance declined over the session in MS participants, there was trending improvement in healthy participants. VAS-F, but not mFIS scores, were related to cognitive performance. NAD was also related to some aspects of cognitive performance and VAS-F scores (but not mFIS). These relationships tended to strengthen at Time 2 testing.

Conclusions: The results indicate that online, but not intellectual, self-reports of cognitive fatigue in people with MS correspond with poorer levels of cognitive functioning. The results also establish a link between the kynurenine metabolic profile, cognitive functioning, and self-reported online fatigue.

Correspondence: *Cynthia A. Honan, Department of Psychology, School of Medicine, University of Tasmania, Launceston, Australia. E-mail: cynthia.honan@utas.edu.au*

Keywords: multiple sclerosis, fatigue, neurotransmitter systems

T. COSTABILE. Olfactory function impairment in Multiple Sclerosis.

Objective: Assess olfactory function in a cohort of Relapsing Remitting Multiple Sclerosis (RRMS) and Secondary Progressive MS (SPSM) patients compared to HC. Correlations between smell identification abilities and cognitive functioning.

Methods: 55 MS patients (mean age 45.9 ± 14.25 yrs) and 20 HC (mean age 40.1 ± 12.98 yrs) were included in the study. Each subject underwent the University of Pennsylvania Smell Identification Test (UPSIT) to evaluate olfactory function and a cognitive battery including the Symbol Digit Modalities Test (SDMT), CVLT II, BVMT-R, PASAT 3", Controlled Oral Word Association Test (COWAT), BDI II, 9-hole Pegboard test for hand dexterity and Timed 25-Foot Walk Test. Modified Fatigue Impact Scale (MFIS), age at onset, disease duration, Expanded Disability Status Scale (EDSS) and Multiple Sclerosis Severity Score were also assessed in MSs.

Results: The total number of recognized smells was significantly lower in patients with 38.2% lower mean recognition rate as compared to HC (28.76 ± 5.48 vs 31.7 ±2.18, p=0.02). Interestingly, SPMS showed lower UPSIT score compared to both HC and RRMS with prevalence of olfactory function impairment of 48%. Finally, MS showing cognitive impairment achieved lower UPSIT scores compared to those with no cognitive impairment (26.32 ± 5.15 vs 31.92 ±4.19, p=0.001). When evaluating correlations between UPSIT and sociodemographic, cognitive and clinical data we found a significantly association with SDMT (r=0.57, p<0.001), CVLT II (r=0.48, p<0.001),BVMT (r=0.57, p<0.001), delayed CVLT II (r=0.41, p=0.002), COWAT

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(r=0.47, p<0.001),MFIS (r=-0.28, p=0.04), BDI II (r=-0.28, p=0.04) and EDSS (r=-0.29, p=0.03).
Conclusions: MS showed impaired olfactory functions and it is strongly related to clinical features, in particular with cognitive impairment. Longitudinal studies are recommended to better understand if olfactory function could represent a marker to predict SPMS conversion and/or cognitive impairment development.
Correspondence: *Teresa Costabile, Department of Neurosciences, Reproductive Science and Odontostomatology, Università degli Studi di Napoli "Federico II", Napoli, Italy. E-mail: teresa.costabile@gmail.com*
Keywords: Multiple Sclerosis, Cognitive Functioning, Olfaction

Paper Session 5. Cognition in the context of serious mental illness

Moderator: Tobias Loetscher

7:40–8:35

B. CULLEN, D.J. SMITH, J.P. PELL, I.J. DEARY, J.J. EVANS. Explaining cognitive impairment in bipolar disorder: Cross-sectional analysis in the UK Biobank cohort.
Objective: Previous research has shown worse cognitive performance in people with bipolar disorder (BD) compared with non-BD peers, but studies have been inconsistent in adjusting for confounders, and have seldom investigated the mediating role of modifiable intermediate factors.
Participants and Methods: Baseline data from the UK Biobank general population cohort were used to identify 2,709 adults with a history of mania/BD and 105,284 with no history of mood disorder or schizophrenia, for comparison. Assumptions regarding a wide range of confounding and intermediate factors were encoded in a directed acyclic graph, which informed the choice of covariates for statistical analysis. Total effects of mania/BD on five cognitive measures were estimated using multiple regression and propensity-score-based methods. Direct and indirect effects through modifiable intermediate factors were estimated in a causal mediation framework using G-computation.
Results: Adjusted or matched analyses showed a difference between the mania/BD and comparison groups on the visuospatial memory task (standardised mean difference = -0.2, 95% CI -0.3, -0.1) but not on other memory, reasoning and reaction time measures. Indirect effects were evident via psychotropic medication (proportion of total effect = 0.28, 95% CI 0.07, 0.48) but not via cardiometabolic disease status. Sensitivity analyses indicated that the results would not be robust to unmeasured confounders, and estimates were likely to have attenuated towards the null due to missing data bias.
Conclusions: A small group difference in visuospatial memory performance was observed between mania/BD and comparison groups in this cohort. Bias from self-selection, residual confounding and missing data were likely to have affected the estimates. Mediation analyses highlighted a potentially important causal pathway through psychotropic medication use, which should be investigated further in longitudinal studies.
Correspondence: *Breda Cullen, Institute of Health and Wellbeing, University of Glasgow, Glasgow, UK. E-mail: breda.cullen@glasgow.ac.uk*
Keywords: bipolar disorder, cognitive functioning

E.L. CLARK, D.P. TERRY, N.D. SILVERBERG, G.L. IVERSON. Evaluation of a New 8-Session Cognitive Health Group for Veterans with Posttraumatic Stress Disorder.
Objective: Many military veterans have posttraumatic stress disorder (PTSD), depression, substance use disorders, chronic bodily pain, chronic headaches, and insomnia. Cognitive difficulties are associated with all of these conditions. This study evaluates a new cognitive rehabilitation group that was developed to help veterans identify and manage factors that impact cognitive functioning in their daily life.
Participants and Methods: The Warrior Cognitive Health Group is an eight-session cognitive rehabilitation group embedded in the Intensive Clinical Program at Home Base, a two-week intensive, multidisciplinary treatment program. From February 2016 to December 2017, 204 veterans with PTSD completed this program (age M=39.6, SD=9.0; 80% men). We examined changes in cognitive symptom self-management (Self-Efficacy for Symptom Management Scale; SE-Cog) before and after participation in the two-week program.
Results: The SE-Cog had minimal ceiling and floor effects (lowest possible score: 10% pre-treatment, 2% post treatment; highest possible score: 0% pre-treatment, 2% post-treatment). Mean improvement on the SE-Cog was 5.84 points (SD=9.77). In a repeated measures ANOVA, the effect of time (pre- vs. post-treatment) was significant, F(1,203)=72.97, p<.001. Most (i.e., 60.8%) of the sample improved by at least 4 points, exceeding the 80% confidence interval for reliable change. Change on the SE-Cog

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was only mildly related to change on the traumatic stress (PTSD Checklist-5; r=-.28), suggesting that improved cognitive symptom self-management is not merely a by-product of improved PTSD.
Conclusion: Cognitive rehabilitation may be useful in meeting the needs of veterans with PTSD and other difficulties. Cognitive strategy training fills an important need in the care of veterans with PTSD. Results to date suggest that this intervention is feasible and effective for reducing the impact of cognitive difficulties.
Correspondence: *Douglas P. Terry, Home Base, a Red Sox Foundation and Massachusetts General Hospital Program, Massachusetts General Hospital, Harvard Medical School, Boston, USA. E-mail: dterry@mgh.harvard.edu*
Keywords: post traumatic stress disorder, cognitive rehabilitation, neuropsychological outcome

J. MICHALEC, L. KALISOVA, T. NIKOLAI, P. HARSA, P. SILHAN, M. HYZA, O. BEZDICEK. Effects of cognitive performance assessed by Czech version of MATRICS Consensus Cognitive Battery on psychosocial functioning of schizophrenia patients.
Objective: The objective of the present study is to evaluate the ability of Czech version of MCCB (MATRICS Consensus Cognitive Battery) to predict schizophrenia patients' level of psychosocial functioning considering also effects of length of illness and premorbid intelligence.
Participants and Methods: Participants: 197 subjects with a diagnosis of schizophrenia; mean age 35.1 ± 9.88; 76% males; length of illness: 35% less than two years, 33% between two and less than ten years, 32% ten and more years. Cognitive performance was evaluated using MCCB composite score. Level of psychosocial functioning was assessed by Personal and Social Performance Scale (PSP). Premorbid IQ assessed by Czech version of National Adult Reading Test.
Results: The results of path analysis show that the length of the illness predicts a lower PSP ($\beta = -0.291$; $p < 0.001$). The effect of illness duration on cognitive performance ($\beta = -0,089$; $p = 0,183$) and on PSP ($\beta = -0,089$; $p = 0,183$) did not reach statistical significance. Premorbid IQ predicts higher cognitive performance ($\beta = 0.426$; $p < 0.001$); the effect of premorbid IQ on psychosocial functioning ($\beta = 0.066$; $p = 0.344$) did not reach statistical significance. Furthermore, higher cognitive performance predicts higher PSP ($\beta = 0.370$, $p < 0.001$). The results also show that higher premorbid IQ ($\beta = 0.157$; $p < 0.001$) predicts higher PSP indirectly due to its effect on cognitive performance. The indirect effect of illness duration on PSP ($\beta = -0,033$; $p = 0,216$) did not reach statistical significance. The model explains 19% of variance in cognitive performance and 27% in psychosocial functioning.
Conclusions: Results show that MCCB predicts the clinically relevant portion of the variance of psychosocial functioning in schizophrenia patients a does not mediate the significant effect of length of illness on PSP. Recent cognitive performance depends on estimated premorbid IQ.
Correspondence: *Jiri Michalec, Department of Psychiatry, 1st Faculty of Medicine, Charles University, and General University Hospital in Prague, Prague, Czech Republic. E-mail: michalec.jirka@gmail.com*
Keywords: schizophrenia, psychosocial functioning, cognitive functioning

Paper Session 6. When low scores are good and high scores are bad: Minding the base rates in diagnostic decision making

Moderator: Ondrej Bezdicek

7:40–8:35

M. PORTER, E. ANDERSSON, J. REEVE, S. BARACZ. Exploring cognitive intra-individual variability in a paediatric typically developing cohort: How much variation is 'normal'?
Inconsistent performance across neuropsychological tests is associated with cognitive dysfunction in a number of clinical populations. However, cognitive intra-individual variability ('scatter') in healthy children is poorly understood, often dismissed as sources of random error. In addition, clinicians often rely on strengths and weaknesses in the cognitive profile to help in the diagnosis of various childhood conditions and as an indication of pathology. Evidence to challenge this position (that scatter is uncommon in healthy children) was first brought to light in the 1970's and has resurged again today. However, to date no research has looked at across test intra-individual variability in a nonclinical paediatric sample.
Objective: The aim of the present work was to address this gap by exploring the presence of intra-individual variability in a typically developing (TD) child cohort.
Participants: Participants were eighty-nine typically developing children aged 2 to 8 years.
Methods: A comprehensive battery of neuropsychological tests was administered to

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investigate both within- and across- test variability. Multiple indices of scatter were utilised.
Results: In line with predictions, significant within- and across- test cognitive variability was found in more than two thirds of children assessed. Both general level of developmental/intellect and chronological age were significantly associated with the magnitude and amount of cognitive scatter observed.
Conclusions: In the light of these results it is argued that cognitive variation in nonclinical children may be the rule rather than the exception.
Correspondence: *Melanie Porter, Psychology, Macquarie University, Sydney, Australia. E-mail: melanie.porter@mq.edu.au*
Keywords: scatter, variability, child

K. KRISHNAN. Misleading MoCA scores: examples when a cognitive screen may be inaccurate.
Objective: To investigate cases where scores obtained on a Montreal Cognitive Assessment (MoCA) are not representative of a patient's diagnosis.
Participants and Methods: A total of 1,632 patients visited Cleveland Clinic's memory disorders center between 2010 and 2017. Participants were given a MoCA at the initial physician visit in addition to a routine neurological evaluation with further testing as warranted (neurocognitive assessment, brain MRI, and CSF testing).
Results: We identified18 cases with MoCA scores 26 and higher with a dementia diagnosis at the initial visit. Average age 66 years, SD=10.6, 61% male (7 females). MoCA scores Mean 27.1, SD 0.99; Education Mean 14.3 years SD 2.7. Further testing (MRI, Neurocognitive assessment, CSF) classified patients as 5 with frontotemporal dementia (FTD), 3 with primary progressive aphasia (PPA), 2 with Traumatic Brain injury, 2 with Alzheimer's disease, 2 with Vascular dementia, 1 with depression, 1 with progressive supranuclear palsy, 1 with Lewy body dementia, 1 with cognitive effects post Epstein-Barr virus. Diagnosis was supported by Neurocognitive assessments in17/18 patients. One patient was referred for testing but did not complete the process. CSF data available for 5/18 cases (1 AD, 4 borderline- clinically diagnosed as major neurocognitive disorder due to depression, Epstein Barr, and FTD).
Conclusions: Initial evaluation in a dementia clinic provides a unique opportunity to assess reasons for high MoCA scores despite clinical judgment prompting a dementia diagnosis. These examples suggest that in clinical settings, further evaluation may be warranted for patients who present with high education, frontal or language complaints (FTD, PPA, TBI), atypical dementia profiles, and longstanding psychiatric history as they be falsely classified as normal if solely relying on MoCA scores. These examples also highlight the need for detailed clinical history and further testing in these patient populations.
Correspondence: *Kamini Krishnan, Cleveland Clinic, Cleveland, USA. E-mail: krishnk3@ccf.org*
Keywords: MoCA, aging, clinical diagnosis

T. NIKOLAI, H. STEPANKOVA, M. KOPECEK, Z. SULC, O. BEZDICEK. Improving the classification accuracy of mild cognitive impairment by determining the prevalence of low scores in healthy elderly population in the UDS-Cz 2.0 battery.
Background: The objective identification of neuropsychological impairment often involves the administration and interpretation of several tests that are designed to evaluate different components of cognitive functioning. However, when interpreting multiple measures included in the battery, there is a risk that a certain proportion of healthy adults and older adults will invariably show low scores in some of the measures. The aim of the study was to improve clinicians' ability to accurately detect cognitive deficit in adults and older adults. This study presents the prevalence of low scores on the Czech Neuropsychological Test Battery from the Uniform Data Set (UDS 2.0) of the Alzheimer's Disease Centers (ADC) program in older adults.
Participants and methods: The exploratory analysis, in which prevalence of low scores is computed, was conducted on T-scores based on the 14 test scores in the UDS-Cz 2.0 battery for all age and education groups. The T-scores with the mean value of 50 and standard deviation of 10 were based on rank scores of the original data, i.e. they were calculated non-parametrically. The base rates of the low scores were calculated using three cutoffs (-1 SD, -1.5 SD, -2 SD). All the calculations were performed using IBM SPSS 24.
Results: When all 14 test scores are considered simultaneously, 65% of respondents younger than 69 years with a lower education had one or more scores below 1 SD, whereas this percentage was 35% for the higher education in the same age group. With the increasing age, the effect of the education slightly decreases. The strong differences between age and education groups also occur in other two cutoffs (-1.5 SD, -2 SD).
Conclusion: We confirm a fair prevalence of low scores in healthy elderly population. The prevalence increases with higher age and lower education. The prevalence of low scores should be taken into

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account when making a diagnosis of a mild cognitive impairment.
Correspondence: *Tomas Nikolai, Dept. of Neurology and Center of Clinical Neuroscience, Neuropsychology Laboratory, First Faculty of Medicine, Charles University and General University Hospital., Prague, Czech Republic. E-mail: tomas.nikolai@lf1.cuni.cz*
Keywords: mild cognitive impairment, aging, normal, neuropsychological assessment

Poster Session 1. Cognitive functions (Memory, visual-spatial abilities, executive functions, emotional processing) & Neuropsychiatric disorders across lifespan (substance use, severe mental illness, autism, depression, anxiety, etc.)

8:35–10:25

Z. GONZALEZ, E. SIRUMAL, E. GARCIA-CABELLO, D. FERREIRA, J. BARROSO, E. WESTMAN. Visoperceptive, visuospatial and visuoconstructive functions: predictive value of demographic factors and cognitive variables.

Introduction: Facial Recognition Test (FRT), Judgment of Line Orientation Test (JLOT) and Cubes subtest of the WAIS-III, serve to evaluate the visoperceptive, visuospatial and visuoconstructive functions respectively.

Objectives: Analyse the possible influence of other cognitive domains, specifically, the processing speed (PS), attentional and executive functions (EF), in these three tests. **Subjects**: 431 participants (40-86 years old) were included.

Method: In the neuropsychological protocol, we included FRT, JLOT, Cubes Subtest, Digit subtest of WMS-III, Reaction Times PC-Vienna System and Oral Control Word Association Test (COWAT). Correlation and multiple linear regression analyses were performed with demographic and cognitive predictive variables (Model 1), and subsequently the FRT, JLOT and Cubes subtest were included as predictor variables (Model 2).

Results: Positive and significant correlations were found among the three tests under study. In model 1, significant relationships were found between these tests and demographic factors (age, cultural level and sex). In addition, FRT are mainly influenced by PS. General cognitive state and attentional components predict JLOT. Cubes subtest is influenced by PS, attentional and EF. In model 2, no predictive value was found between FRT and JLOT, despite a significant correlation was found. Contrarily, it highlights the predictive power of JLOT and, to a lesser extent, FRT, on Cubes subtest.

Conclusions: These results highlight the influence of other cognitive components when interpreting performance in FRT, JLOT and Cubes Subtest. Emphasize that the execution in the Cubes subtest predicts the performance of FRT and, mainly, of JLOT. Therefore, visuoconstructive functions are more influenced by visuospatial functions than visoperceptive. Finally, these data reflect the high sensitivity and low specificity of FRT, JLOT and, especially, of Cubes subtest when applied in a heterogeneous population.
Correspondence: *Eloy Garcia-Cabello, Universidad de La Laguna, La Laguna, Spain. E-mail: elogarciacabello@gmail.com*

T. KIMURA, M. MORIKAWA, K. SHINOHARA, Y. KINOSADA. Expansion in positional relationship of objects in mirrored space.

Objective: Even though all images in mirrored space are reversed with reference to objects in real space, we can effortlessly and unconsciously acquire the necessary information. A previous study (Kimura et al., 2017) reported results concerning the relative relationship between actual and reproduced object locations, but specific differences remain unclear. This study therefore compared reproduced angles and positions of objects between real and mirrored space.

Participants and Methods: Twenty-nine observers participated in this study, with two observation conditions: real; and mirrored. In the real condition, stimuli were presented in front of the observer. In the mirror condition, stimuli were presented behind the observer, observed through a mirror. The physical relationships of stimuli were adjusted to be identical. A black cube (18 mm per side) as a reference point was located 177 cm from the observer on a desk. Three conditions were set in terms of object numbers, with one, three, or six objects (colored cube) were arranged in random order within an area of 70 × 43 cm around the reference point. A liquid crystal shutter was used to control the duration of observation to 300 ms. Observers using a chinrest were required to reproduce the arrangement of objects on a piece of paper that described only the reference point on a 1:10 scale.

Results: Errors in reproduced angles and distances of objects were calculated using the difference between actual and reproduced positions of object. For the reproduced position, only the main effect of observation condition was significant, indicating that

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objects in mirrored space were reproduced at a more distant position, regardless of the number of objects. **Conclusions:** These results indicate that reproduced distance is further in mirrored space than in real space. Our spatial frames of reference for mirrored space might expand in the brain system.

Correspondence: *Takahiko Kimura, Kansai University of Welfare Sciences, Kashiwara, Japan. E-mail: takimura@tamateyama.ac.jp*

Keywords: cognitive processing, visuospatial, mirror

A. MAŃKOWSKA, K.M. HEILMAN, J.B. WILLIAMSON, J. MICHAŁOWSKI, M. HARCIAREK. Age-Related Changes in the Allocation of Spatially Directed Focal Attention.

Objectives: Since the right hemisphere has been shown to be dominant for allocating spatial attention when bisecting horizontal lines, healthy young adults deviate their attempted bisections toward the left of the center (pseudoneglect). For the same reason, they respond faster to targets presented in left than right hemispace. However, with aging, there is greater deterioration of the right than left hemisphere, and it could be posited that older individuals may no longer react faster to stimuli presented in left hemispace. The aim of this study was to test this hypothesis.

Participants and Methods: Fifty-two healthy adult participants (aged 20-82) were divided into two groups: 1) younger (n = 25, aged 20-60), and 2) older (n = 24, aged 61-82). All individuals performed a Posner-type visual attention task where there were boxes to the left and right of the central point in the participants' midsagittal plane. Before each imperative stimulus appeared in either of these two boxes a right or left preparatory cue was presented (box highlighting) and this cue was valid in 80% of the trials.

Results: Both younger and older participants responded faster to trials with valid than invalid cues, and this effect was significant for imperative stimuli presented in both left and right hemispace. With valid cues, however, the reaction times were shorter for the left than right-sided imperative stimuli for young participants, whereas seniors exhibited a reversed pattern.

Conclusions: Valid cues can direct the allocation of spatially focused attention. The finding that with valid cues the younger participants showed a left-sided attentional bias and the older participants revealed a rightward bias is consistent with the age-related right hemisphere deterioration hypothesis.

Correspondence: *Aleksandra Mańkowska, Institute of Psychology, University of Gdańsk, Gdańsk, Poland. E-mail: aleksandra.wojtowicz@phdstud.ug.edu.pl*

Keywords: Visuospatial Attention, Pseudoneglect, Posner-type task

A. MAŃKOWSKA, K.M. HEILMAN, J.B. WILLIAMSON, J. MICHAŁOWSKI, M. HARCIAREK. Elderly Look Higher: An Age-Related Increase in the Upward Attentional Spatial Bias.

Objective: In line bisection tasks neurologically healthy adults tend to bisect vertical lines above the centre of the lines. This phenomenon, like the leftward attentional bias when bisecting horizontal lines (pseudoneglect), has been attributed to the right hemispheres' dominance for allocating spatial attention. Recent studies have demonstrated that, with age-related deterioration of the right hemisphere, the leftward bias tends to diminish with advancing age. However, it is not known whether aging also affects the upward bias found in young participants, and this study was designed to test this hypothesis.

Participants and Methods: In the present study, we tested a group of 26 young (mean age 41.92 ± 2.49 years) and 22 older participants (mean age 71.95 ± 1.10). Participants performed a line bisection task using 24 vertical lines (24 cm long and 2 mm thick) that were sequentially placed at eye level on a white board.

Results: The older adults had a significantly greater upward bias than the younger adults.

Conclusions: Prior lesion research has revealed that where the dorsal visual stream allocates attention downward, the ventral stream allocates attention upward. The reason for the age-related increase in an upward attentional bias remains unclear. Nonetheless, recent studies suggest that, within the visual networks, aging may predominantly affect the dorsal visual stream that directs attention downwards. As a result, the ventral visual stream directing attention upwards might become disinhibited, creating an increase in upward bias. However, future studies will have to test this hypothesis.

Correspondence: *Aleksandra Mańkowska, Institute of Psychology, University of Gdańsk, Gdańsk, Poland. E-mail: aleksandra.wojtowicz@phdstud.ug.edu.pl*

Keywords: Aging, Line Bisections, Pseudoneglect

A. MAŃKOWSKA, K.M. HEILMAN, J.B. WILLIAMSON, J. MICHAŁOWSKI, M. HARCIAREK. Feeling and Looking Down: Impact of Depression on the Allocation of Spatial Attention.

Objective: Symptoms of depression, of varying intensity, can be present in healthy populations.

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Depression has been linked to a relative increase in the activation of the right hemisphere (RH). Further, RH has also been shown to be dominant for the upward allocation of spatial attention. Thus, with an increase in depression one might expect an increase in an upward spatial bias. Alternatively, the ventral visual attentional stream (VS), that allocates attention upward, is primarily allocentric, and the dorsal stream (DS), that allocates attention downward is more egocentric. With depression there might be a shift toward egocentric attention with a downward bias. However, the relation between depression and the allocation of spatial attention in a vertical plane has never been examined.

Participants and Methods: A total of 48 right-handed individuals (20 women; mean age=57.31 years), volunteered to participate. Depression of each subject was examined with the Hospital Anxiety and Depression Scale. Following the assessment of current mood, participants were asked to mark the center of the 24 vertically presented lines.

Results: Analyses showed that, overall, participants tended to deviate their bisections of vertical lines upwards (mean=2.66 mm; SD= .56). However, the number of symptoms of depression was negatively correlated (r=-.37, *p*= .009*)* with the upward attentional bias.

Conclusion: The results of this study show that in general, as previously reported when performing the vertical line bisection test adults tend to deviate their attention upwards. However, our analyses also revealed that the more depressed the individual the stronger his/her tendency to allocate attention downwards. Depression and sadness have been linked to an increased activation of both the RH and the DS. Since the DS primarily allocates attention downward, increased activation of this system in more depressed individuals might have led to a tendency to allocate their attention downward.

Correspondence: *Aleksandra Mańkowska, Institute of Psychology, University of Gdańsk, Gdańsk, Poland. E-mail: aleksandra.wojtowicz@phdstud.ug.edu.pl*

Keywords: Visuospatial Attention, Line Bisections, Mood

M.E.R. NICHOLLS, S. BOYD. Cerebral asymmetries in dorsal/ventral stream processing revealed through a divided visual field task.

Objective: The brain employs different cognitive and neural mechanisms to attend to objects located in near and far space. The dorsal stream is specialised for action and processing objects located in near and lower space. The ventral stream is specialised for perception and processing objects located in far and upper space. Using a divided visual field method, we examined whether the left/right cerebral hemispheres are biased towards dorsal/ventral stream processing, respectively.

Participants and Methods: Forty dextrals made relative distance judgements for two dots presented to the left or right visual fields for 180ms. The relative position of the dots was manipulated so that one was either higher or closer than the other. In the *vertical* condition, the screen was in its normal upright position and participants judged which of the dots was higher. In the *radial* condition, the screen was laid down on the table and participants judged which of the dots was closer or further.

Results: In the vertical condition, the dot on the right was judged to be lower than the dot on the left. The radial condition showed a trend towards more 'closer' responses when the dot was on the right, but this failed to reach statistical significance. There was a strong positive correlation between the biases in the different planes.

Conclusions: The bias towards more 'lower' responses on the right in the vertical condition is consistent with a left hemisphere / dorsal stream processing bias, which causes objects on the right to appear lower. The radial condition failed to produce a significant asymmetry – though the results did suggest that the left hemisphere/ dorsal stream bias also causes objects on the right to appear closer. A strong correlation in the responses bias between the different planes suggests that a common mechanism, related to the relative activation of the dorsal/ventral streams, underlies the cerebral asymmetry.

Correspondence: *Mike Nicholls, Flinders University, Adelaide, Australia. E-mail: mike.nicholls@flinders.edu.au*

Keywords: attention, laterality, visuospatial

M. SHIBASAKI, H. MATSUZAWA, H. YASUNO, K. YOSHITOMI, A. TAKASHITA. Effect of Handedness on Face-specific N170 Event-Related Potential Component.

Objective: Previous studies have revealed that handedness affects the cognitive performance of various face recognition tasks (including facial emotion recognition tasks) in healthy adults. However, it is unclear which stages of face processing handedness influences. To explore the cognitive and neural mechanisms underlying differential characteristics of face recognition in right- and left-handers, we investigated the effect of handedness on brain activity related to early face perception processing, by using event-related potentials (ERP).

Participants and Methods: 19 right-handed (mean age 21.3 years) and 16 left-handed (mean age 20.5 years) healthy adults participated in this study.

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Participants performed go/no-go tasks with upright and inverted faces or clocks as target stimuli. During the tasks, electroencephalographic data were simultaneously recorded from nine scalp electrodes for ERP extraction. We examined N170, a face-specific ERP component, which is a negative waveform peaking approximately 150-180 ms post-stimulus and is generated in the fusiform gyrus, to evaluate brain activity related to early face perception processing in right- and left-handers.
Results: Left-handers demonstrated large N170 amplitudes not only for face stimuli but also for non-face stimuli in the posterior temporal regions. As a result, the face-specific effects on N170 amplitudes were significantly reduced in left-handers compared to right-handers. Additionally, the degree of right hemisphere dominance of N170 amplitudes for inverted face stimuli was lower in left-handers compared to right-handers.
Conclusions: The results indicate that handedness affects face-specific effect and the hemispheric dominance of N170 activity elicited by face stimuli. Moreover, this suggests differences in early face perception processing, e.g., structural encoding of faces, in the posterior temporal regions, and differences in its hemispheric lateralization between right- and left- handers.
Correspondence: *Mitsuyo Shibasaki, Psychology, Meisei University, Hino-City, Tokyo, Japan. E-mail: mitsuyo@psy.meisei-u.ac.jp*
Keywords: handedness, face processing, event-related potentials

C. NIKI, T. KUMADA, T. MARUYAMA, M. TAMURA, Y. MURAGAKI. Two types of action inhibition impairments for executing familiar action task found in patients with frontal lobe damage.
Objective: When asking to perform sequential tasks such as wrapping a gift, patients with right frontal lobe damage did unnecessary actions using distractor objects, for example writing a message for the gift using calligraphy, reported as action disinhibition syndrome (Niki et al., 2009). In this study, we investigated types of inhibitive action errors in detail.
Participants: 18 patients with frontal glioma (12 right frontal glioma, 6 left: mean age=38.8).
Methods: Task: two single tasks and three distractor object-paired-tasks were administered. For single tasks, only objects necessary to perform the target task were presented. For distractor object-paired-tasks, in addition to necessary objects to perform a target task, distractor objects that were not be used normally in a target task were also presented. Patients were instructed to perform a target task. Task schedule: to investigate change of performance by surgical resection of glioma, all the tasks were administered twice, pre- and 6 months post-operations. Action errors such as omission, sequential errors were recorded, and "distractor error" that they used distractor objects were analyzed in detail. Data of normal control (N=6) obtained from Niki et al. (2009) was also analyzed.
Results: Distractor errors were found in 2 left and 5 right glioma patients already in pre-operations. No right glioma patients showed distractor errors that were not related to the action goal of target task, on the other hand, 3 of 6 left glioma patients showed distractor errors that were not associated to goal of target task. No normal control showed any distractor errors.
Conclusions: Two types of distractor errors were found, one of which would be emerged by an object itself and not related to a goal of action task, the other one emerged by objects or a set of objects, affecting a goal of action task contextually.
Correspondence: *Chiharu Niki, Institute of advanced biomedical engineering and science, Tokyo Women's Medical University, Tokyo, Japan. E-mail: niki.chiharu@twmu.ac.jp*
Keywords: cognitive functioning, frontal lobes, executive abilities, abnormal

É. AUMONT, G.L. WEST. Spatial learners display reduced risk-taking behavior.
When people navigate, they use one of two strategies. The hippocampus-based spatial strategy consists of using multiple landmarks in order to create a mental map of the environment. In contrast, caudate nucleus-based response strategy is based on the memorization of a rigid series of turns. The caudate is a structure central to the reward circuit, while the hippocampus supports spatial and episodic memory. The predominant strategy used by an individual can be assessed by using the 4 on 8 virtual maze. Importantly, response learners display more grey matter and functional activity in the caudate and less grey matter in the hippocampus.
While it is known that response learning is linked to increased addiction-related behaviors in young adults, its links with higher cognitive functions remained largely unknown. The goal present study was to explore the links between navigation strategy that is correlated with grey matter in the caudate and risk-taking, task-switching, working memory and mental flexibility. To accomplish this, participants completed 4 on 8 virtual maze, the Iowa Gambling Task (IGT), the Wisconsin Card Sorting Test-64 (WCST-64) and the digit span (DS) test.
Spatial learners were shown to have reduced risk-taking behaviors by choosing a lower amount of high-risk disadvantageous decks in the IGT. It is

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hypothesized that response learners' sensitivity to negative feedback is reduced when faced with higher losses in disadvantaged decks, therefore increasing the relative importance of the perceived reward.
In contrast, response learners showed increased mental flexibility by completing more sets in the WCST-64, which is a measure of the ability to adapt to changing rules. This supports previous findings linking the caudate nucleus to the standard WCST.
Finally, response learners displayed increased working memory in the forward DS. This finding is supported by previous work showing that working memory training increased grey matter within the caudate nucleus.
Correspondence: *Étienne Aumont, Psychology, Université de Montréal, Montreal, Canada. E-mail: e.aumont@hotmail.com*
Keywords: Navigational strategies, Executive abilities - normal, Decision-making

M. ENNOK, J. JUURMAA, A. STEPENS, P. TABA. Performance of patients with manganese-methcathinone encephalopathy in Link's Cube test.
Objective: Manganese-methcathinone encephalopathy (MME) is a parkinsonian syndrome described in drug addicts who have self injected a home-made mixture containing methcathinone and manganese. Our initial studies have shown that in contrast to moderate to severe motor deficits their cognitive status, including executive skills seem to be mostly unimpaired. Since executive deficits are frequently seen in other parkinsonian syndromes we were interested to see, if the dysexecutive features can be observed on the level of separate problem-solving and flexible action behaviors.
Participants and Methods: The sample includes 17 patients (12 men, 5 women; mean age 42.9 years; mean education 11.1 school years) and 15 matched control subjects (10 men, 5 women; mean age 41.5 years; mean education 11.8 school years). In this analysis we used the results of Standardized Link's Cube test. It is a cube construction task where subject has to follow different rules in assembling a big cube from smaller ones. Main score is a combination of 10 different performance categories observed during construction.
Results: Groups did not differ in their main score ($Z=-1.64$, $p<.10$) although control group obtained a slightly higher score (controls M=15.4, SD=7.9; patients M=10.6, SD=7.1). The only performance category where we found a group difference was Spatial sub-goaling ($\chi^2(1, N=32)=5.51$, $p<.019$). Other performance categories (exploration, action organization, mental spatial structure, attention control, error correction, edge length estimation, final state, number of cues needed, time required for completion) did not show a significant difference between groups ($p<.10$).
Discussion: In matched group comparison patients with MME did not show deficits in planning skills both in the main score and various task performance aspects. We only observed difference in spatial sub-goaling: control group analyzed the task situation better before other actions.
Correspondence: *Margus Ennok, Department of Neurology and Neurosurgery, University of Tartu, Tartu, Estonia. E-mail: margus.ennok@ut.ee*
Keywords: executive functions, parkinsonian syndrome, qualitative analysis

R. HERNÁNDEZ-TORRES, J. VELÁZQUEZ DE-JESUS, Y. RODRÍGUEZ-CORREA, M.S. RODRÍGUEZ-RABASSA, E. RIVERA-SEGARRA. Self-Efficacy and Working Memory Among Puerto Ricans with Mental Illness: Preliminary Findings.
Objective: The present work is part of an ongoing study addressing the implications of social determinants in the health of Puerto Ricans with Mental Illness (MI). Literature shows that people living with MI tend to present lower self-efficacy and lower performance in executive functioning, particularly working memory. This is important as working memory is vital for daily living activities and general social functioning. Recent studies have documented that self-efficacy serves as a mediator in the recovery of people living with MI and is beneficial in tasks that demand working memory. However, scientific literature has yet to address how self-efficacy and working memory are manifested among diverse populations with MI. For the purpose of this presentation, we aim to explore the self-efficacy and executive functioning of Puerto Ricans with MI.
Participants and Methods: A total of 14 Puerto Ricans with MI participated in the study. Executive functioning was assessed using the NIH Toolbox Cognition Battery, and Self-efficacy was assessed using the General Self-Efficacy Scale. We conducted simple linear regression analyses to ascertain if self-efficacy level predicted working memory performance.
Results: Our preliminary findings suggest a moderate positive correlation between self-efficacy and working memory ($r(14) = 0.57$, $p = 0.03$). In addition, participants presented clinically significant scores in inhibitory control and attention (Mean = 44.14, SD = 8.89).
Conclusions: Results suggest that people with MI who have higher scores in self-efficacy have better ability of simultaneously storing and manipulating

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the information in a short-term buffer. Therefore, although preliminary, our findings suggest the need to expand research efforts in this area. Future findings could elucidate if by addressing self-efficacy we can foster recovery, social integration, and general health among diverse populations such as Puerto Ricans with MI.

Correspondence: *Ruthmarie Hernández, School of Behavioral and Brain Sciences, Ponce Health Sciences University, Ponce, Puerto Rico. E-mail: rhernandez15@stu.psm.edu*

Keywords: Executive Function, Social Cognition, Mental Illness

H. TROJANOVA, H. BOUKALOVA, L. PESKA. Perpetrator Descriptions and Other Race Effect in Eyewitness Identification.

Objective: The aim of this study is to examine the relationship between the description length of a perpetrator of own- and other-race and correct identification in target-present lineups.

Participants and Methods: Participants (N = 153; M_{age} = 34,5 years) watched a videotaped robbery (with Czech or Vietnamese offender) and were later asked to write down all they remember about the perpetrator´s appearance, identify the perpetrator in a lineup and state how confident they are about the decision. This procedure was repeated a month later with the same participants but unseen perpetrator.

Results: Significant relationship between description length and correct identification decisions was found when identifying perpetrator of other race (p=0,003). Participants who made a correct decision reported more information (M_{cz} = 5,51; M_V = 5,45) than participants who made an incorrect decision (M_{cz} = 5,21; M_V = 4,47). When identifying the perpetrator of own ethnicity significant relationship was found between description length, correct identification and confidence. Respondents who had longer description stated higher confidence in their identification. The gender effect was not found on the description length, although there were a few differences in stated details.

Conclusions: In this experiment, a significant relationship was found between the length of the offender's description and the correct identification of other-race offender. Although the description length showed stronger relationship with accuracy than certainty, this finding should be further examined. The provision of word description and a lineup identification are two different cognitive tasks – recall and recognition. For more accurate results, we recommend assessing the cognitive abilities of participants in further research.

Acknowledgement: *The study was supported by the Charles University, project GA UK No. 232217.*

Correspondence: *Hana Trojanová, Charles University, Department of Psychology, Faculty of Arts, Prague, Czech Republic. E-mail: trojhanka@gmail.com*

Keywords: ethnicity, decision-making

S. BATISTELA, O.F.A. BUENO, I.S.S. TUDESCO, S.A.P. BOLOGNANI, N.M.F. SOUSA. Random number generation signals the ability of mentally reconstructing context in amnesic patients.

Objective: Some deeply amnesic patients have a null performance in delayed tests of short stories while others are able to achieve a small retrieval in this task. This study aimed to investigate if the null retention relates to deficits in the episodic buffer (EB) or the central executive (CE) components of working memory (WM).

Participants and Methods: 15 amnesic patients with mixed etiologies divided in two subgroups: NUL subgroup: n=7; had 0 raw score delayed in Logical memory and MOR subgroup: n=8; remembered at least 1 item; and 13 matched healthy controls. Episodic buffer (a WM subcomponent responsible for temporary maintenance of information while the focus of attention is directed elsewhere), was assessed by complex span tasks, and central executive (which coordinates the activities of the other WM subcomponents) by random number generation (RNG) which requires attention, concentration, selection of stimuli, ability to abstract, planning, flexibility and self-control.

Results: EB tasks were impaired in both subgroups compared to controls. RNG was impaired in NUL but not in MOR subgroup, showing a deficit of CE activities in the former clinical subgroup.

Conclusions: Prefrontal cortex damage is known to cause RNG impairment and CE deficits that lead in turn to difficulties in activity initiation. In addition to medial temporal lobe, prefrontal cortex is often injured in amnesic patients, turning likely the NUL subgroup had also prefrontal cortex damage. We interpret the present finding as CE impairment hampering retrieval mode to initiate mentally reconstruction of the context in which the to-be-remembered information was presented minutes ago.

Correspondence: *Silmara Batistela, Psicobiologia, Universidade Federal de São Paulo, São Paulo, Brazil. E-mail: batistela.sil@gmail.com*

Keywords: Amnesia, Working Memory, Retrieval mode

E. LEHTO, M. VIRTA, S. IMMONEN, I. JÄRVINEN, N. KORHONEN, K.

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MICHELSSON, J. LAUNES, L. HOKKANEN. Predictors of time- and event-based prospective memory performance in adults with a history of low birth weight.

Objective: Prospective memory (PM) performance is affected in e.g. in TBI and Parkinson's disease. Executive functions and episodic memory have been suggested to predict time-based prospective memory (TMPM) and event-based prospective memory (EBPM) performance. Low birth weight (LBW) has been found to associate with cognitive impairment. Predictors of PM performance in LBW adults have not been studied previously. We assessed executive functions, episodic memory and working memory as predictors of both TBPM and EBPM performance in LBW adults.

Participants and Methods: Participants were part of a prospective birth-risk cohort born in 1971–1974, who participated at the age of 40: a LBW (2000 g) group (n = 72) and a control group with no birth risks (n = 83). Both TBPM and EBPM performance were assessed using the new Finnish Proper Prospective Memory Test (PROPS), which includes both laboratory and naturalistic tasks. Cognitive domains of executive functions, episodic memory and working memory were assessed with neuropsychological tests (TMT, Stroop, phonemic verbal fluency task, WAIS-IV and WMS-III logical memory and word list learning, ROCFT) and everyday executive problems with the BRIEF self-report. We used stepwise multiple linear regression analysis.

Results: Adjusted for age, sex and education, executive functions assessed with the BRIEF BRI T score predicted 28 % of the variance (p < .001) in TBPM performance in LBW adults. Episodic memory domain explained 7 % of the variance (p = .02) in EBPM performance in LBW adults.

Conclusions: PM appears to be only partially explained by other cognitive domains. TBPM was more associated with executive functions, EBPM with episodic memory.

Correspondence: *Eliisa Lehto, Psychology and Logopedics, University of Helsinki, Helsinki, Finland. E-mail: eliisa.lehto@helsinki.fi*

Keywords: memory, prospective, perinatal factors, cognitive functioning

T. TCHINTCHARAULI. The age-related changes in repetition priming: the role of learning conditions and task's features.

Objectives: The main goal of the study is to investigate age-related changes in repetition priming. Despite of numerous studies, there is no clear evidence about age related decline of repetition priming. The ambiguity of studies' results was related to difference in learning conditions (incidental vs. explicit) and in tasks.

Participants and methods: 316 persons of age between 18-25 (mean age (SD)=20.24 (1.86)) and 65-80 (mean age (SD) = 69.7 (6.45)) took part in the experiment. All participants were healthy without any neurological conditions. Between – group design was used. There were 3 independent variables defined: age (participants aged 18-25 and 60-80 years old), learning conditions (intentional – incidental learning), and word-completion task with different characteristics of fragments (first letter (task I), first syllable (task II), first and last letter (task III) and middle syllable (task IV)). The dependent variables were recognition (number of explicitly recalled words) and repetition priming (number of competed words based on past experience and reaction time). In summary, the participants were divided into 16 groups.

Results: As it was expected, young persons have better learning and recognition scores in comparison with older persons; explicit memory declines by age. It was confirmed that while performing the fragment completion task after different learning conditions the participants of both age groups had reliably different scores almost in each case. The regression analysis proved the significance of age, learning conditions and fragment completion task characteristics for repetition priming. The single exclusion are learning conditions (p<0.054), which is a significant factor only for older persons.

Conclusions: Based on the results of this study it could be concluded that age, learning conditions and superficial characteristics of repetition priming task have significant influence on repetition priming.

Correspondence: *Tinatin Tchintcharauli, School of Arts and Sciences, Ilia State University, Tbilisi, Georgia. E-mail: tinatin.chincharauli@iliauni.edu.ge*

Keywords: repetition priming, learning, age

B. UTTL, C.A. WHITE, K. CNUDDE, L.M. GRANT. Influence of cognitive vs. non-cognitive factors on episodic prospective and retrospective memory.

Objectives: The study objective was to examine relative importance of cognitive vs. non-cognitive factors in explaining performance on prospective vs. retrospective memory tasks.

Participants and Methods: A large sample of undergraduate students completed a 2–3 hour long battery of cognitive and non-cognitive tests (e.g., personality) including measures of event-cued episodic prospective memory, retrospective memory, processing speed, working memory,

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crystallized intelligence, fluid intelligence, and personality.
Results: Our results showed that (1) cognitive factors including measures of processing speed, working memory, crystallized and fluid intelligence explained substantial amount of variability in both measures of prospective and retrospective memory; and (2) non-cognitive factors did not appreciably improve prediction of neither prospective nor retrospective memory.
Conclusions: Similarly to retrospective memory, episodic prospective memory correlated with fundamental cognitive functions including processing speed, working memory, crystalized intelligence, and fluid intelligence. Non-cognitive factors such as personality appear to be far less significant.
Correspondence: *Bob Uttl, Psychology, Mount Royal University, Calgary, Canada. E-mail: uttlbob@gmail.com*
Keywords: memory, prospective, memory, retrospective

D. RODRÍGUEZ-SALGADO, M. PIDAL-MIRANDA, M.T. CARRILLO-DE-LA-PEÑA, E.M. ANDRADE-FERNÁNDEZ. Memory complaints in women with fibromyalgia: Importance of non-cognitive symptoms of the disease.
Objective: We aim to examine the frequency of memory complaints in a sample of women with fibromyalgia, in addition to analyzing associations between these complaints and measures linked to non-cognitive symptoms of the disease such as pain, fatigue, quality of sleep, catastrophizing, stress and depression. We also aim to investigate the ability of these symptoms to explain memory complaints.
Participants and Methods: Thirty-eight women diagnosed with FM were administered the *Memory Failures of Everyday Questionnaire* to asses subjective memory complaints. They also completed *Visual Analogue Scales*, the *Pittsburgh Sleep Quality Index*, the *Pain Catastrophizing Scale,* the *Perceived Stress Scale* and the *Beck Depression Inventory* in order to get information respectively about pain and fatigue, quality of sleep, catastrophizing conceptions toward pain experiences, stress and depressive symptoms.
Results: Seventy-one percent of the patients reported mild/moderate cognitive impairment. Correlational analysis showed that pain (r=.47, p<.01), fatigue (r=.57, p<.001), quality of sleep (r=.45, p<.01), catastrophizing (r=.46, p<.05) and depression (r=.64, p<.001), but not stress (r=.26, p=.144), were associated with memory complaints. A multiple regression analysis was performed to evaluate the impact of these five symptoms on memory complaints. The model accounted for 51% of the variance (R= .78, $F_{5,32}$=4.65, p<.05), with depression being the only variable to make a significant independent contribution to the prediction of memory complaints (p<.05).
Conclusions: Results reveal the widespread presence of subjective memory complaints in fibromyalgia patients and their association with non-cognitive symptoms linked to the disease, with depression being a main predictor of memory complaints. The implications of these data for treatment of dyscognition in fibromyalgia should be considered.
Correspondence: *Dolores Rodríguez-Salgado, Clinical Psychology and Psychobiology, Faculty of Psychology. University of Santiago de Compostela, Santiago de Compostela, Spain. E-mail: dolores.rodriguez@usc.es*
Keywords: depression, memory complaints, chronic pain

M. PIDAL-MIRANDA, D. RODRÍGUEZ-SALGADO, M.T. CARRILLO-DE-LA-PEÑA. Reduced visuospatial but not verbal working memory span in fibromyalgia patients.
Objective: Our aim was to analyse the working memory capacity of fibromyalgia patients in the visuospatial and verbal modalities by means of comparison with pain-free healthy controls.
Participants and methods. Thirty-eight women diagnosed with fibromyalgia and 42 matched healthy controls were enrolled in the study. They were administrated the Digit (Forward and Backwards) and the Spatial Localization (Forward and Backwards) subtests of the Wechsler Memory Scale-III. Span scores of Digit subtest were recorded to measure the capacity of the phonological loop (Forward part) and the capacity to manipulate verbal information while in temporary storage (Backwards part). Span scores of Spatial Localization subtest were recorded to measure the capacity of the visuospatial sketchpad (Forward part) and the capacity to maintain and manipulate visuospatial information while in temporary storage (Backwards part). Differences between fibromyalgia and healthy control groups in span working memory scores were analyzed using Student´s t-test for independent samples.
Results: Fibromyalgia patients did not perform less well than healthy controls in the Digit Forward (t[69] = .639, p = .529), and Backwards (t[69] = -.658, p = .512), and in the Spatial Localization Forward (t[69] = 1.837, p = .649) subtests. However, the fibromyalgia patients obtained a lower span score in

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the Backwards part of the Spatial Localization subtest (t[69] = 2.056, $p < .05$).

Conclusions. Patients with fibromyalgia do not show reduced working memory span when it involves handling verbal content, nor in the phonological loop or in the capacity to manipulate verbal information while in temporary storage. However, they show a reduced span when the contents of working memory are visuospatial, not in the visuospatial sketchpad, but when involve the manipulation of visuospatial information.

Correspondence: *Dolores Rodríguez-Salgado, Clinical Psychology and Psychobiology, University of Santiago de Compostela, Santiago de Compostela, Spain. E-mail: dolores.rodriguez@usc.es*

Keywords: working memory, visuospatial, chronic pain

M. PATIÑO-SAENZ, M. APONTE-CANENCIO, M.A. TANGARIFE, C.F. BUITRAGO-PANADER, F. TORRES-GARZÓN, J.C. CAICEDO-MERA, C. RINCÓN-MENDIETA, A. IBAÑEZ, J. MARTÍNEZ-COTRINA, S. BAEZ. Moral decision-making in the Colombian criminal justice system.

It has been shown that gruesome descriptions of harm can increase the punishment given to a transgressor, a biasing effect mediated by negative emotions. However, there is a lack of studies inquiring the influence of such descriptions on moral decision-making in people involved in the criminal justice system. The objective of this study was to explore the influence of gruesome written descriptions on moral decision-making in this group of people. To that end, we recruited attorneys (n=18) and judges (n=28) whose field of specialty was criminal law. In addition, we included a control group of people who did not have a formal education in law (n=30), but who were paired in age and sex with the latter groups. All participants completed a computer based, Spanish-adapted version of a moral decision-making task during which an electrocardiogram (ECG) recording was performed. A series of text-based stories describing two characters, one inflicting harm on the other, were presented to participants. Transgressor's intentionality (accidental vs. intentional harm) and language used to describe harm (gruesome vs. plain) were manipulated in the stories. Results showed that only control subjects rated harmful actions as significantly less morally adequate when harm was described using gruesome language. However, that was not the case of judges and attorneys. Moreover, in general, control participants rated actions as less morally adequate than judges. This was mirrored by less power in the high frequency (HF) band of the ECG in the control subjects during the task relative to judges. Overall, our results suggest that affective signals can be modulated by the expertise a person has in dealing with emotionally charged moral scenarios. Furthermore, since HF is an index of autonomic nervous system function, we found a putative physiological correlate of the modulation of affective signals during moral decision-making.

Correspondence: *Sandra Baez, Departamento de Psicología, Universidad de los Andes, Bogotá, Colombia & Laboratorio Interdisciplinar de Ciencias y Procesos Humanos – LINCIPH – Área Salud, Conocimiento Médico y Sociedad, Facultad de Ciencias Sociales y Humanas, Universidad Externado de Colombia, Bogotá, Colombia. E-mail: sj.baez@uniandes.edu.co*

E. CICHOŃ, R. SZCZEPANOWSKI. The mediating role of control strategy in suppressing intrusions.

Objective: The intrusive and uncontrollable thoughts are the object of the control strategy aimed at suppressing such unwanted contents. Previous research has shown that attempts to suppress intrusions may either result in their increase or decrease. The various outcomes of the suppression strategies suggest additional psychological variables mediating the relation between the suppression and severity of intrusion. Our study assumed that possible mediators of this relationship are psychological strategies of controlling suppressed thoughts.

Participants: One hundred twenty-fours students of University of Social Sciences and Humanities in Wroclaw volunteered in this study in exchange for credit points.

Methods: The study used the White Bear Suppression Inventory and Thought Control Questionnaire to verify the effectiveness of control strategies in suppressing unwanted thoughts. The Polish version of WBSI allowed measures of suppression and intrusion, while the Thought Control Questionnaire measures five factors that correspond to the control strategies: distraction, punishment, worrying, re-appraisal and social control. The statistical mediation analysis with PROCESS macros was used to investigate indirect effects.

Results: The results showed that the factors of distraction and punishment significantly mediated the relation between suppression and intrusion. The greater tendency of punishment in the context of suppressed thoughts resulted in higher severity of intrusion. In contrast, the more frequent distraction decreased frequency of intrusive thoughts.

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Conclusions: Our results provide evidence in favor of the effectiveness of suppression. Clearly, our research shows that distraction can be the effective strategy to control suppressed thoughts, whereas punishment is ineffective and increases intrusions. Thus, our findings indicate that distracting attention to suppress intrusions helps reducing their severity.

Correspondence: *Ewelina Cichoń, WROCŁAW FACULTY OF PSYCHOLOGY, SWPS University of Social Sciences and Humanities, Wrocław, Poland. E-mail: ecichon@swps.edu.pl*

Keywords: suppression, intrusion, thought control strategies

G. FRONDA, D. DE FILIPPIS, D. CRIVELLI, M. BALCONI. Electrophysiological and hemodynamic correlates of emotional states. A new protocol for emotional behavior evaluation.

Objective: Emotional processes definition is a discussed topic in literature. Indeed, emotional states are considered fundamental components for individuals development, well-being and social interactions. Psychological and neuropsychological studies have investigated, in particularly, the different components of emotional states and the relation between cognitive processes and physiological responses related to different emotions. The aim of the present study was to investigate different patterns of emotional responses elicited by the construction of new paradigms for emotional elicitation.

Participants and Methods: The protocol provided the administration of three different tasks on a sample of healthy participants. Specifically, two tasks required participants to observe different positive, negative and neutral emotional pictures selected from the International Affective Picture System (IAPS) and stimuli representing human interactions of different hedonic valence and physiological arousal. The other task was created to elicit emotional responses related to participants autobiographical memories. During the administration of the tasks, cortical (EEG), hemodynamic (Functional Near - Infrared Spectroscopy, fNIRS) and autonomic (biofeedback) correlates of emotional responses were recorded.

Results: The findings highlighted different cortical and autonomic responses, in agreement with the valence of emotional stimuli presented in the three tasks. Furthermore, clusters of biomarkers related to distinct elicited emotions were found through specific algorithms.

Conclusions: Although the existence of different paradigms for emotional states elicitation, this study shows the potentials of a new protocol for emotional responses analysis and of specific algorithms employment for emotional biomarkers creation. Moreover, the use of a multimethod approach allows to investigate the electrophysiological and autonomic correlates of emotional states.

Correspondence: *Giulia Fronda, Research Unit in Affective and Social Neuroscience, Catholic University of the Sacred Heart; Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy. E-mail: giulia.fronda@unicatt.it*

Keywords: Emotional responses, electrophysiological correlates, biomarkers

M.C. MIRANDA, L.M.C. INACIO, R.S. FREITAS, G. ZANINI, S. POMPEIA. Frequency of intense positive and negative mood in adolescence and rash actions under these mood states.

Objectives: To determine the frequency of intense positive and negative mood and Positive and negative urgency in youngsters, if this is related to sex, age, pubertal development, and if any of these factors relate to acting rashly under these mood states.

Methods: The sample consisted of 150 youngsters aged 9-19 years. The self-assessment Pubertal Development Scale (PDS) was used to estimate pubertal staging. Participants rated the frequency of intense positive and negative mood on 10 point scales (1=never; 10=all the time). They were then asked if they had ever done things in these states that led to regret (yes or no answers) and, if so, what they had done.

Results: States of extreme positive mood were equivalent among males and females, although females reported more intense negative mood than males. Pubertal status had very slight effects on these mood states. The higher the frequency of positive mood, the lower the probability of engaging in rash actions, while those who had more frequent intense negative mood engaged in more rash actions. These effects were observed even when controlling for age, sex, and pubertal development. Rash actions committed under extreme positive mood were accounted for by Positive Urgency, but Negative Urgency did not explain regrettable actions under negative mood. The reported actions under positive and negative mood, reported by 45% and 37% of the sample, respectively, were similar, and involved regretting eating too much and saying things that should not have been said.

Conclusions: Youngsters have more frequent extreme positive than negative mood, but females have more negative mood than males. Those who have extreme positive mood less frequently, and extreme negative mood more often, irrespective of age, sex and sexual maturity, are more prone to

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engaging in acts that lead to regret. Impulsive urgency traits explained rash acts under positive mood, but nor under negative mood.

Correspondence: *Monica C. de Miranda, psychobiology, Universidade federal de São Paulo, São Paulo, Brazil. E-mail: mirandambr@yahoo.com.br*

Keywords: adolescence, mood, impulsivity

N. MOTA, M. ANTUNES, E. CHAVES, A. PAIVA, V. DAUDT, R. BORGES. Kindness as attitude: individual marker for well-being under unpleasant circumstances.

Background: Peace is one of the utmost non-declarable goals across generations and cultures. Taken as a stable and self-managed condition, it entails pleasant emotion even under unfavorable environmental circumstances. Presented as a self-managed prosocial inclination, kindness involves care and non-judgmental understanding towards someone.

Objective: Building proximity to clinical analysis, we aimed to contextually address the contribution of kindness for emotional activation and regulation.

Participants and Methods: Resembling the neurocognitive paradigms, we individually administered the Emotional Regulation Task among 46 (31 female; 18 to 21 years-old) healthy college students in order to evoke the own studied psychological process: emotional activation or regulation (through reappraisal). In an attempt to characterize its contextual contribution, we tested in R (non-)linear models with all possible combinations including kindness (from Compassion Scale). Eligible models would have had all their emotional and sociodemographic factors with top weighted estimates (calculated in relation to all models).

Results: Out of 93 combination models, only negative emotion intensity under unpleasant stimulus presented association with kindness. Despite our interest to address contextual influence of sociodemographic factors, kindness was the only variable in that eligible model. This pattern of a single model exclusively including kindness was resembled in the composite score of emotional regulation (diminish/express emotion for unpleasant stimuli).

Conclusions: Reported kindness is uniquely relevant for self-managed well-being under unpleasant circumstances. Confirming its self-regulatory nature, in dissociation from cultural factors, kindness might be taken as an attitudinal marker for individualized appreciation and overcoming of aversive circumstances.

Correspondence: *Nayara Mota, State University of Rio de Janeiro, Rio de Janeiro, Brazil. E-mail: contato@nayaramota.com*

Keywords: kindness, emotional regulation, prosocial inclination

M.J. RAMIREZ FLORES, N. SOTO, S. MORALES CHAINE. Social skills, aggression and empathy in adolescents that committee a crime.

Social skills is a cognitive process that has an important development during adolescence, making it susceptible to deficits due to various circumstances, among them aggression and delinquency. Objective: Evaluated social cognition, aggression and empathy in adolescents who are in detention for committing a crime. Participants Methods: 43 male adolescents participated (age: 16.54 ± 1.14, education: 7.05 ± 1.87, drug use age: 14.07 ± 2.18), inmates in a detention center for adolescents in Mexico City. They were evaluated with the CogSoc test that evaluates social reasoning with the understanding of causal relationships, judgment, and identification of absurdities; as well as with the Interpersonal Reacitivity Index (IRI), the Inventory of Situations and Aggressive Behaviors (ISCA) and the Inventory of Motives for Aggression (IMA). Results: Adolescents obtained a performance close to 65% in CogSoc test, with greater difficulty to identify absurdities (53% of correct answers). They show deficiencies to determine which situations trigger the aggressive behaviors (53th percentile), and identify the reasons linked to the aggression (61th percentile). In the IRI, they only showed deficits in the empathic behavior domain (63th percentile). Correlation between CogSoc performance and affectivity inventories, the understanding of causes correlated negatively with ISCA (r = - 324, p = .034), while the identification of absurdities correlated negatively with the personal distress dimension of the IRI (r = -. 359; p = .025). Conclusions: Adolescents who have committed some crime, show difficulties in identifying incongruities in a social context, as well as identifying which situations or motives make them aggressive, this was linked to the difficulty they show to detect their distress when observing the negative experiences of others, as well as between the causes of their aggression and the origin of a social situation.

Correspondence: *Maura Jazmin Ramirez Flores, Faculty of Psychology, National Autonomous University of Mexico, Mexico City, Mexico. E-mail: mau_ramz@comunidad.unam.mx*

Keywords: Social Cognition, Empathy, Adolescents

A. SCHRAEGLE, M. HOLCOMB, C. LANTRIP. Executive Functions Mediate the Relationship between Childhood Emotional Abuse and Rumination in Nondemented Adults with Cognitive Complaints.

Objective: Childhood trauma has been shown to have wide-ranging effects into adulthood including increased rates of psychopathology and cognitive dysfunction. Emotion regulation has been identified as a variable of interest in this population and investigating particular strategy use, such as rumination, provides a unique opportunity to explore the relationship to cognition in the context of childhood trauma. This may offer valuable information for tailoring focused psychological intervention and screening at-risk patients.

Participants and Method: The present study evaluated subjective executive functions in the everyday lives of nondemented adults presenting for a clinical neuropsychological evaluation using the BRIEF-A, self-reports of childhood trauma using the CTQ and ruminative response style using the RRS. We hypothesized that these adults who have experienced childhood abuse would report greater use of rumination and daily executive dysfunction.

Results: Results indicate that childhood emotional abuse is associated with ruminative reflection and self-reported executive dysfunction in daily living. Furthermore, childhood emotional abuse was found to be a significant predictor of a ruminative thought style. This relationship was found to be fully mediated by self-reported daily executive dysfunction. In other words, a ruminative thought style in individuals with who self-report childhood emotional abuse is fueled by daily executive dysfunction.

Conclusions: Future work will be necessary to determine the role of attachment status and executive profiles of adults with childhood trauma. Moreover, more extensive exploration into the role of early childhood maltreatment and executive function for nondemented adults in later life may also be a fruitful area of research for treatment planning and development of population specific interventions.

Correspondence: *Andy Schraegle, Neuropsychology, Barrow Neurological Institute at Phoenix Children's Hospital, Phoenix, USA. E-mail: waschraegle@gmail.com*

Keywords: Emotion Regulation, Executive Function, Childhood Trauma

A.Y. KLINTSOVA, Z.H. GURSKY. Third trimester-equivalent alcohol exposure produces persistent hippocampo-thalamic-prefrontal circuit-specific damage and behavioral impairment in animal model of FASD.

Objective: Children exposed to alcohol during pregnancy can display diverse physical and behavioral irregularities, many of which can persist into adulthood. Rodent models of developmental alcohol exposure (AE) indicate that AE during the period of brain development equivalent to the human third trimester can damage hippocampus (HPC) and frontal lobe. The medial prefrontal cortex (PFC) communicates extensively with HPC through both direct projections and indirect relay via midline thalamus (thalamic nucleus Reuniens; RE). Selective damage of RE prevents function of the entire HPC-RE-PFC circuit and impairs executive functioning (i.e., spatial working memory, response inhibition, contextual learning).

Methods: On PD3, Long-Evans rat pups were assigned to alcohol exposed group (AE; 5.25 g/kg/day) or sham-intubated (SI; no liquid) on PD4-9. In adulthood, male animals underwent behavioral testing on novel object recognition (NOR), object-in-place (OIP), spontaneous alternation (SA), and behavioral flexibility (BF) tasks. Total cell number in midline thalamic nuclei was estimated after completion of behavioral testing.

Results: Our data indicate that a rodent model of binge-drinking during third trimester leads to significant cell loss (≈30%) in RE of adult female rat. No significant cell loss is found in neighboring thalamic nuclei (mediodorsal thalamus, rhomboid nucleus). AE rats display alterations in novel object recognition and object-in-place memory in adulthood that are strongly correlated to blood alcohol content during developmental alcohol exposure. Further, AE animals display impairments in rule switching in a plus maze-based operant conditioning task (taking 2-4 times as many trials to learn a new rule).

Conclusions: These data suggest that RE is critically damaged in postnatally AE rats and that this damage persists into adulthood. The integrity of RE may be a structural indicator of impaired executive functioning observed in some manifestations of FASD.

Correspondence: *Anna Y. Klintsova, Psychological and Brain Sciences, University of Delaware, Newark, USA. E-mail: klintsov@udel.edu*

Keywords: fetal alcohol syndrome, thalamus, frontal lobes

M. OEY, E. OUDMAN, S. HOES, A. POSTMA. Behavioural effects of light simulation therapy in patients with Korsakoff Syndrome.

Objective: Patients with Korsakoff Syndrome (KS) are known to exhibit behavioural symptoms such as agitation, depression, disinhibition and sleep problems due to extensive cognitive problems after

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chronic alcoholism and concomitant thiamine deficiency. KS patients often reside in specialized long-term care facilities reducing their exposure to natural light. Although it is known that sufficient light exposure attributes to the overall well-being of dementia patients and those with affective disorders, little is known about the positive effects of light intervention KS. Our objective was to evaluate the influence of light simulation therapy on behavioural changes in KS patients.

Participants and Method: In our first experiment, 17 KS patients were exposed to light simulation therapy whilst neuropsychiatric and behavioural problems were simultaneously indexed using the Neuropsychiatric Inventory Questionnaire and a behaviour observation scale for nursing homes (GIP-28). In our follow-up experiment on 38 KS patients, we wanted to replicate prior findings in a more substantial group, and control for inter-rater differences. A total of 10 weeks were used to measure behaviour, of which 4 weeks pre-measurement and 6 weeks light intervention.

Results: The results of the first study show that neuropsychiatric symptoms and behavioural problems were less prominent during the weeks of light intervention compared to no light intervention, more specifically a significant effect was found on the 'affect' subscale which measures despondency, anxiety and restlessness. This effect was found in both the 'severity' scale and the 'emotional load' scale for caregivers. Currently the follow-up study is being conducted taking recommendations into consideration and searching to replicate the findings of the first experiment.

Conclusion: Results of this study suggest that light simulation therapy has a positive effect on frequently observed behavioural problems in KS patients.

Correspondence: *Misha Oey, Korsakoff Center Slingedael, Lelie Care Group, Rotterdam, the Netherlands. E-mail: m.oey@leliezorggroep.nl*

Keywords: Korsakoff's Syndrome, Light simulation therapy

E. FIABANE, F. SCARPINA, M. OTTONELLO, C. PISTARINI, A. SEDDA. Alcohol rehabilitation treatment: secondary effects on cognition.

Objective: We explored the cognitive effects of a 28-day residential alcohol addiction treatment, not including neuropsychological training, and their association with relapses 1 month later, in a sample of individuals diagnosed with alcohol dependence.

Participants and Methods: Thirty nine patients (mean age= 48.66±7.78; 69.2 % male), meeting the DSM-IV-TR criteria for diagnosis, have been recruited for the study. Each individual has been administered with five neuropsychological tasks: Balloon Analog Risk task (BART); Go/No-Go task; Posner Cueing task; Tower of London (TOL); Trial-Making Test (TMT) through a dedicated software both at admission after detoxification (T1) and at discharge (T2). Participants were also interviewed at a 1-month follow up, after hospital discharge, to explore any relapse into alcohol use.

Results: Patients showed significant improvements between T1 and T2 in the BART, including both earning (t= -2.02; $p<0.05$) and burst (t=-2.05; $p<0.05$) measures, in the TMT time (t=4.42; $p<0.001$) and errors number (t=3.34; $p<0.01$), and in the TOL time (t=4.14; $p<0.001$). At follow-up, 36% of patients relapsed into alcohol use, but no significant differences in neuropsychological profiles were found between abstinent and relapsing individuals.

Conclusions: Our preliminary findings reveal a positive effect of residential alcohol treatment on cognitive functions of individuals with alcohol addiction, including improvement in risk behavior (BART), problem solving (TOL) and speed of processing (TMT). Put it differently, the treatment, acting in conjunction with the detoxification physiological processes, promoted cognitive flexibility in the participants, even though it was not targeting cognitive functioning directly. Interestingly, this amelioration is not a predictor of relapses, possibly indicating that other relevant factors (i.e., clinical or personality) may be key predictors of drinking outcome.

Correspondence: *Elena Fiabane, Department of Physical and Rehabilitation Medicine, ICS Maugeri Spa SB, Institute of Genoa Nervi, Genoa, Italy. E-mail: elenamaria.fiabane@unipv.it*

Keywords: alcohol addiction, rehabilitation, cognition

C.A. HONAN, J. TURNER. The Effect of Acute Alcohol Intoxication on the Ability to Detect Sarcasm and Metacognitive Judgements of Sarcasm Detection Ability.

Objective: Alcohol occupies a significant place in various cultures throughout the world. Acute excessive alcohol use in particular has been linked to negative social behaviours. At the extreme, this may include increased aggression, one-punch assaults, and partner-related violence. However, the mechanisms underpinning this link remain poorly understood. This study aimed to establish whether alcohol intoxication impairs the ability to detect and differentiate sarcasm, a type of theory of mind ability, from more sincere remarks or direct lies. An additional aim of the study was to examine if metacognitive judgements (insight) of sarcasm

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detection ability is impaired following alcohol-intoxication.
Participants and Methods: Following quasi-random allocation counterbalancing for gender, 47 participants were administered either an alcohol (M_{age} = 23.31, *SD* = 4.33) or placebo (M_{age} = 22.71, *SD* = 3.23) beverage. Sarcasm detection ability was assessed using The Awareness of Social Inference Test – Short Version (TASIT-S). Metacognitive performance was measured by obtaining confidence ratings for each TASIT-S item.
Results: No overall impairment in sarcasm detection ability was found for alcohol-intoxicated individuals. Alcohol-intoxicated individuals were however poorer at comprehending how an individual was feeling (but not doing, saying, or thinking) when the individual was being sincere and telling direct lies. That is, they were more likely to indicate that these individuals were being sarcastic when they were not. Intoxicated individuals also demonstrated some evidence of impaired insight into, and displayed some over-confidence in, their ability to detect and differentiate sarcasm from sincere remarks and lies.
Conclusions: These findings provide new insight into the possible role of the ability to detect affective aspects of literal and direct social communication in negative social behaviours following acute alcohol-intoxication.
Correspondence: *Cynthia A. Honan, Department of Psychology, School of Medicine, University of Tasmania, Launceston, Australia. E-mail: cynthia.honan@utas.edu.au*
Keywords: alcohol, social cognition, theory of mind

E. OUDMAN, E. KASSE, J.W. WIJNIA, A. POSTMA. Selective object perception difficulties in Korsakoff's syndrome.
Objective: Korsakoff's syndrome (KS) is a neuropsychiatric syndrome, caused by vitamin B1 (thiamine) deficiency typically following alcohol abuse. The core clinical symptoms of KS are declarative amnesia, dysexecutive functioning, and confabulations. Visuospatial function involves the identification of a stimulus and its location. The Visual Object and Space Perception (VOSP) battery evaluates visuospatial function, while minimizing the role of other cognitive aspects. Although visuospatial function is fundamental to everyday functioning, little knowledge is available on task performance in KS. Our objective was therefore to evaluate visuospatial function in KS patients using the VOSP.
Participants and Methods: Fifteen KS patients and fifteen healthy age-, education- and gender- matched controls were assessed using a neuropsychological screener and the eight subtests of the VOSP indexing object perception (four tasks) and space perception (four tasks).
Results: In the VOSP, KS patients showed selective problems in object perception, but not on space perception tasks. Specifically, the identification of degraded and atypical positioned objects was lower than in healthy subjects, and not related to other cognitive tasks. VOSP performance was not subthreshold, suggesting relatively selective visuospatial deficits.
Conclusions: Results of this study suggest that the perceptual integration of objects is more limited in KS than in healthy subjects. Possibly, integrative mechanisms underlying apperceptive gnosis are more restricted in KS, despite preserved general visuospatial perceptual abilities.
Correspondence: *Erik Oudman, Experimental Psychology, Helmholtz Institute, Utrecht University, Utrecht, the Netherlands. E-mail: f.a.oudman@uu.nl*
Keywords: Alcoholism, Amnesia, Visuospatial

J.C.L.M. DUIJKERS, C.T.W.M. VISSERS, M. RINCK, J.I.M. EGGER. Self-awareness, (error-) monitoring and self-motivation in Dual-Diagnosis.
Objective: Self-regulation is seen as key to happiness, influencing for example the achievement of life-goals. Barkley's self-regulation model defines self-regulative executive functions and positions self-awareness as "central executive". That is, self-awareness of one's own state, strengths and weaknesses forms the base for goal striving. In Dual-diagnosis (DD), self-regulation seems compromised looking at relapses in addiction-related behavior, also raising questions about self-awareness. In this study self-awareness, monitoring and motivational pitfalls were assessed in DD.
Participants and Methods: Measures of self-awareness, (error-) monitoring and self-motivation were obtained of 23 DD patients and 23 healthy controls (HC), with comparable age and intelligence. Substance abstinence was six weeks/more.
Results: DD patients had comparable insight in their executive functioning and a similar number of technical errors on neurocognitive tasks (D2, Trail Making Test, Stroop, WCST) as HC. The main difference between the groups lay in the awareness of emotions. That is: the capacity to identify, verbalize and analyze own emotion. Both groups do feel emotion and affectively fantasize about it, but DD patients do not cognitively elaborate on these emotions. Moreover, DD patients show more negative emotion and self-criticism.
Conclusions: DD patients exhibit more negative emotion and de-motivating critical self-speech than HC. This overstimulation with negative emotion and

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thought can overwhelm DD patients, the more because they show lower capacity to identify, monitor and self-regulate feelings. Instead, they may seek other ways of handling this negativity by using substances. But, DD patients make a comparable number of technical errors as HC and they show similar extent of illness-insight as HC in self-regulatory problems. In DD treatment, training aspects of emotional insight and regulation may be accentuated, promoting self-awareness by Stop, Feel, Think and Act mode.

Correspondence: *Judith C.L.M. Duijkers, Centre of Excellence for Korsakoff and alcohol related cognitive disorders, and Addiction care, Vincent van Gogh for Psychiatry, Budel, the Netherlands. E-mail: Judithonderzoek@hotmail.com*

Keywords: Executive functioning, Dual-Diagnosis, Self-regulation

A. MATTHEWS, C. NICHOLLS, C. STONE, R. BRUNO. Chronic Cannabis use and ERP Correlates of Visual Spatial Cuing and Inhibitory Control.

Objective: The aim of the study was to examine the effects of chronic cannabis use on both early selective attention and later inhibitory control mechanisms using a combined peripheral cuing go/nogo task.

Participants and Methods: Participants were males aged between 18-32 years (*M*=21.5 years, *SD*=3.2). The Cannabis group (*n*=16) were defined as having a minimum of weekly cannabis use for at least two years. The Drug Naïve Control group (*n*=14) were defined as having had six or less lifetime occasions of any illicit drug use, with none in the last six months. EEG activity was measured while participants completed a task that combined a peripheral spatial cueing paradigm with a go-nogo response paradigm.

Results: On go trials, reaction time was shorter on valid in comparison to invalid trials, and the cannabis group showed significantly longer reaction times and greater P1 amplitude on invalid trials, when compared to the drug naïve group. The were no significant group differences in accuracy. N2 amplitude, an index of inhibitory control, was greater on nogo relative to go trials for the drug naïve group, but not the cannabis group.

Conclusions: Results suggest that chronic cannabis use is associated with disruptions to both early selective attention and frontal inhibitory control processes.

Correspondence: *Allison Matthews, School of Medicine, Department of Psychology, University of Tasmania, HOBART, Australia. E-mail: Allison.Matthews@utas.edu.au*

Keywords: cannabis, event related potentials, attention

A.J. MATTHEWS, A. JOHNSTONE, T. NIKITENKO. Behavioural and Electrophysiological Hypervigilance in Spider Fear.

Objective: Attentional bias to threat may be a causal and maintaining factor in specific phobia. The aim of the research was to examine evidence for both behavioural and cortical hypervigilance among high and low spider fearful participants, by examining both reaction time and event-related potentials (ERPs) during image-based tasks.

Participants and Methods: Participants comprised of females with high (n=16) or low spider fear (n=15), and all participants reported low snake fear. Both picture identification and colour identification (emotional Stroop) tasks were completed while EEG was recorded. Each task comprised coloured (blue, green and red) images of either spiders (fear-relevant), mushrooms (neutral) or snakes (negative).

Results: For the picture identification task, both groups responded more quickly to spiders in comparison to snakes, and participants with high spider fear showed significantly shorter reaction times to spiders. Reaction time was slower overall for the emotional Stroop task, but there were no significant differences between images or groups. P100 amplitude at occipital sites, an ERP measure of early visual processing and selective attention, was greater for spiders in comparison to snakes for both tasks, suggesting threat-specific cortical hyper-vigilance. However, this threat-related modulation was common to both groups.

Conclusions: While there was evidence for specific behavioural hypervigilance to spiders among those with high spider fear, cortical hypervigilance to spiders was common to both groups, and may represent a phylogenetic phenomenon. These results provide insight into the neurocognitive mechanisms underlying threat-related attentional bias, and have implications for further research into habituation during image-based exposure therapy.

Correspondence: *Allison Matthews, School of Medicine, Department of Psychology, University of Tasmania, HOBART, Australia. E-mail: Allison.Matthews@utas.edu.au*

Keywords: attention, fear, event related potentials

A. STERNAK. Need for diagnosis or need for reflection – SPD (sensory processing disorder) in terms of narrative medicine in the Polish context.

Objective: The aim of the research was to identify the factors responsible for the popularity of the therapeutic method addressed to children diagnosed

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with SPD, also called as *sensory integration therapy* (SIT), in Poland. The study checked what changes are experienced during the course of therapy by the whole family of the child with SPD and what significance is attributed to them.
Using the qualitative paradigm, we explored and analyzed the importance of the meaning attributed to the SPD diagnosis and reflection of the child's difficulties based on the information obtained from the professionals. Scientific skepticism towards the SIT and the growing popularity of these therapeutic approach in Poland was the starting point to explore the field of this therapeutic approach.
Participants and Methods: Parents of children who ended the SIT lasting at least 1 and max 2 years were invited to the study. The research took the form of in-depth, semi-structured individual interviews (lasting about 90 minutes) with 8 mothers. Interviews were recorded, transcribed and analyzed in accordance with the principles of Interpretative Phenomenological Analysis (Smith, 2012).
Results: All interviews contained a category of needs formulated by the mothers, which concerned two areas: 1) the need to obtain a diagnosis in the form of clear statement of the reasons for the child's difficulties and possible ways to obtain help for him; and 2) the need to understand the child's behavior and interpret this in the context of the whole family.
Conclusions: The obtained results show that implemented in Poland standards of SPD diagnosis - in relation to the study participants - satisfy the needs of parents in both cases: 1) when they want to take action with clear structure, and 2) when the form of assistance is a reflection and narrative of the disorder and its effects and changes experienced by the whole family. This may determine growing popularity of SIT among parents as well as professionals.
Correspondence: *Agnieszka Sternak, Faculty of Psychology, University of Warsaw, Warsaw, Poland. E-mail: agnieszka.sternak@psych.uw.edu.pl*
Keywords: narrative medicine, sensory integration, family and professional assistance

A.M. GÓMEZ-CARVAJAL, H. SANTAMARÍA-GARCÍA, M. BERNAL, J. SILVA, D. MATALLANA, S. BAEZ. Increased schadenfreude levels in Parents of Newborns.
Several studies have shown increased oxytocin levels in both mothers and fathers of newborns. Likewise, there is an association between oxytocin levels and social emotions. A double-blind, placebo-controlled study showed that, at higher levels of oxytocin, the subjects reported higher levels of envy and *schadenfreude*.
Objective: This study aimed at characterizing negative social emotions (envy and *schadenfreude*) in participants with high levels of endogenous oxytocin.
Participants: Our sample included twenty-eight women in the puerperal period and their respective partners compared to a control group of twenty-eight men and women without children or partners. Control women were in the luteal phase of the menstrual cycle or taking oral contraceptives. Both study groups were matched in age, sex, and years of education.
Methods: A modified version of an experimental task designed to provoke envy and *schadenfreude* through real-life situations was employed. In addition, general cognitive state was assessed with Montreal Cognitive Assessment and executive functions were measured using the INECO Frontal Screening. For assessing other relevant variables we used: Zung Depression Scale, Perceived Stress Scale, Hendrick Relationship Assessment Scale and Experience in close relationships. Potential confounding variables such as general cognitive functioning, stress levels, hours of sleep and depression symptoms were controlled by means of covariance analyses.
Results: Results showed that parents of newborns have increased levels of *schadenfreude*. Even though, women showed higher levels on envy than men in both groups. No effects of confounding variables were found.
Conclusions: Our results offer unprecedented evidence of specific differences in *schadenfreude* levels in parents of newborns, supporting previous studies showing a negative relationship between oxytocin levels and *schadenfreude.* Moreover, the present results contribute to the understanding of negative social emotions.
Correspondence: *Sandra Baez, Psychology, Universidad de los Andes, Bogotá, Colombia. E-mail: sj.baez@uniandes.edu.co*
Keywords: Oxytocin, Envy, Schadenfreude

D.C. MOGRABI, E. BERTRAND, R. DA SILVA, R. LEÃO, E. CHENIAUX. Insight and implicit awareness in bipolar disorder.
Bipolar disorder (BD) affects around 1.5% of the population, with up to 5% of people within the BD spectrum. BD causes considerable individual and social impact, with studies indicating it is associated with negative outcomes on work and leisure activities, and high suicide rates. There is still considerable stigma associated with BD, reducing patients and caregivers' quality of life. One defining feature of BD is lack of insight or reduced awareness during manic episodes. In euthymic (i.e. normal) or depressive mood, BD patients are often aware of

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their condition and its implications, but knowledge about their affective state, condition, symptoms and their consequences is reduced during mania. In the current presentation, results from 5 studies are going to be presented, indicating whether there is a linear relationship between mania and loss of insight, exploring the role of previous manic episodes on insight and investigating the heterogeneity of this phenomenon. In addition, novel findings exploring the extent to which unaware BD patients may show implicit interference in relation to illness-related material are going to be discussed.

Correspondence: *Elodie Bertrand, Psychology, PUC-Rio / King's College London, Rio de Janeiro, Brazil. E-mail: elodie.bertrand1@gmail.com*

Keywords: insight, implicit awareness, bipolar disorder

K. GUTIÉRREZ RUIZ. Psychomotor development screening in toddlers as a predictor of Autism Spectrum Disorder severity symptomology.

Objective: Significant efforts have been made worldwide to detect Autism Spectrum Disorder (ASD) during the first years of life, with positive effects on the prognosis of children. However, in developing countries like Colombia there are disparities in access to autism screening, diagnosis and treatment. Primary health care services are an ideal scenario to promote the exploration of early signs of ASD that facilitate diagnosis, especially in high-risk populations. Nevertheless, one of the limitations for it is the lack of instruments that facilitate the identification of early signs of autism and the lack of knowledge about available alternatives.

The study aimed to evaluate the relationship between the severity of ASD symptomology in Colombian toddlers and scores on the Battelle screening Developmental Inventory (BSDI), one of the instruments most used in clinical practice in Colombia for the screening of alterations in childhood development.

Participants and Methods: 40 children with early diagnosis of ASD and their parents participate. Total scores on the BSDI and Q-CHAT scores were examined to explore the relationship between severity of ASD symptomology and developmental quotient, impairment in personal-social skills, adaptive functioning, cognition, and communication in toddlers.

Results: Regression analyses indicating that higher ASD severity scores were associated with greater impairment in personal-social skills, cognition and expressive communication skills in toddlers. These development areas would be important predictors of the severity of ASD.

Conclusion: These results suggest that the exploration of specific areas of development through an instrument commonly used in primary health care services may contribute to the early suspicion of ASD. Clinical implications of study findings are discussed.

Correspondence: *Karol Gutiérrez Ruiz, Psychology, Universidad Tecnológica de Bolívar, Cartagena, Colombia. E-mail: kgutierrez@utb.edu.co*

Keywords: Autism Spectrum Disorder, child development disorders

F. LAMI, K. WILLIAMS, R. CONROY. Predictors of adaptive behaviour in young people with ASD.

Objective: To describe executive functioning abilities, adaptive behaviour, ADHD and mental health symptoms in adolescents with ASD without intellectual disability, and to explore the associations between scores in these domains.

Participants and Methods: 39 10-16y.o. (Full-Scale IQ>77) with ASD completed the Verbal Fluency Test, Sorting Test and Color-Word Interference Test from the Delis-Kaplan Executive Functioning System; the Spence Children's Anxiety Scale, and the Depression scale in the Beck Youth Inventories-2. Their parents completed: the Vineland Adaptive Behavior Scales-3 and the Conners 3-Parent Short. Test scores were described using range (R), mean (M) and standard deviation (sd). A hierarchical multivariable linear regression was performed to explore associations between executive function, ADHD and mental health symptoms and the outcome, adaptive behaviour.

Results: Executive functioning scores varied considerably between participants (Category Switching Total Correct R: 1-18, M=9.71,sd=3.71; Free sorting description R:3-16, M=10.05,sd=3.16; Inhibition time R=1-16, M=9.30,sd=3.21), as well as ADHD and mental health scores did. VABS-3 Composite scores ranged from 63 to 104 (M=79.61;sd =9.56). The results of the regression indicated that the executive functioning, ADHD and mental health predictors explained 46% of the variance (R^2=.46,F(5,29)=5.01,p<.002). We found that Inhibition time was significantly associated to VABS-3 Composite (β =1.13, p=.03), as was combined score of anxiety and depression (β=-.14,p=.02).

Conclusion: Measures of inhibition and self reported mental health difficulties were associated to adaptive behaviour in a sample of young people with ASD without intellectual disability. To better understand the types of support a young person with

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autism needs, and to identify mechanisms underpinning their difficulties, assessments of executive function, especially inhibition, as well as adaptive behaviour and mental health may be helpful.

Correspondence: *Francesca Lami, Paediatrics, The University of Melbourne, PARKVILLE, Australia. E-mail: francesca.lami@rch.org.au*

Keywords: everyday functioning, executive abilities, mental health

K.E. BIESMANS, L. VAN AKEN, E.M.J. FRUNT, P.A.M. WINGBERMÜHLE, J.I.M. EGGER. Inhibition, shifting, and updating in relation to psychometric intelligence across ability groups in the psychiatric population.

Objective: Measurement of intelligence (*g*) and executive functions (EFs) is often part of neuropsychological assessment. It is unknown how these constructs are interrelated across different levels of intellectual ability. Spearman's Law of Diminishing Returns (SLODR) suggests that lower intellectual ability is characterized by higher *g*-loadings and less differentiated cognitive profiles, compared to higher intellectual ability. Therefore, it is hypothesized that the correlation between EF and intelligence decreases when ability level increases.

Participants and Methods: 250 Neuropsychiatric patients (M_{age} = 39.8, *SD* = 14.3, 52.8% male) were divided into three ability groups (mild: FSIQ 50-70, borderline: FSIQ 71-84, and normal/high intelligence: FSIQ 85-130). All participants completed an intelligence test (KAIT, WAIS-III or WAIS-IV) and three EF tasks covering inhibition (Stroop CWT), shifting (TMT), and updating (Spatial Working Memory). The correlational pattern between the three EFs and intelligence was assessed; groups were compared using ANCOVA.

Results: The correlational pattern of shifting and inhibition with intelligence shows an upward trend across ability groups, reaching significance in the normal/high intelligence group ($p < .001$). Updating shows similar correlations across groups. ANCOVAs show a significant interaction effect of group*shifting on FSIQ, reflecting a difference in the relation between shifting and intelligence, depending on ability level.

Conclusions: Contradictory to SLODR, findings show lower correlations between EF and intelligence in the lower ability groups. The correlational pattern of inhibition and the differential relation of shifting and intelligence may be explained by the influence of cognitive primitives as processing speed, since this affects performance on inhibition and shifting tasks, but not on updating. Therefore, EF tasks may not measure EF performances in neuropsychiatric patients with lower intellectual ability.

Correspondence: *Kim Ellen Biesmans, Specialistic and Forensic care, STEVIG, Oostrum, the Netherlands. E-mail: ke.biesmans@gmail.com*

Keywords: neuropsychiatry, executive abilities, abnormal, intelligence

L.A. CALDERON DELGADO, M.A. BARRERA-VALENCIA, M. O'BOYLE, K. AL-KHALIL, I. NORIEGA, E. TREJOS-CASTILLO, J. DUQUE, G. CORREA. Neurocognitive characteristics of children with Post-Traumatic Stress Disorder (PTSD): Evidence from neuropsychological testing and fMRI data.

Objective: Examine how cognition in PTSD children is altered for processing emotional expressions depicted in faces, and explore the impact of emotion laden words in a Stroop task.

Participants & Methods: Fifteen children comprised the PTSD group, with 7 matched controls (NTs). Assignment to the PTSD group was a score > 23 on the Child Scale of PTSD Symptoms. Both groups completed an fMRI session while performing the face task and the Stroop word task. Fiber optic button-presses indicated whether the face reflected a negative, neutral, or positive expression; for the Stroop task, participants viewed positive, negative, or neutral words printed in red, green, or blue ink and indicated the ink color in which it was presented. Imaging analysis was conducted using FSL to preprocess data and model fixed effects (p_{corr}<.05).

Results: No differences in reaction time/accuracy were found between groups. For all face types, PTSD showed greater para-cingulate and central operculum activity, and exhibited greater inferior/superior frontal activity when processing negative faces. For positive words, PTSD showed greater inferior/middle frontal activity; NTs showed greater temporal pole activity. For negative words, PTSD showed greater activation of precentral gyri.

Conclusion: Both groups exhibited equivalent behavioral performance when processing facial expressions and had similar responses to emotional Stroop words. fMRI data suggests that children with PTSD hyper-activate a compensatory network, recruiting regions involved in executive and emotional processes to promote detection of facial expressions. Children with PTSD also hyper-activate regions associated with executive functioning during the Stroop task when processing the print color of emotionally positive words. For negative words, the PTSD hyper-activate regions associated with alleviating emotional intensity. Our findings

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highlight the need for interventions that ease the emotional regulation demands of PTSD.
Correspondence: *Mauricio A. Barrera, Psychology, Universidad CES, Medellin, Colombia. E-mail: mauricio.barrera@udea.edu.co*
Keywords: PTSD, emotional regulation, children

L. SWEET, M. OWENS, K. DEMOS, J. MCCAFFERY, C. HART, R. WING. Brain and Behavioral Correlates of Vigilance and Working Memory during Sustained Insufficient Sleep.

It is known that working memory (WM) and vigilance decline during total sleep deprivation (TSD); however, it is not known whether this extends to sustained partial sleep deprivation (PSD). Given the prevalence of PSD and its associated costs to health and society, it is clear that more research on PSD is needed. This study used functional MRI (FMRI) to examine effects of sustained PSD on behavioral WM and vigilance assessments and associated brain activity.

All 27 participants (age 21-55; 72% women; 24% minority; 100% right-handed) completed four consecutive nights of short sleep (6hrs), four consecutive nights of long sleep (9hrs), and FMRI on day five of each condition in a randomized within-subject counterbalanced design. Sleep was monitored using sleep diaries, daily phone-ins, Sensewear accelerometer armbands and Mini-motionlogger actigraphs. An n-Back task comprised of 0-Back (vigilance) and 2-Back (WM) was completed during FMRI.

As expected, sleep duration achieved during short (5.91hrs, SD=0.30) and long (8.65hrs, SD=0.26) sleep were significantly different ($t=33.74$, $p<0.01$). Mean performance accuracy did not significantly differ between short (0-Back=98%; 2-Back=85%) and long sleep (0-Back=97%; 2-Back=83%; 0-Back, $t=-.98$, $p=.34$; 2-Back, $t=-1.02$, $p=.32$). Likewise, mean response times did not significantly differ between short (0-Back=618ms; 2-Back=759ms) and long sleep (0-Back=623ms; 2-Back=771ms; 0-Back, $t=.25$, $p=.81$; 2-Back, $t=.30$, $p=.77$). Despite activation that was consistent with prior n-Back literature, no significant sleep effects were observed in any a priori or functionally defined region of interest ($p>.05$). Effect sizes were small (typically $d<.20$) for both behavioral and brain measures.

Four nights of carefully monitored PSD resulted in small, nonsignificant effects on WM and vigilance. Prior findings on acute TSD may not generalize to sustained PSD. Although other functions may decline following PSD, WM and vigilance may be preserved.
Correspondence: *Lawrence H. Sweet, University of Georgia, Athens, USA. E-mail: sweet@uga.edu*
Keywords: sleep, functional magnetic resonance imaging, working memory

T. CYRKOT, R. SZCZEPANOWSKI. Moral judgments and personalizing bias in patients with persecutory delusions.

Modern research shows that paranoid ideation of reality affects the ability of social cognition and attribution styles and metacognitive awareness. The aim of this study was to investigate the relations between attribution of intentions to others and persecutory delusions. We expected that people experiencing persecutory delusions will be more severely evaluating the others' behavior regardless of the type of intentions presented. Our study included patients with a diagnosis of schizophrenia with symptoms of persecutory delusions and healthy participants recruited among students. The participants performed a moral judgment *paradigm* in which they assessed behavior of actors presenting intentions to others. We used 64 stories depicting various social situations, varied in terms of completion and intentions of one of the main characters. So far, this paradigm has not been used in the studying schizophrenia. To measure the severity of psychotic symptoms, we used the SANS and SAPS scales as well as *Peters Delusions Inventory* and *Internal, Personal and Situational Attributions Questionnaire*. Metacognitive awareness was measured with the confidence rating scale. Our results showed the influence of persecutory perception on the shaping of moral judgment among patients. The patients more severely assessed the behavior of the characters in the stories, when they achieved higher rates on the scale of delusions, but only in situations when the characters intentionally harmed the other person. In the group of patients, we also observed the relation between the tendency to personal attributions style and more severe moral judgments in situations of intentional harm to other people. There were no differences between the groups in the estimation of metacognitive awareness. Our research shows that patients with persecutory delusions are aware and able to differentiate the intentions of others, but in the context of intentional harm to another person tend to exhibit *personalizing bias*.
Correspondence: *Tomasz Cyrkot, SWPS University, Wrocław Faculty of Psychology, Wroclaw, Poland. E-mail: t.cyrkot@gmail.com*
Keywords: persecutory delusions, attribution bias, moral judgement

J. PÉREZ-FLORES, O. DELGADO, A. NIETO. Relationship of Basic Cognitive Processes and Emotional Recognition in Schizophrenia.

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Objective: Some studies have proposed a possible relationship between basic cognitive processes and Emotional Recognition, one of the components of the Social Cognition construct (Jang et al., 2016; Liu et al., 2016). Our objective is to study the relationship between the Attention/Vigilance, the Visuoperception and the Emotional Recognition.
Participants and Methods: The sample consisted of 25 outpatients (18 men) with schizophrenia (F 20.0). The age range was 27-59 years (M = 45.96, SD = 7.92). A CPT A-X task designed by our group was used to assess the Attention, the Facial Recognition Test was used to evaluate the Visuoperception (FRT; Levin, Hamsher & Benton, 1975), and the Emotional Recognition was assessed trough the Face Test (Baron-Cohen et al., 1997). Correlation analyses were carried out to study the relationships between the variables, and regression analyses were implemented to know the predictive capacity of the Attention/Vigilance and the Visuoperception on the Emotional Recognition.
Results: Significant correlations were found between the total score in the CPT A-X task and the total score of the Face Test (r = .53, p < .01), also between the total score of the Facial Recognition Test and the total score of the Face Test (r = .53, p < .01). The linear regression model generated was significant [R^2 = .36, F (2, 21) = 5.96, p < .01], although the independent predictors were not significant.
Conclusions: Attention/Vigilance and Visuoperception are related to Emotional Recognition and predict a significant percentage of the variance of Emotional Recognition performance. This indicates the importance of considering basic cognitive processes when assessing the social cognition performance of people with schizophrenia.
Correspondence: *Javier Pérez-Flores, Clinical Psychology, Psychobiology and Methodology of Behavioral Sciences, Universidad de La Laguna, San Cristobal de La Laguna, Spain. E-mail: jperezfl@ull.edu.es*
Keywords: Schizophrenia, Social Cognition, Cognitive Processes

M. RODRIGUEZ, F. SPANIEL, V. VORACKOVA, A. CVRCKOVA, Z. KRATOCHVILOVA, A. DORAZILOVA, J. JONAS, P. MOHR. Cognitive dysfunction and quality of life in first-episodes of Schizophrenia and their healthy siblings.
Introduction: Cognitive dysfunction is a well-established feature of schizophrenia. However, it is not clear whether there is also a decline in cognitive performance before the onset of psychosis. Endophenotyp is a heritable marker associated with illness, state-independent and shared among their healthy relatives
Our objective was to quantitatively examine the cognitive function in patients who presented first-episode psychosis (FEP), and their healthy siblings (HS), compared with controls (HC) and to compare cognitive functioning with their quality of life (QOL)
Methods: In a sample consisted of 3 groups (FEP, HS, HC) we analyzed their cognitive performance with a neurocognitive battery covering the most important cognitive domains related with deficit in schizophrenia. Cognitive performance was compared with QOL in all groups
Results: A significant difference in memory functions was found in between the 3 groups. Significant difference was found in Speed of processing and attention between FEP and HC. The domains of abstraction and flexibility showed a significant difference between FEP and HS when compared wih the HC group. Correlation between QOL and cognition was found in HC and HS, but not in FEP
Conclusions: Cognitive dysfunction in its total cannot be specified as an Endophenotyp in Schizophrenia. However the cognitive domains of abstraction and flexibility can be proposed as endophenotyp of the disorder. A strong relationship between QOL and cognition is more related to healthy individuals
This study is a result of the research funded by the Czech Science Foundation (GAČR), grant nr. 16-13093S, and the project MH CR AZV 15-28998A
Correspondence: *Mabel Rodriguez, Neurocognition, National Institute of Mental Health, Prague, Czech Republic. E-mail: mabel.rodriguez@nudz.cz*
Keywords: Schizophrenia, Cognition, Healthy siblings

H. GÜNDÜZ, Z. BARAN, B. BASKAK, N. SEDES BASKAK, Y. KIR. Effects of Executive Functions on Past Remembering and Future Imagination in Schizophrenia: A f-NIRS Study.
Objective: The main objective of the research was to examine the effects of executive functions (EF) on past remembering and future imagination while controlling effects of long term memory (LTM) and to show brain areas differentially engaged in these processes using functional near-infrared spectroscopy (f-NIRS).
Participants and Methods: 20 subjects with schizophrenia and 23 healthy controls were enrolled. The two groups had similar LTM performance, but EF was impaired in the index group.
Physiological data [oxy-hemoglobin (ΔOxy-Hb)] were recorded through 52 channels, while participants were performing a narrative generating

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task (NGT) in which they were asked to remember their memories and to generate a plausible future event related to presented cue words. The paradigm involved three conditions: Past remembering using one cue word (PR), future imagining using one cue word (FI1) and future imagining using 3 cue words (FI3). The FI3 was included to eleminate recast problem. Behavioral data were number of internal and external details determined by using the Autobiographical Interview (AI) method (Levine et al. 2002).

Results: Results indicated *(i)* that schizophrenia patients generated fewer internal and more external details than healthy controls especially in the FI conditions, and *(ii)* that internal details in the PR condition were higher than both FI conditions in the index group. ΔOxy-Hb measured from Brodmann Area (BA) 21 and BA22 during the PR condition were lower than the FI1 but not from the FI3 conditions. Left hemisphere was more dominantly active during the NGT than the right hemisphere in both groups.

Conclusions: EF seems to be critical for recombining recalled details for novel future events. BA21 and BA22 may be important areas for recombination. Retrieval suppression may be more engaged in FI3 condition which may be represented by lower activity in BA21 and BA22.

Correspondence: *Hasan Gündüz, Psychology, Hacettepe University, Ankara, Turkey. E-mail: hasangunduz006@gmail.com*

Keywords: future imagination, schizophrenia, executive functions

V.P. BOZIKAS, E.I. NAZLIDOU, E. PARLAPANI, A. ALEXIADOU, S. BARGIOTA, E. SKEMPERI, E. DANDI, G. FLOROS, G. GARYFALLOS. No effect of impaired memory retrieval on autobiographical memory deficits in bipolar disorder.

Objectives: Autobiographical memory (AM), the recollection of personal events and facts, has been studied extensively in different psychiatric disorders. However, little is known about AM in bipolar disorder (BD). Aim of the present study was to investigate AM in bipolar patients, and, in particular patients' ability to recall autobiographical memories after controlling for the effect of other possible neurocognitive deficits.

Participants and Method: Participants included 30 remitted outpatients with BD type I and 30 healthy controls (HCs), matched for age, gender, educational level, and premorbid intellectual functioning. AM was examined by the Questionnaire of Autobiographical Memory, consisting of the Personal Semantic Memory scale and the Autobiographical Incidents scale. Participants' verbal memory, working memory, attention and verbal fluency were also assessed.

Results: Bipolar patients showed significantly lower scores on both the Personal Semantic Memory scale (personal facts) and the Autobiographical Incidents scale (personal events) compared with HCs. Deficits were present in all three examined life periods (childhood, early adulthood and recent life). Moreover, patients showed impaired verbal memory. Differences between study groups in both scales of the Questionnaire of Autobiographical Memory remained significant even after controlling for verbal memory deficits.

Conclusions: Remitted bipolar patients showed deficits in recalling personal episodic memories and personal facts dating to childhood, early adulthood, as well as recent life. These deficits could not be attributed to verbal memory impairment. Further research is required to gain a better understanding of the mechanisms underlying difficulties in AM retrieval within BD.

Correspondence: *Vasilis P. Bozikas, 1st Department of Psychiatry, Aristotle University of Thessaloniki, Thessaloniki, Greece. E-mail: vbozikas@med.auth.gr*

Keywords: memory, false, bipolar disorder

S. TSOTSI, A. DARDAGANI, E. NTOUROS, P. ATHANASIS, V.P. BOZIKAS. Facial affect recognition in first episode psychosis.

Objectives: Facial affect recognition (FAR) deficits have been repeatedly noted in patients with first episode psychosis (FEP) and they may be of comparable severity to those in patients with chronic schizophrenia.

Participants and Method: Participants included 44 outpatients with FEP (19 male) and 40 healthy controls (19 men) matched for gender, age and educational level. Diagnosis was made according to DSM-IV criteria and confirmed with the Greek version of the Mini International Neuropsychiatric Interview (MINI). FAR was evaluated by a task that assessing the recognition of the six basic emotions, i.e. happiness, sadness, anger, disgust, surprise and fear, in facial expressions. Thirty-five stimuli consisted of a target photo and a list of the six basic emotions plus one extra option for neutral faces. Participants were asked to choose which of the seven options was, in their opinion, the most descriptive of a facial expression. The task was administered through the E-Prime software. Variables of interest were the total number of correct responses (maximum: 35) and number of correct responses for each emotion (maximum: 5). Patient symptom

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severity was assessed by the Greek version of the PANSS.
Results: FEP exhibited decreased affect recognition overall and in sadness and anger, compared with healthy controls. Female patients' performance in surprise recognition was marginally higher compared with male patients' performance (p=0.08). No correlation was noted between clinical symptoms and emotion recognition performance.
Conclusions: In accordance with earlier demonstrations of FAR impairment in patients with FEP, present findings suggest that this impairment is present early on the course of the disorder and, as such, may constitute a core deficit in psychosis.
Correspondence: *Vasilis P. Bozikas, Lab of Cognitive Neuroscience, School of Psychology, Aristotle University of Thessaloniki, Thessaloniki, Greece. E-mail: vbozikas@med.auth.gr*
Keywords: facial affect, schizophrenia

Paper Session 7. Mediators and moderators of cognitive decline with increasing age

Moderator: Hendrik Niemann

8:45–10:15

L.B. ZAHODNE, A.Z. KRAAL, A. ZAHEED, K. SOL. Subjective Social Status Predicts Late-Life Memory Trajectories through Mental and Physical Health Pathways.
Objective: Subjective social status (SSS) is associated with mental and physical health, independent of objective socioeconomic status (SES), but its association with late-life cognitive decline is unknown. This study characterizes the association between SSS and late-life memory trajectories in a large, nationally representative sample of older adults in the United States.
Participants and Methods: Using data from 8,530 participants aged 65 and older in the Health and Retirement Study, structural equation models tested associations among SSS, objective SES (i.e., educational attainment, occupation, income, and wealth), physical and mental health, and six-year memory trajectories, controlling for sociodemographic characteristics.
Results: Independent of objective SES, lower SSS was associated with worse initial memory, but not subsequent memory decline. The association between SSS and initial memory was separately mediated by chronic diseases, stroke, and depressive symptoms.
Conclusions: Results provide preliminary behavioral evidence for the deleterious effects of social stress on cognitive aging. These results may help inform the development of policies and interventions to reduce cognitive morbidity among older adults who perceive a low position on the social hierarchy.
Correspondence: *Laura B. Zahodne, Psychology, University of Michigan, Ann Arbor, USA. E-mail: lzahodne@umich.edu*
Keywords: aging, normal, cognitive functioning

M. JOANNETTE, C. BOCTI, M.M. LAVALLÉE, P. SÉVIGNY DUPONT, G. VALLET, J. NIKELSKI, H. CHERTKOW, S. JOUBERT. The relation between episodic memory and amyloid burden in healthy elderly adults is moderated by educational level.
Objective: Cognitive reserve (CR) is thought to reflect the discrepancy that can be observed between the pathology and the clinical manifestations of dementia. Life experiences such as education are associated with reduced risk of developing Alzheimer's disease (AD). It is also known to moderate cognitive changes both in AD and in normal aging. It remains unclear if CR may help cope with brain changes due to amyloid (Aβ) load, a key signature of AD, even at a stage when cognition is still intact. The aim of this study is to determine whether education, a proxy of CR, modulates the relation between amyloid burden and episodic memory (EM) in normal aging.
Participants and Methods: 104 healthy elderly adults completed an extensive neuropsychological evaluation, positron emission tomography (PET) with the amyloid tracer [11C] Pittsburgh compound B (PiB) to measure Aβ load, and an anatomic MRI. An equal number of participants were selected according to three bands of education (9-11, 12-13 and 14+ years).
Results: In order to examine whether education is a moderator of the relationship between PiB retention and a composite score of EM, a moderation analysis was carried out (corrected for age). Performance in EM was found to be significantly related to PiB retention ($p<.05$) and education significantly moderated that relationship ($p<.05$). The Johnson-Neyman technique showed that the relationship between EM and PiB retention was significant when education was less than 13.4 years of education but not significant with higher values of education.
Conclusions: These results suggest that there is an impact of Aβ load on EM in normal elderly individuals (without SMI, MCI or dementia). However, this relation between Aβ deposition and EM is moderated by education, a proxy of CR.

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Cognitively normal older adults with higher education (university degree) appear to be protected against the effect of amyloid burden on EM.

Correspondence: *Maude Joannette, Psychology, Centre de recherche de l'Institut universitaire de gériatrie de Montréal, Montreal, Canada. E-mail: maude.joannette@umontreal.ca*

Keywords: amyloid load, cognitive reserve, normal aging

P. SÉVIGNY DUPONT, C. BOCTI, M. JOANNETTE, M.M. LAVALLÉE, G. VALLET, J. NIKELSKI, R. PILON, H. CHERTKOW, S. JOUBERT. Beta-amyloid burden and white matter hyperintensities as mediators of the relationship between age and cognition in normal aging.

Objective: This cross-sectional study aimed at assessing the predictive value of beta-amyloid burden (Aβ) and white matter hyperintensities (WMH) across several cognitive domains in a sample of healthy older adults.

Participants and Methods: One hundred and four healthy adults aged 65 years or more completed an extensive cognitive assessment. Aβ deposition was measured using Positron emission tomography with the amyloid tracer [^{11}C] Pittsburgh compound B. WMH levels were quantified with the ARWMC visual rating scale on FLAIR MRI. A composite score was created for every main cognitive domain. We used a multiple stepwise regression approach using age, sex, Aβ and WMH as predictors and cognition as the outcome. We conducted multiple mediation analyses using ordinary least squares path analysis to estimate if age influences cognition through its effect on Aβ and WMH.

Results: Aβ alone better predicted Episodic Memory, $F(1,102) = 20.513$, $p<0.001$, while Working Memory was better predicted by the combination of WMH, Aβ and sex, $F(3,100) = 11,870$, $p<0.001$. Both Aβ and WMH were significant predictors of Executive Functions, $F(2,98) = 13.565$, $p<0.001$, Attention, $F(2,97) = 16.458$, $p<0.001$, and Language, $F(2,101) = 12.425$, $p<0.001$. In contrast, age better predicted Processing speed, $F(1,102) = 41,578$, $p<0.001$, while sex and age predicted Visuospatial Abilities, $F(2,101) = 13.304$, $p<0.001$. Mediation analyses revealed that age's influence on Episodic Memory is fully mediated by Aβ, while age's influence on Working Memory, Executive Functions and Attention is fully mediated by the combination of Aβ and WMH, and that age's influence on Language is fully mediated by WMH.

Conclusions: Our results suggest that biomarkers associated with AD and VD can account for most age-related cognitive changes in the healthy elderly. The presence of significant brain pathology in cognitively normal older adults may thus signal a preclinical phase of dementia.

Correspondence: *Pénélope Sévigny Dupont, Université de Montréal, Montréal, Canada. E-mail: penelope.sevigny.dupont@umontreal.ca*

Keywords: normal aging, Alzheimer's disease, cognitive

A. VIK, A.J. LUNDERVOLD, S. ADOLFSDOTTIR, A. LUNDERVOLD. Trajectories of lateral ventricle volumes predict response inhibition in middle aged and older adults – a combined imaging, longitudinal mixed-effect modelling, and machine learning study.

Objective: Relative lack of brain pathology is important for preserved cognitive function in older age. In a 3-wave ~6 yrs longitudinal study we ask if the time evolution of lateral ventricle volumes (regarded as a proxy for brain parenchyma loss) can predict response inhibition at wave3.

Participants and Methods: 74 subjects (mean age 60.7 yrs at inclusion) participated in a longitudinal study on cognitive aging, collecting MRI and cognition 3 times, 3 yrs apart. Anatomical trajectories of left and right lateral ventricle volumes were quantified using the Longitudinal Stream in Freesurfer 5.3. Response inhibition was measured as response time on the 3rd condition of Color-Word Interference Test (CWIT). The CWIT raw scores were discretised into three equiprobable response time intervals: fast (F), medium (M), and slow (S). The ventricular volume changes were modelled using a linear mixed-effect model, where the random effects (b_{0i} and slope, b_{1i}) were predictors in a comprehensive 10-fold cross-validation framework (scikit-learn), mapping (b_{0i},b_{1i}) to {F,M,S}. Here we report the performance of a Voting classifier across five linear and nonlinear classifiers, estimating its accuracy, precision and recall.

Results: The Voting classifier predictions of CWIT from modelling the individual volumetric trajectories of left and right lateral ventricles gave the following performance values, mean and (SD). Left hemisphere: Accuracy = .46 (.12), Precision = .42 (.19), Recall = .46 (.12). Right hemisphere: Accuracy = .41 (.12), Precision = .35 (.19), Recall = .41 (.12). The cross-validation prediction of IQ level was close to non-informative (~ .33).

Conclusion: The prediction results indicate an important relationship between lateral ventricle volume trajectories and cognitive inhibition in older age. Thus, lateral ventricle volumes may serve as a biomarker of response inhibition decline in older

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adults, and could possibly also be an early sign of neurodegenerative disease.
Correspondence: *Astri J. Lundervold, Department of Biological and Medical Psychology, University of Bergen, Bergen, Norway. E-mail: astri.lundervold@uib.no*
Keywords: Cognitive ageing, Longitudinal MRI, Machine learning

M. CERVENKOVA, R. HEISSLER, A. DRABINOVA, A. RULSEH, B. SCHMAND, H. STEPANKOVA, O. BEZDICEK. Different approaches to the definition of cognitive superaging and their volumetric correlates.
Objective: The aim of the present study was to investigate volumetric correlates of two different classifications of cognitive aging.
Participants: Overall, we analyzed the data from 41 healthy aging participants (mean age 75.5±6.4, mean education 15.0±3.6, 54% female). Based on Northwestern University classification, there were 26 Superagers (75.7±6.7; 15.2±4.0) and 15 Non-Superagers (75.3±6.2; 14.5±3.0). Based on a MoCA linear mixed effects (LME) model classification there were 21 Superagers (74.5±6.5; 14.7±3.7) and 20 Non-Superagers (76.7±6.3; 15.2±3.6).
Methods: We used Northwestern University classification (68% of our participants were, however, not over 80 years of age) and our own classification based on a LME model over 5 annual MoCA assessments. Whole-brain T1- and T2-weighted images (0.7 mm isotropic) were corrected for distortions and segmented using Freesurfer. Whole-brain volumetry was performed using FSL's VBM tool. Statistical analyses were performed in R.
Results: We did not find any significant group-wise differences in gray matter volume between Superagers and Non-superagers based on the Northwestern University classification, nor any correlation between the MoCA LME score and gray matter volume. We did, however, detect a significant difference in white matter lesion volume in the frontal lobes of Non-superagers vs. Superagers (p=0.012 corrected) using the LME model, as well as a trend toward greater white matter lesion volume in the parietal lobes of decliners vs. non-decliners (p=0.070 corrected). No other significant differences in white matter lesion volumes were found.
Conclusions: Although significant differences or correlation in gray matter volume were not detected, we did observe a significant difference in frontal white matter lesion volume between Non-superagers vs. Superagers, based on a MoCA LME model score. White matter changes may be more sensitive to changes in cognition than gray matter volumes.
Correspondence: *Ondrej Bezdicek, National Institute of Mental Health, Klecany, Czech Republic. E-mail: ondrej.bezdicek@gmail.com*
Keywords: aging, normal, neuroimaging, structural, cognitive functioning

Paper Session 8. Pediatric TBI

Moderator: Jennifer C.G. Larson

8:45–10:15

E.M. SCHORR, S. WADE, G. TAYLOR, T. STANCIN, K.O. YEATES. Parenting Practices as a Moderator of Long-Term Psychosocial Outcomes after Traumatic Brain Injury (TBI) in Early Childhood.
Objective: To determine whether parenting practices moderate long-term psychosocial outcomes after traumatic brain injury (TBI) in young children
Participants and Methods: 206 total children with moderate to severe TBI or orthopedic injury (OI) ages 3 to 6 years 11 months of age were recruited from four hospitals in the Midwestern United States between 2003 and 2006. The study involved a prospective, longitudinal, cohort study design, with assessments at six-time points, the last at 6.8 years post injury. Parents rated pre-injury functioning shortly after injury, and post-injury outcomes at the final assessment. Outcomes included behavioral adjustment (Child Behavior Checklist) social competence (Home and Community Behaviour Scale), and executive functioning (Behavior Rating Inventory of Executive Function). Parenting styles (permissive, authoritarian, and authoritative) were measured using the Parenting Practices Questionnaire. Hierarchical regression analyses examined parenting at the final assessment as a predictor of long-term psychosocial outcomes.
Results: After controlling for pre-injury functioning, significant group differences were found for all three outcomes, with the worst outcomes shown by the severe TBI group. More permissive parenting predicted worse social competence and executive functioning, more authoritarian parenting predicted poorer executive functioning, and more authoritative parenting predicted greater social competence. The severe TBI X permissive parenting interaction was significant for behavioral adjustment, with group differences increasing at higher levels of permissive parenting. The severe TBI X authoritative interaction was significant for social competence, with group differences increasing at lower levels of authoritative parenting.

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Conclusions: Parenting is predictive of children's long-term psychosocial functioning after early childhood injury, and may be an important moderator of the effects of early TBI.
Correspondence: *Emily M. Schorr, Psychology, University of Calgary, Calgary, Canada. E-mail: emily.schorr1@ucalgary.ca*

N.J. REID, A. FIGAJI, K. THOMAS, L. WEPENER, L. SCHRIEFF-ELSON. Acute outcomes of pediatric sport-related concussion: A systematic review on cognitive outcomes.
Context: Sport-related concussion (SRC) is a serious public health problem. Youth who participate in collision sports such as rugby and football are particularly vulnerable. It is only in the last decade, however, that pediatric SRC has been researched as an independent entity of adult SRC. Therefore, there are few systematic reviews on pediatric SRC. Furthermore, the few pediatric SRC-related systematic reviews that have been published tend to focus on aspects of pediatric SRC that are not related to neuropsychological outcomes.
Databases: PubMed, PsycINFOÒ, MEDLINEÒ, Web of Science, and the Cochrane Library.
Study evaluation: Following application of the inclusion criteria and evaluation tools, 12 articles were eligible for the systematic review analysis.
Results: The analyses suggested that the domains of memory, attention, and cognitive switching were significantly impaired following pediatric SRC. There were mixed results on whether verbal memory is more impaired than visual memory, as well as whether there is impairment in processing speed and reaction time, following pediatric SRC.
Conclusion: The results of this systematic review provide an important description of the acute neuropsychological outcomes of pediatric SRC. The type of knowledge summarized here can be used to develop targeted intervention strategies and tailored programs that assist in facilitating return-to-play and return-to-learning following pediatric SRC.
Correspondence: *Nicholas J. Reid, Department of Psychology, University of Cape Town, Cape Town, South Africa. E-mail: rdxnic007@myuct.ac.za*
Keywords: Concussion, Pediatric Concussion, Sport-related concussion

D.P. TERRY, N.E. COOK, B. MAXWELL, R. ZAFONTE, T. SEIFERT, P.D. BERKNER, G.L. IVERSON. Cognitive Effects Acutely Following a Concussion among Adolescent Athletes with a History of Pre-Injury Migraines.
Objective: Acute neuropsychological deficits following a concussion may be a risk factor for a prolonged recovery. Little is known about cognition in youth with pre-existing migraines who sustain a concussion. This study examined associations between pre-existing migraines and cognition acutely after a concussion.
Participants and Methods: A total of 39,161 adolescent athletes underwent baseline testing, of whom 3,730 had a suspected concussion and completed a post-injury evaluation. Of the 3,730 with a suspected injury, 633 were evaluated within 3 days of injury, and 59 reported having pre-injury treatment for migraine. Using a nested case-control design, each participant with pre-injury migraine was individually matched to two injured youth without a migraine disorder (controls) based on age, sex, concussion history, and sport (total n=177; age: M=15.8, SD=1.3). ImPACT® composite scores were examined with a Mixed ANOVA (Between-Subjects=group, Within-subjects=time).
Results: The migraine and control groups performed similarly at baseline (d=-0.04-0.13). The interaction term showed a group by time effect for Verbal Memory (F=4.32, p=.041) and Visual Memory (F=3.95, p=.049), such that adolescents with migraine disorders performed worse following concussion than the control participants when accounting for baseline scores. The migraine group had greater changes from baseline to post injury on Verbal Memory (d=0.74 vs. d=0.35) and Visual Memory (d=0.63 vs. d=0.29) compared to the control group. The interaction was not significant for Visual Motor Speed (p=.06) or Reaction Time (p=.79).
Conclusions: Adolescents with pre-injury migraine disorders had greater acute changes in memory scores from a concussion than those without migraine disorders.
Correspondence: *Douglas P. Terry, Department of Physical Medicine and Rehabilitation, Harvard Medical School, Boston, USA. E-mail: dterry@mgh.harvard.edu*
Keywords: concussion, migraine, sports-related neuropsychology

S. DEIGHTON, N. JU, S. GRAHAM, K.O. YEATES. Pragmatic Language Comprehension after Paediatric Traumatic Brain Injury: A Scoping Review.
Objective: Children and adolescents with traumatic brain injury (TBI) are at risk of impairments in pragmatic language abilities that are essential for successful communication and social interactions. Previous studies have shown deficits in pragmatic language comprehension after pediatric TBI, but no published reviews have focused on this domain. The aim of this scoping review is to examine the literature pertaining to pragmatic language comprehension (i.e., nonliteral language comprehension) in pediatric

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TBI, in order to summarize the current evidence and to identify areas for further research.
Participants and Methods: We undertook a scoping review including original research articles published in peer-reviewed journals. We searched MEDLINE Ovid and PsycINFO Ovid for articles published until November 2017.
Results: A total of 11 articles met our inclusion criteria. On the whole, original research suggests that children and adolescents with TBI, as compared to healthy or orthopedically injured children, display impairments in knowledge-based and pragmatic inferences, detection and judgment of ambiguous sentences, comprehension of humor, understanding of figurative language (e.g., metaphors and idioms), and comprehension of irony and deceptive praise. Children with severe TBI demonstrate more widespread impairments in pragmatic comprehension abilities, whereas children with mild TBI show relatively intact pragmatic comprehension.
Conclusion: Limitations and gaps identified in the literature warrant further research in this area. More research is needed in several areas to better understand pragmatic comprehension impairments after childhood TBI, the association of other factors with these impairments (e.g., age at injury), and the implications of pragmatic comprehension for social outcomes after pediatric TBI.
Correspondence: *Stephanie Deighton, Psychology, University of Calgary, Calgary, Canada. E-mail: smdeight@ucalgary.ca*
Keywords: traumatic brain injury, pragmatic langauge, social outcomes

C. LALIBERTÉ DURISH, M. BEAUCHAMP, W. CRAIG, Q. DOAN, R. ZEMEK, B.H. BJORNSON, J. GRAVEL, K.O. YEATES. Psychological resilience as a predictor of post-concussive symptoms in pediatric concussion: Preliminary analyses.
Objective: Psychological resilience has been identified as a potential predictor of post-concussive symptoms (PCS) following concussion. No prospective study has yet examined the relationship of resilience to trajectories of PCS in children. Thus, this study examined psychological resilience as a predictor of the trajectory of PCS in children with concussion and orthopaedic injury (OI), and as a possible moderator of group differences in PCS.
Participants and methods: Participants (N = 547), ages 8-16 years, with concussion (n = 326) or OI (n = 221), were recruited prospectively from five pediatric emergency departments across Canada. Participants completed assessments at 1-week, 3-month, and 6-month follow-ups. Self-reported psychological resilience was measured at 1-week post-injury using the 10-item version of the Connor-Davidson Resilience Scale. Child- and parent-reported PCS were measured at all three time points using the Health and Behaviour Inventory. Hierarchical linear modelling was used to examine the prediction of PCS trajectories from group, resilience, and their interaction, controlling for sex and age.
Results: Group, age, and psychological resilience were significant predictors of child- and parent-reported PCS, such that concussion (vs OI), older age, and lower psychological resilience predicted more PCS; female sex also predicted more child-reported PCS. Children with concussion also showed a more rapid decline in symptoms over time. Resilience did not significantly moderate group differences in PCS.
Conclusions: High psychological resilience may serve to decrease PCS shortly after an injury, regardless of injury type. Given that resilience may be modifiable, our results suggest that the development of interventions targeted at increasing resiliency is warranted to help alleviate the burden of PCS for children with concussion.
Correspondence: *Christianne Laliberté Durish, Psychology, University of Calgary, Calgary, Canada. E-mail: christianne.lalibert@ucalgary.ca*
Keywords: mild traumatic brain injury, child, hardiness

Symposium 3. Emotion and Cognition in Epilepsy

Chairs: Alena Javurkova, Jana Amlerova

8:45–10:15

A. JAVURKOVA, J. AMLEROVA. Emotion and Cognition in Epilepsy.
Symposium Summary: First talk will focused on functional mapping of brain structures involved in emotion recognition by intracranial electroencephalography (EEG). We examined 15 pharmacoresistant epilepsy patients undergoing intracranial EEG monitoring as a part of their presurgical evaluation. We used visual (the Ekman-Friesen set of faces) and auditory emotional stimuli. We found a complex network involved in recognition of emotional stimuli and also different structures involved in emotion recognition.
Second talk will be focused on social cognition. The aim of our study was to investigate the effect of epilepsy surgery in emotion recognition in a group of

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TLE (temporal lobe epilepsy) patients using Ekman and Friesen facial series and Faux Pas detection test (FPT). We included both cross sectional and longitudinal data. We found that both emotion recognition and Faux Pas test are impaired in patients with TLE, irrespective of the side, and that these impairments are related to lower intelligence level.
Third talk will be focused on correlation between emotion recognition, faux-pas identification, and amygdalar and hippocampal volumes in TLE patients. Previous methods Emotion Recognition Test (ERT) and (FPT) were used in a group of 14 patients with unilateral, refractory TLE. Based on high-resolution MRI (T1-weighted images) amygdala and hippocampus volumetry was manually performed. The volume of amygdala and hippocampus did not correlate with the performance in the ERT nor the FPT.
Fourth talk will be focused on screening tool of cognition (EpiTrack®). The test was administered to 134 patients (45% with focal epilepsy) and 121 healthy controls. According to age-corrected norms, 44% of patients and 4% of healthy controls only demonstrated deficits in cognitive functions. Objectively assessed cognitive functions in epilepsy patients correlated negatively with cognitive reserve. We did not find any correlation between EpiTrack and subjective evaluation of depression and anxiety.
Correspondence: *Alena Javurkova, Dpt of Clinical Psychology, Motol University Hospital, Prague, Czech Republic. E-mail: alena.javurkova@post.cz*

A. KALINA, J. HAMMER, P. JEZDIK, M. TOMASEK, P. MARUSIC. Functional mapping of emotion recognition in epilepsy patients: an intracranial EEG study.

Purpose: Resection of brain areas involved in emotion processing could lead to a more rapid decline of cognitive functions, specifically in the domain of emotion recognition. Our aim was to map brain structures involved in emotion recognition by intracranial electroencephalography (EEG).
Method: We examined 15 pharmacoresistant epilepsy patients undergoing intracranial EEG monitoring as a part of their presurgical evaluation. We used both visual (the Ekman-Friesen set of faces) and auditory emotional stimuli, and, as a control stimuli, photos and sounds of musical instruments (violin and piano). We identified intracranial electrodes with significantly different reaction ($P < 0.01$) in high-gamma band (60 - 120 Hz) after stimulus presentation to the emotional stimuli in comparison to musical instruments.
Results: For facial emotions, significantly more activations were consistently found in inferior and middle temporal gyri, and inferior frontal gyrus (especially pars triangularis). For the auditory stimuli, middle temporal gyrus and planum temporale were more activated for emotional sounds than for the musical instruments. In superior temporal gyrus, different sites of activations were found for emotional and non-emotional stimuli. Lingual and middle frontal gyri were more activated by images of musical instruments than by facial emotions.
Conclusion: We found a complex network involved in recognition of emotional stimuli and also different structures involved in emotion recognition from image and sound. Thus, such emotion-specific activations could be used in the future as a potential biomarker of critical brain structures to prevent postoperative deficit in emotion recognition.
Supported by GAUK 488217/2017
Correspondence: *Adam Kalina, Department of Neurology, Second Faculty of Medicine, Charles University and Motol University Hospital, Prague, Czech Republic. E-mail: adam.kalina89@gmail.com*
Keywords: emotion recognition, epilepsy, SEEG

J. AMLEROVA, P. MARUSIC. Effects of epilepsy surgery on social cognition.

Objective: Social cognition is a complex of interpersonal interactions ranging from the more basic perception abilities, such as emotion recognition (ER) from another person´s face, to processes using covert social cues and requiring higher-level mentalizing. This advanced behavior is known as Theory of Mind (ToM). All those abilities are crucial for social interaction and are tightly connected. ER and ToM depend mainly on temporal lobes and their impairment is observed in patients with temporal lobe epilepsy (TLE). Right sided TLE patients are prominently affected. TLE patients are often considered as candidates of epilepsy surgery due to their pharmacoresistancy. The impact of temporal lobe surgery on social cognition is still not well understood. There are studies showing decline in social cognition, whereas other studies suggest its improvement or neutral effect.
Participants and Methods: The aim of our study was to investigate the effect of epilepsy surgery in ER and ToM in a group of TLE patients using Ekman and Friesen facial ER series and Faux Pas detection test. We included both cross sectional and longitudinal data.
Results: We found that both ER and ToM are impaired in patients with TLE, irrespective of the side, and that these impairments are related to lower intelligence level. Other variables, such as epilepsy onset, longer disease duration, and history of brain injury during early childhood, appear to have an influence only on faux pas identification. Finally,

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although performance in both cognitive functions remained stable after epilepsy surgery in our cohort, there were subjects who showed significant deterioration or improvement after surgery. The changes were not associated with any clinical or demographic variables, including age, seizure frequency, age at epilepsy onset, duration of epilepsy, or intelligence level. Furthermore, significant changes in one test - ER or faux pas detection, were not associated with the change in the other test.

Correspondence: *Jana Amlerova, Neurological Department, University Hospital Motol 2nd Faculty of Medicine, Charles University, Prague, Prague, Czech Republic. E-mail: jana.amler@gmail.com*

L. MARTINKOVIC, J. AMLEROVA, P. MARUSIC. Emotion recognition and faux-pas identification in temporal lobe epilepsy patients: Correlation of performance with amygdalar and hippocampal volumes.

Introduction: Emotion recognition from facial expression and identification of social faux-pas depend on intact temporal lobe structures. There is extensive evidence that patients with temporal lobe epilepsy (TLE) are frequently impaired in these functions. The aim of our study was to assess the correlation between emotion recognition, faux-pas identification, and amygdalar and hippocampal volumes in TLE patients.

Methods: An experimental Emotion Recognition Test (ERT) adapted from Ekman and Friesen and short version of Faux Pas Test (FPT) were used to evaluate emotion recognition and social cognition in a group of patients with unilateral, refractory TLE (6 with right-sided and 8 with left-sided). Based on high-resolution MRI (T1-weighted images, 1.5mm slice thickness, perpendicular to AC-PC line) amygdala and hippocampus volumetry was manually performed. Volumes were measured in coronal sections by InsightSnap software and normalized to intracranial volume.

Results: Almost 36 % of TLE patients scored abnormal in ERT and 50 % in FPT irrespective of the epilepsy lateralization. The volume of amygdala and hippocampus did not correlate with the performance in the ERT nor the FPT. There was a trend in correlation between the low score in ERT and the volume of ipsilateral amygdala (Pearson correlation test, r= -0,44; p= 0,11). On the other hand, the patient with most prominent bilateral atrophy showed no functional impairment.

Conclusion: In our small cohort of TLE patients the volume of amygdala or hippocampus did not predict the performance on ERT or FPT which allow us to hypothesize that rather functional network changes may be responsible for the impairment.

Correspondence: *Lukas Martinkovic, Department of Neurology, Charles University in Prague, 2nd Faculty of Medicine, University Hospital Motol, Prague, Czech Republic. E-mail: lukas.martinkovic@seznam.cz*

Keywords: social cognition, neuroimaging, structural

A. JAVURKOVA, J. ZARUBOVA, M. TOMASEK, J. RAUDENSKA, P. MARUSIC. Preliminary First Czech Validation of EpiTrack®.

Objective: EpiTrack® (second edition with recently extended and revised norms) is a screening tool for tracking adverse cognitive effects of anti-epileptic medication. Achievement of maximum seizure control with preservation or even improvement of patients cognitive capabilities is the major aim of epilepsy therapy.

Participants and Methods: The test, which comprises six subtests (Speed, Flexibility, Planning, Response Inhibition, Word Fluency, Working Memory), was administered to 255 adults aged 19-74 years. For the first clinical Czech preliminary validation 134 patients (45% with focal epilepsy, 55% with generalized epilepsy, 68% seizure free in last month) were evaluated. Epilepsy patients underwent objective assessment of premorbid intelligence (CRT) as well and performed subjective ratings of depression (BDI-II), anxiety (BAI), activities of daily living (FAQ) and quality of life (QOLIE-89).

Results: According to age-corrected norms, 44% of patients (n=134) and 4% of healthy controls only (n=121) demonstrated deficits in executive functions. Objectively assessed executive functions correlated in patient group negatively with premorbid IQ, years of education, psychiatric comorbidities, seizure frequency, polytherapy, earlier age at onset and employment rate. Subjective evaluated activities of daily living and quality of life (subscales Physical function, Emotional well-being, Pain, Language) difference in EpiTrack test performance. We did not find any correlation between EpiTrack scores and overall subjective evaluation of quality of life, depression and anxiety.

Conclusions: Future Czech studies focused on EpiTrack® must show validity of this tool among Czech epilepsy patients.

Correspondence: *Alena Javurkova, Dpt of Clinical Psychology, Motol University Hospital, Prague, Czech Republic. E-mail: alena.javurkova@post.cz*

Keywords: cognitive screening, anxiety, depression

Symposium 4. Adaptation of neuropsychology instruments from a cross-cultural perspective, from screening to batteries

Sponsored by the Section for Neuropsychology, the Czech and Moravian Psychological Society (CMPS)

Chairs: Tomas Nikolai, Ondrej Bezdicek

8:45–10:15

T. NIKOLAI, O. BEZDICEK. Section for Neuropsychology, Czech and Moravian Psychological Society, Adaptation of neuropsychology instruments from a cross-cultural perspective, from screening to batteries.

Symposium Summary: Adaptation of neuropsychological tests and measures for the local neuropsychological community is one of the key responsibilities of scientific societies. Members of Section for Neuropsychology of Czech and Moravian Psychological Society present four examples of normative and validation studies of commonly used neuropsychological instruments and batteries into the Czech clinical neuropsychology practice. A screening measure Frontal Assessment Battery (FAB), newly developed National Institute of Mental Health Repeatable Neuropsychological Battery, Neuropsychological Test Battery from the Uniform Data Set (UDS-Cz 2.0) and Parkinson's Disease Mild Cognitive Impairment Battery Using the Movement Disorder Society Task Force Criteria were adapted into the Czech language. The aim of the authors is to present the local adaptation of tests and batteries including their normative data and clinical utility from an international perspective.

Correspondence: *Tomas Nikolai, Department of Neurology and Center of Clinical Neuroscience, Neuropsychology Laboratory, First Faculty of Medicine, Charles University and General University Hospital., Prague 2, Czech Republic. E-mail: tomas.nikolai@lf1.cuni.cz*

A. FENDRYCH MAZANCOVA, R. JECH, J. ROTH, E. RUZICKA, O. BEZDICEK. Frontal Assessment Battery (FAB) in Parkinson's Disease and Normative Data: A Sensitive Tool for Level I Assessment.

Background: The aim of the study was to show the utility of the Frontal Assessment Battery (FAB) in the evaluation of executive dysfunction in Parkinson's disease (PD) and to assess the relation of the FAB to age and education in the Czech environment.

Methods: All patients underwent a neurological examination and a comprehensive neuropsychological battery and were classified according to IPMDS criteria at Level II: 32 PD mild cognitive impairment (PD-MCI; mean age 61.3±8.2, mean education 13.7±3.3), 41 PD with no cognitive deficit (PD-ND; mean age 58.7±9.3, mean education 14.7±2.6), then 41 demographically matched controls for each group of patients were chosen from the pool of 339 healthy participants.

Results: The FAB showed a good discriminative validity for the differentiation of PD-MCI from PD-ND and controls based on a ROC, areas under the curve >.80. We also confirmed that performance in the FAB depends on age and education.

Conclusions: The FAB can be recommended as a valid instrument for PD-MCI Level 1 screening. For a normative interpretation of FAB performance, we provided percentile values for cognitively healthy Czech adults from 24 to 87 years of age.

Correspondence: *Adela Fendrych Mazancova, Department of Neurology and Centre of Clinical Neuroscience, First Faculty of Medicine and General University Hospital in Prague, Prague, Czech Republic. E-mail: adelamazancova@gmail.com*

E. BOLCEKOVA, G. VECHETOVA, M. PREISS. KONB: National Institute of Mental Health Repeatable Neuropsychological Battery.

Background: Although the number of neuropsychological methods that are standardized in the Czech Republic is growing, a short repeatable neuropsychological battery which could be used with a wide range of patients has been lacking. We designed such instrument utilizing standard measures of memory, visuo-spatial functions, language, attention, and executive functions.

Methods: Standard measures of reliability and validity were employed to evaluate psychometric properties of the battery. The standardization sample includes 800 adult subjects (age 18-95 years).

Results and Conclusions: We present the newly constructed battery with four parallel forms, which can be used both with healthy subjects and with patients with mild to moderate cognitive impairment. The battery takes about 30 minutes to administer and offers standard scores for separate cognitive domains and a total score. The results can be used in the diagnostic process, as well as evaluating disease progress or treatment/rehabilitation outcomes.

Correspondence: *Eva Bolcekova, National Institute of Mental Health, Klecany, Czech Republic. E-mail: eva.bolcekova@nudz.cz*

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Keywords: test development

T. NIKOLAI, H. STEPANKOVA, M. KOPECEK, M. VYHNALEK, Z. SULC, O. BEZDICEK. Uniform Data Set, Czech version, Normative Data in Older Adults.

Background: The neuropsychological test battery from the Uniform Data Set (UDS) of the Alzheimer's Disease Centers (ADC) program of the United States National Institute on Aging (NIA) is one of the most sensitive batteries for the evaluation of both normal cognitive ageing and pathological cognitive decline. This study aimed to determine the feasibility of the Czech Neuropsychological Test Battery from the Uniform Data Set (UDS-Cz 2.0), while also evaluating the results obtained from an international perspective.

Participants and methods: 520 cognitively normal participants underwent complex neuropsychological assessment based on UDS-Cz 2.0. Regression analyses were used to describe the influence of demographic variables on UDS-Cz test performance. The results were compared to existing international normative studies.

Results: Cognitive performance on all measures declined with age, with patient education level serving as a protective factor. Therefore, the present study provides normative data for the UDS-Cz, adjusted for the demographic variables of age and education.

Conclusion: The present study determines the psychometric properties of the UDS-Cz and establishes normative values in the ageing Czech population, which can be used in clinical settings.

Correspondence: *Tomas Nikolai, Department of Neurology, Neuropsychology Laboratory, 1st Faculty of Medicine, Charles University and General University Hospital, Prague, Czech Republic. E-mail: tomas.nikolai@lf1.cuni.cz*

Keywords: Neuropsychological assessment, Aging, normal, Normative data

O. BEZDICEK, T. NIKOLAI, J. MICHALEC, F. RUZICKA, P. HAVRANKOVA, J. ROTH, R. JECH, E. RUZICKA. Parkinson's Disease Mild Cognitive Impairment Battery Using the Movement Disorder Society Task Force Criteria.

Objective: The aim of the present study was to provide empirical evidence regarding the classification accuracy of the International Parkinson and Movement Disorder Society (MDS) neuropsychological battery (NB) in the determination of Parkinson's disease mild cognitive impairment (PD-MCI). Participants: The present cross-sectional study included 106 PD patients subjected to PD-MCI classification at Level I and 120 healthy controls (HCs).

Methods: All HC and PD subjects were then assessed with MDS-NB at Level II and matched according to age and education using different thresholds (1.5 and 2.0 standard deviations [SDs] below average).

Results: We found that Level I and II resulted in different classifications of PD-MCI status. Detection thresholds of –1.5 SD and –2.0 SDs at Level II had also a significant impact on the discriminative validity of all measures in the MDS neuropsychological battery, based on area under the curve analyses. Overall, semantic fluency showed the highest potential in all comparisons not only between PD-MCI and HC but also between PD-MCI and PD with no deficit (PD-ND).

Conclusions: Our results show that the battery at Level II is applicable and that Level I and II are not freely interchangeable. Furthermore, some measures in the Czech version, such as semantic fluency, have high discriminative validity in the detection of PD-MCI versus PD-ND and HCs.

Correspondence: *Ondrej Bezdicek, Department of Neurology and Center of Clinical Neuroscience, Charles University, First Faculty of Medicine, Prague, Czech Republic. E-mail: ondrej.bezdicek@gmail.com*

Keywords: Parkinson's disease, mild cognitive impairment, test validity

Morning Coffee Break

10:15–10:30

Paper Session 9. Postacute and chronic sequelae of mTBI: What do we know and what do we believe?

Moderator: Mieke Verfaellie

10:30–12:00

G.L. IVERSON, J.E. KARR, A.J. GARDNER, N.D. SILVERBERG, D.P. TERRY. Mild Traumatic Brain Injury is Not Associated with a High Incidence of Chronic Cognitive Impairment.

Objective: A recently published review of 45 studies concluded that approximately half of individuals who sustain a single mild traumatic brain injury (MTBI) experience long-term cognitive impairment [McInnes, Friesen, MacKenzie, et al. Mild

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Traumatic Brain Injury (mTBI) and chronic cognitive impairment: A scoping review. *PLoS ONE* 2017;12:e0174847]. Stratified by age, they reported that 50% of children and 58% of adults showed some form of cognitive impairment.
Participants and Methods: Each study was re-reviewed by two members of our team. We extracted age, recruitment strategy, sample characteristics (e.g., complicated MTBI, moderate/severe MTBI), the number of statistical comparisons, the number of statistically significant differences, the proportion of the sample considered by the original authors to be impaired, and the original study conclusions.
Results: We disagree with the findings and conclusions from the McInnes et al. review. Their definition of "cognitive impairment" was idiosyncratic, not applicable to individual patients or participants, and inconsistent with how cognitive impairment is defined in clinical practice and research. This resulted in a large number of false positive cases of cognitive impairment. If a study reported the MTBI group performed statistically worse on a single cognitive test, the authors concluded that *every* participant with MTBI in that study was cognitively impaired – an approach that cannot be justified statistically or psychometrically. The authors concluded that impairment was present in all cognitive domains, such as attention, memory, and executive functioning, but they did not analyze or report the results from these cognitive domains. Moreover, their analyses and conclusions regarding many published studies contradicted the interpretations provided by the original authors of those studies.
Conclusions: We conclude that a single MTBI is not associated with a high incidence of chronic cognitive impairment.
Correspondence: *Douglas P. Terry, Department of Physical Medicine and Rehabilitation, Harvard Medical School, Boston, USA. E-mail: dterry@mgh.harvard.edu*
Keywords: mild traumatic brain injury, brain injury

H.L. COYLE, J. PONSFORD, K.E. HOY. The relationship between cortical activity and cognitive function after traumatic brain injury.
Objectives: To examine the association between cortical activity and neuropsychological function after mild traumatic brain injury (mTBI).
Participants and Methods: As part of an ongoing study, 17 adults (13 male, age M=33.35 years, SD = 9.91) who had sustained a mTBI in the past 4 weeks (M= 20.41 days, SD= 7.12), and 18 age and gender matched healthy controls participated (12 male, age M = 29.89 years, SD = 8.77). All participants completed self-report measures of post-concussion, mood and fatigue symptoms and a neuropsychological battery. Paired sample t-tests were performed to explore differences between the groups. Next, functional connectivity from resting electroencephalography (EEG) was compared using the debiased weighted phase lag index (wPLI) to compare groups using network based statistics (NBS). Pearson's correlations assessed whether differences in connectivity correlated with neuropsychological measures.
Results: The mTBI group reported a greater number of post-concussion (RPQ, p = .001) and depression and anxiety (HADS, p = .04) symptoms and higher levels of mental fatigue (MFI, p = .004). Performance on measures of verbal learning (RAVLT T1, p = 0.03) and processing speed (Coding, p= .021) were reduced in mTBI participants. Electrophysiological measures demonstrated control participants had lower theta connectivity in a fronto-parietal network which negatively correlated with processing speed within that group (r= -.499, p = .035). No significant correlations for theta connectivity were seen between neuropsychological measures for mTBI participants or between controls and verbal learning.
Conclusions: mTBI has consequences for post-concussion, mood and fatigue symptoms. Findings suggest dysfunctional theta connectivity is present in mTBI which may be related to processing speed, possibly due to maladaptive plastic reorganisation.
Correspondence: *Hannah L. Coyle, Monash Alfred Psychiatry research centre (MAPrc), Monash University, Melbourne, Australia. E-mail: hannah.coyle@monash.edu*
Keywords: traumatic brain injury, cognition, electroencephalography

S. DEIGHTON, E. BIGLER, A. BACEVICE, D. COHEN, L. MIHALOV, B. BANGERT, N. ZUMBERGE, H.G. TAYLOR, K.O. YEATES. Does post-acute symptom burden predict functional deficits after paediatric mild TBI? A preliminary analysis.
Objective: Pediatric mild traumatic brain injury (mTBI) is a significant public health issue. Functional deficits, which are often investigated using measures of health-related quality of life (HRQoL), have been observed in children with mTBI. Further, evidence suggests that children who experience persistent post-concussion symptoms (PCS) are at particular risk for decreased HRQoL. The current study's aim is to investigate whether post-acute PCS predict functional outcomes in children 3-months after a mTBI.
Participants and Methods: Children ages 8 to 16 years old (96 with mTBI and 55 with OI) were

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followed for 3-months post-injury. Functional outcomes were measured using parent reports on the Pediatric Quality of Life Inventory (PedsQL; assess HRQoL), Functional Disability Inventory (FDI; assesses activity limitations), and Barkley Functional Impairment Scale (BFIS; assesses psychosocial impairment). Post-acute PCS were measured using the Health and Behavior Inventory (HBI).

Results: A hierarchical multiple regression was conducted, with pre-injury functioning entered as the first step, a dummy variable for group entered second, the HBI total score entered third, and the interaction between the HBI total score and injury group entered fourth. Injury group (OI vs. TBI) was not a significant predictor of functional outcome after adjusting for pre-injury functioning. Post-acute PCS was a significant predictor of the PedsQL (R^2 =.36, ΔR^2 =.16, p < .001), FDI (R^2 =.16, ΔR^2 =.16, p < .001), BFIS home/school (R^2 =.46, ΔR^2 =.14, p < .001) and BFIS community/leisure (R^2 =.34, ΔR^2 =.13 p < .001) scores, accounting for significant variance, over and above pre-injury functioning. There was no significant interaction observed between injury group and PCS on functioning.

Conclusions: Children who demonstrate higher post-acute symptom burden are at risk for decreased functioning 3-months post-injury, and thus warrant early intervention to prevent functional declines.

Correspondence: *Stephanie Deighton, Psychology, University of Calgary, Calgary, Canada. E-mail: smdeight@ucalgary.ca*

Keywords: Mild traumatic brain injury, Post-concussion symptoms, Functional outcomes

L.E. OEHR, M.L. SEAL, J.Y.M. YANG, J. CHEN. Quantifying the impact of mild traumatic brain injury on the relationship between white matter tract damage and cognitive function.

Objectives: The contribution of white matter neuropathology to changes in cognitive function following mild traumatic brain injury (mTBI) remains poorly understood. To date, this relationship has been examined using diffusion tensor imaging (DTI), but this model has significant limitations—while sensitive, it is non-specific to white matter microstructural changes. Advanced diffusion weighted imaging (DWI) modelling techniques, such as Neurite Orientation Dispersion and Density Imaging (NODDI), overcome these limitations. This study aimed to determine whether NODDI can assess changes in the relationship between cognitive function and white matter structure following mTBI.

Participants and Methods: DWI data was acquired on a 3T MAGNETOM Prisma scanner from 21 mTBI participants (aged 18–58) at 6–10 weeks post-injury. The Multi-Shell Multi-Tissue (MSMT) constrained deconvolution method was used to estimate white matter fibre orientations and for fibre tractography reconstructions. DTI and NODDI were used to assess white matter microstructure within tracts implicated in mTBI. Cognitive function was measured using standard neuropsychological tests and two novel computer-based tasks.

Results: Significant linear associations were found between DTI and NODDI measures of tissue microstructure and performance on measures of attention and executive function (p<.05). Importantly, NODDI revealed significant associations with processing speed (p<.05), that were not detected using DTI.

Conclusions: Compared to DTI, NODDI revealed more extensive information about white matter microstructure and associations with cognitive test performance—demonstrating its potential to contribute to the understanding of mTBI-related neuropathology. These findings represent a significant advance in our ability to use neuroimaging markers to understand and document cognitive recovery following mTBI. This has important clinical implications for individuals who experience persistent cognitive symptoms.

Correspondence: *Lucy E. Oehr, Melbourne School of Psychological Sciences, The University of Melbourne, Melbourne, Australia. E-mail: lucy.oehr@unimelb.edu.au*

Keywords: Mild traumatic brain injury, Neuroimaging, structural connectivity, Neuropsychological assessment

J.C.G. LARSON, M. VAN TUBBERGEN, A. JOHNSON, K. KOLBERG, N. SALEEM, I. ICHESCO, A. ALMEIDA, A. HASHIKAWA. Concussion Knowledge Among Children and Adolescents after Concussion: A Pilot Study.

Objective: Public information about risks of youth concussion has significantly changed. Recommendations for intervention of concussive injures varies among medical professionals, educators, and youth sports personnel. The current study addresses levels of concussion knowledge among children and adolescents who have sustained a concussion.

Participants and Methods: The sample included 50 youth patients (m=14.5 years +/-.3, range 10-18; 52% male) receiving concussion treatment at an outpatient medical clinic. 54% of the sample had a history of at least one previous concussion. 72% sustained the current concussion in a sports activity. 76% were within six months of the most recent injury and all patients had contact with a health care provider about this concussion prior to participation. Participants completed a concussion

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knowledge survey developed from the CDC's "Heads Up!" education program materials. Survey results were compared to those published by Kurowski et al (2014) from 500 high school athletes using Chi-Square.

Results: Our youth clinic sample was consistent with or better than the published sample at correctly identifying concussion-related symptoms. Our sample incorrectly identified neck pain as a concussion-related symptom (X^2=.01) and did not associate slowed reaction time with concussion (X^2=.03) more frequently than the previous sample. Our clinic sample may have a better understanding that concussion is not associated with imaging findings (X^2=.055) and that loss of consciousness does not result in permanent brain damage (X^2=.053). Across samples, a sizeable majority reported that concussion causes permanent brain damage and that every injury to the head causes a concussion.

Conclusions: Youth treated for a recent concussion perform similarly to high school athletes with brief pre-season concussion education, yet all had knowledge deficits fundamental to concussion treatment. More robust education measures are needed.

Correspondence: *Jen Larson, Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, USA. E-mail: jlarso@med.umich.edu*

Keywords: concussion, pediatrics

Symposium 5. Exploring the use of telehealth to improve patient access to effective neuropsychological assessment and rehabilitation services

Chair: Renerus (Rene) J. Stolwyk

10:30–12:00

R.J. STOLWYK. Exploring the use of telehealth to improve patient access to effective neuropsychological assessment and rehabilitation services.

Symposium Summary: This symposium will be of particular interest to clinicians and researchers who are interested in utilising telehealth methods to improve patient access to neuropsychology services. Using stroke in Australia as a model, where geographical and community access barriers can be significant, this symposium will showcase a number of innovative clinical research projects demonstrating the potential to deliver a range of neuropsychological assessment and rehabilitation services using telehealth. First, a brief review of telehealth service models utilised within similar disciplines will be provided, in addition to preliminary work completed in the field of neuropsychology. Second, the development of a novel teleneuropsychology rehabilitation service, provided to a rural stroke rehabilitation inpatient unit from a metropolitan hub, will be presented in addition to evaluation data of service feasibility, acceptability, effectiveness and efficiency. Third, research comparing test performances on telehealth versus face-to-face administration of commonly used neuropsychological assessment measures will be presented with specific emphasis on validity of telehealth assessment in clinical practice. Fourth, the effectiveness of a comprehensive memory rehabilitation program delivered using telehealth will be explored, including a non-inferiority examination compared to face-to-face delivery. Fifth, clinician training in telehealth methods and clinician experience delivering assessment and rehabilitation services will be explored. Finally, a question and answer session will be held allowing discussion of enablers and barriers of service implementation, legal and ethical issues, and future research directions to explore the potential for teleneuropsychology use in clinical and research practice.

Correspondence: *Renerus (Rene) J. Stolwyk, Monash Institute of Cognitive and Clinical Neurosciences, Monash University, Melbourne, Australia. E-mail: rene.stolwyk@monash.edu*

R.J. STOLWYK, L. ARTHURSON, J. KIM, K. BAGOT, D. CADILHAC. Utilising telehealth to deliver neuropsychological rehabilitation services to rural patients with stroke: development and evaluation of a novel pilot program.

Objective: Over two-thirds of survivors of stroke exhibit cognitive and/or mood impairment, yet only 6% of Australian rural inpatients with stroke have access to psychological services. The aim of this pilot program was to develop, implement and evaluate a novel teleneuropsychology rehabilitation service.

Participants and Methods: Neuropsychology services were provided to a rural inpatient stroke rehabilitation unit from a metropolitan clinic hub, via telehealth, 1 day per week over a 12-month period. Patients received comprehensive assessment of cognition, mood and behaviour in addition to cognitive rehabilitation and psychological interventions. An education program and consultation service to assist clinicians with management of patient neuropsychological impairments was also provided.

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Results: Compared to a pre-implementation control period, screening rates improved significantly from 42% to 90% for cognition and 19% to 88% for mood during teleneuropsychology implementation. Provision of specialist neuropsychological services rose from 0% to 71% for assessment and 0% to 61% for therapy. Setting of interdisciplinary goals increased from 23% to 43% relating to cognition and 10% to 55% for mood. Median waiting times for neuropsychology consultation was 7 days. 89% of patients and 95% of clinicians reported being satisfied with their teleneuropsychology consultation. Preliminary economic simulations indicate teleneuropsychology services may be delivered for approximately half the cost of an equivalent counterfactual face-to-face model of service provision.
Conclusions: Preliminary data provide initial support for the feasibility, acceptability, effectiveness and efficiency of teleneuropsychology rehabilitation services. Key enablers and barriers to teleneuropsychology implementation and delivery will be discussed.
Correspondence: *Renerus (Rene) J. Stolwyk, Monash Institute of Cognitive and Clinical Neurosciences, Monash University, Melbourne, Australia. E-mail: rene.stolwyk@monash.edu*
Keywords: telehealth, stroke recovery, cognitive rehabilitation

J. CHAPMAN, J. PONSFORD, B. GARDNER, D. CADILHAC, R.J. STOLWYK. Investigating the reliability of telehealth delivery of neuropsychological assessment following stroke.
Objective: Cognitive impairment occurs in up to 75% of people post-stroke. However, in Australia only 27% of hospitals that treat stroke patients have access to neuropsychological services, with access significantly lower (only 6%) in regional areas. Conducting neuropsychological assessments via videoconference could help address this service gap. The aim of this study was to evaluate the reliability of videoconference administration of 12 common neuropsychological tests by comparing this method of assessment to standard (face-to-face) assessment.
Participants and Methods: Twenty-five participants with a primary diagnosis of stroke (15 Male; M_{Age}= 64.32, SD_{Age}= 11.19; $M_{Months\ Since\ Stroke}$= 81.88, $SD_{Months\ Since\ Stroke}$= 53.59) completed two sessions on average 16.88 (SD= 12.54) days apart, face-to-face and via videoconference (counterbalanced administration). In each session, tests were completed in a standardised order.
Results: All tests demonstrated highly similar performance means across videoconference and face-to-face conditions, with no significant differences identified. The TOPF and COWAT demonstrated significant Intraclass Correlation Coefficients (ICCs) between conditions within the excellent range (>0.90). The majority of tests (WAIS-IV Block Design, Similarities, WMS-IV Visual Reproduction, BNT, RCFT, SDMT, TMT, Animal Fluency, Stroop Test) demonstrated significant ICCs within the good range (0.75-0.90). WAIS-IV Digit Span and the HVLT demonstrated lower ICCs (0.51 for Digit Span; .26 for HVLT Learning; .63 for HVLT Delayed Recall).
Conclusions: Encouraging preliminary evidence suggests a high correlation between face-to-face and videoconference assessment for the majority of tests. Findings from this study highlight the potential to utilise telehealth to address barriers in the provision of necessary neuropsychological assessment services post-stroke.
Correspondence: *Jodie Chapman, Monash Institute of Clinical and Cognitive Neurosciences, School of Psychological Sciences, Monash University, Melbourne, Australia. E-mail: jodie.chapman@monash.edu*
Keywords: stroke recovery, neuropsychological assessment, telehealth

D. LAWSON, D. WONG, R.J. STOLWYK, J. PONSFORD. Is telehealth delivery of post-stroke memory rehabilitation as effective as face-to-face programs?
Objective: Memory rehabilitation programs, focusing on compensatory strategies, have been established to improve everyday memory after stroke. However, barriers prevent accessibility of services for many, often due to lack of services in regional locations. Telehealth delivery of memory rehabilitation may improve access to these services, however evidence of equivalent effectiveness is needed. This research aimed to establish equivalence of individual face-to-face (F2F) and telehealth delivery of a six-week memory skills rehabilitation program with a group F2F format with previously established effectiveness.
Participants and Methods: The group program was adapted for individual delivery, via F2F and telehealth (internet-enabled videoconferencing). Participants with stroke (*N*=35; 61% male; mean age 58.6years) were allocated into telehealth (*N*=23) or F2F (*N*=12) modes. Achievement of personal memory-related goals was monitored using Goal Attainment Scaling, at pre- and post-intervention, and six-week follow-up, alongside objective and subjective measures of memory functioning. Outcomes of F2F and telehealth participants were compared to group delivery participants from a

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previous comparable cohort, using non-inferiority analyses.
Results: Non-inferiority to group delivery was established at clinically conservative margins (z=0.67) for individual telehealth and F2F modes on goal attainment, objective and subjective measures of everyday memory, and strategy use. At least one personal memory goal was achieved by 93.8% of telehealth and 100% of individual F2F participants at follow-up, compared with 72.2% of group program participants.
Conclusions: Individual F2F and telehealth delivery of memory rehabilitation appear at least as effective as group-based delivery. These findings have significant implications for improving access to effective memory rehabilitation post-stroke.
Correspondence: *David Lawson, Monash Institute of Cognitive and Clinical Neurosciences, Monash University, Melbourne, Australia. E-mail: david.lawson@monash.edu*
Keywords: Telehealth, Memory rehabilitation, Stroke

D. WONG, D. LAWSON, J. PONSFORD, R.J. STOLWYK. The clinician's experience of delivering neuropsychological services via telehealth.
Objective: The clinician's apprehension of the unknown can be a barrier to the uptake of telehealth as a mode of delivery of neuropsychological services. The aim of this qualitative study was to explore the experiences of clinicians who had each delivered the same memory rehabilitation program in telehealth and face-to-face (F2F) formats.
Participants and Methods: Nine psychology trainees participated in semi-structured interviews asking them to compare and contrast their experiences delivering a memory skills program to stroke survivors in individual telehealth, individual F2F and group F2F formats. Written transcripts of each interview were coded by two independent raters.
Results: Seven main themes emerged from thematic analysis: 1) *content differences* (e.g., individual tailoring of content, adaptation for remote delivery), 2) *participant factors* (comfort with technology, suitability for group settings), 3) *clinician experience* (time and organisational demands, enjoyment of telehealth format), 4) *technical issues* (internet access, glitches), 5) *in-session delivery factors* (confidentiality), 6) *communication and rapport* (verbal and non-verbal differences between modes), and 7) *value of each delivery mode* (pros and cons, access to services). Some clinicians expressed concern about managing distress and risk issues via telehealth, though all reported that they were able to build a therapeutic relationship. They consistently reported that each delivery mode had value, and that they would use telehealth again in the future.
Conclusions: Clinicians described mainly positive experiences with telehealth delivery of memory rehabilitation. Clinical experience with telehealth appears important for addressing potential barriers and has implications for training the next generation of neuropsychologists.
Correspondence: *Dana Wong, School of Psychology and Public Health, La Trobe University, Melbourne, Australia. E-mail: d.wong@latrobe.edu.au*
Keywords: telehealth, stroke recovery, clinician experience

Symposium 6. Challenging assumptions: Behaviour, cognition and neuroimaging in non-Alzheimer's dementia syndromes

Sponsored by the College of Clinical Neuropsychology (CCN)

Chair: Fiona Kumfor

10:30–12:00

F. KUMFOR. Challenging assumptions: Behaviour, cognition and neuroimaging in non-Alzheimer's dementia syndromes.
Symposium Summary: Alzheimer's disease (AD) is the most common dementia syndrome in older age. In people under the age of 65, however, at least half of all dementia cases have a non-AD aetiology. Despite this, dementia research has focused predominantly on AD, and understanding of the clinical presentations of non-AD dementia syndromes has been largely neglected. This symposium showcases new findings in the area that challenge existing assumptions in the literature, with a focus on frontotemporal dementia. Unlike AD, frontotemporal dementia is characterised by insidious changes in behaviour and personality (i.e., behavioural-variant frontotemporal dementia, bvFTD) and/or language (i.e., Primary Progressive Aphasia), reflecting relatively circumscribed atrophy to the frontal and/or temporal lobes.
First, Piguet uses neuroimaging techniques to evaluate the integrity of the cerebellum, a brain region traditionally implicated in motor function only. The results reveal discrete patterns of cerebellar atrophy, which are related to syndrome-specific cognitive profiles. Then, Janssen combines meta-analytic and empirical techniques to comprehensively study memory in primary progressive aphasia; a cognitive domain that is

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traditionally believed to be spared in these clinical phenotypes. Next, Kumfor takes an innovative approach to studying behavioural change in dementia, recognising the multidimensional nature of apathy, with results pointing towards divergent mechanisms and targets for treatment. Finally, Wong focuses on new experimental paradigms which can objectively measure changes in behaviour, an area which typically relies on carer-report. Her results uncover abnormal responses to social and non-social reward in bvFTD. These findings provide new insights into our conceptualisation of non-AD dementias and together, inform the differential diagnosis and management of these under-studied disorders.

Correspondence: *Fiona Kumfor, School of Psychology and Brain and Mind Centre, University of Sydney, Camperdown, Sydney, Australia. E-mail: fiona.kumfor@sydney.edu.au*

O. PIGUET, Y. CHEN, F. KUMFOR, R. LANDIN-ROMERO, M. IRISH, J.R. HODGES. Cerebellar atrophy and its contribution to cognitive dysfunction in the frontotemporal dementias.

Objective: Increasing evidence suggests that cerebellar damage impacts on cognitive, as well as motor functions. Frontotemporal dementias (FTD) are neurodegenerative brain conditions, primarily affecting the frontal and/or temporal lobes. Three main phenotypes are generally recognised, each with a distinct clinical and cognitive profile: behavioural-variant FTD (bvFTD), semantic dementia (SD) and progressive nonfluent aphasia (PNFA). The severity of cerebellar changes and its relations to cognition in FTD, however, remains unclear.

Participants and Methods: Forty-five bvFTD, 28 SD and 23 PNFA patients and 35 age-, sex- and education-matched controls were included. Cerebellar grey matter integrity was investigated using voxel based morphometry.

Results: Each FTD subtype showed a specific pattern of cerebellar changes. Compared with controls, bvFTD showed intensity decrease in the right lobule VIIb with widespread changes in the cerebellar hemispheres and posterior vermis bilaterally. In SD, intensity decrease was found in the right Crus II extending into bilateral posterior hemispheres. Finally, in PNFA, intensity decrease was observed in the right Crus II extending into bilateral posterior and inferior hemispheres. Correlational analyses revealed that cerebellar grey matter degeneration in the bilateral hemispheres and the posterior vermis was associated with attention and working memory capacity in bvFTD. The bilateral cerebellar posterior and inferior hemispheres were associated with deficits in word repetition task in PNFA. Finally, the bilateral cerebellar posterior hemispheres were associated with semantic loss in SD, which were anatomically distinct from the regions found related to the word repetition task in PNFA.

Conclusions: This study is the first to identify distinct patterns of cerebellar grey matter changes across FTD phenotypes, and provides evidence that cerebellar degeneration contributes to their cognitive deficits.

Correspondence: *Olivier Piguet, School of Psychology and Brain and Mind Centre, University of Sydney, Camperdown, Sydney, Australia. E-mail: olivier.piguet@sydney.edu.au*

Keywords: cerebellum, neuroimaging, structural, cognitive processing

N. JANSSEN, W.S. EIKELBOOM, L.C. JISKOOT, E. VAN DEN BERG, A. ROELOFS, R.P.C. KESSELS. Episodic and working memory function in Primary Progressive Aphasia.

Objective: The distinction between Primary Progressive Aphasia (PPA) variants remains challenging for clinicians, especially for the non-fluent (nfv-PPA) and the logopenic variants (lv-PPA). Previous research suggests that memory tests might aid this differentiation. In this talk differences in memory function among PPA variants will be addressed.

Participants and methods: A meta-analysis was performed on 40 studies (total N=687). Random-effects models were used to compare performance on episodic and working memory tests between PPA patients and healthy controls, and among the different PPA variants.

Results: Memory deficits were frequently observed in PPA compared to controls, with large effect sizes for both episodic (Hedges g=-1.49 [-1.74 to -1.25]) and working memory (g=-1.11 [-1.43 to -0.78]). The semantic variant showed primarily verbal memory deficits, whereas specific patterns of impaired performance on both verbal and non-verbal memory tests were found in nfv-PPA and lv-PPA. Empirical data collected in an ongoing study on PPA (N=16) substantiate this finding, in that specific patterns of memory deficits were found even on nonverbal memory tests.

Conclusions: Episodic, but not working memory deficits were more pronounced in lv-PPA compared to nfv-PPA. This suggests that episodic memory tests may be helpful to distinguish between these PPA variants. Also, the underlying neural mechanisms will be discussed.

Correspondence: *Nikki Janssen, Donders Institute for Brain, Cognition and Behaviour, Radboud*

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University, Nijmegen, the Netherlands. E-mail: N.Janssen@donders.ru.nl
Keywords: language: aphasia, memory, working memory

F. KUMFOR, A. ZHEN, J.R. HODGES, O. PIGUET, M. IRISH. A multidimensional approach to apathy in dementia.

Objective: Apathy is the most prevalent and disabling non-cognitive symptom of dementia and affects 90% of patients across the disease course. Despite its pervasiveness, how apathy manifests across dementia syndromes and the neurobiological mechanisms driving these symptoms are poorly understood. Here, we applied the multidimensional ABC model of apathy, which recognizes Affective, Behavioural and Cognitive apathy, in Alzheimer's disease (AD) and behavioural-variant frontotemporal dementia (bvFTD).

Participants and methods: One hundred and twenty-two patients (53 AD; 69 bvFTD) were included. Informants completed the Neuropsychiatric Inventory (NPI), Cambridge Behavioral Inventory and Disability and Dementia scale to quantify Affective, Behavioural and Cognitive apathy. All patients underwent structural MRI and voxel-based morphometry was employed to identify brain regions correlated with increased Affective, Behavioural and Cognitive apathy.

Results: On the NPI, 60% of AD and 84% of bvFTD patients had some degree of apathy, but bvFTD had more severe and more frequent symptoms than AD. Using the multidimensional ABC model, bvFTD patients had higher affective and cognitive apathy whereas AD had higher cognitive apathy only. Neuroimaging analyses revealed that affective apathy was associated with the ventral prefrontal cortex; behavioural apathy with the basal ganglia; and cognitive apathy with the dorsomedial prefrontal cortex. Finally, affective and behavioural apathy significantly predicted carer burden.

Conclusions: Our results support the notion that apathy is multidimensional and manifests differently across dementia syndromes. Thus, novel interventions which target these divergent mechanisms will be necessary to improve motivation and goal-directed behaviour in people with dementia.

Correspondence: *Fiona Kumfor, School of Psychology and Brain and Mind Centre, University of Sydney, Camperdown, Sydney, Australia. E-mail: fiona.kumfor@sydney.edu.au*
Keywords: motivation, dementia, Alzheimer's disease, frontal lobes

S. WONG, M. IRISH, M. HUSAIN, J.R. HODGES, O. PIGUET, F. KUMFOR. Impaired learning of social rewards in behavioural-variant frontotemporal dementia.

Objective: The ability to learn from social feedback is critical for adaptive behaviour in social settings. Evidence from clinical populations suggests that social dysfunction may stem from deficits in processing social rewards. Individuals with behavioural-variant frontotemporal dementia (bvFTD) show impairments in social cognition and alterations in reward processing. However, it is unclear whether the ability to adapt their behaviour in response to social stimuli is impaired, and whether these impairments are specific to social rewards.

Participants and methods: The current study contrasted reward learning for monetary versus social rewards. Here, bvFTD patients (n=5) and age-matched healthy control participants (n=6) performed two computerised probabilistic reward learning tasks – one involving social feedback (pictures of smiling or angry faces) and the other involving monetary feedback (winning or losing money).

Results: While overall learning accuracy was lower in the bvFTD patients compared to controls, performance in the social condition was disproportionately impaired in bvFTD (p=.042). In contrast, controls showed preserved learning, which was similar across both social and monetary feedback (p=.117).

Conclusions: Our findings demonstrate a greater deficit in reward learning for social relative to monetary rewards in bvFTD. Disproportionate impairments in social reward processing may contribute to the social dysfunction observed in bvFTD. Future group studies are planned to replicate these findings and to explore associations between physiological and neural markers of social reward processing in bvFTD.

Correspondence: *Stephanie Wong, Brain and Mind Centre & School of Psychology, University of Sydney, Camperdown, Sydney, Australia. E-mail: stephanie.wong@sydney.edu.au*
Keywords: social cognition, motivation, dementia

Symposium 7. Using the NIH Toolbox Cognition Battery in Individuals with Acquired Brain Injury and in Older Adults

Chair: David S. Tulsky

10:30–12:00

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D.S. TULSKY. Using the NIH Toolbox Cognition Battery in Individuals with Acquired Brain Injury and in Older Adults.

Symposium Summary: The NIH Toolbox for Assessment of Neurological and Behavioral Function (NIH Toolbox) provides a comprehensive set of cognitive, motor, sensory, and emotional health and function measures for use in clinical, longitudinal, and epidemiological research. However, the extensive NIH Toolbox norming efforts focused exclusively on children and adults without disabilities and did not include disability samples nor extensive testing in older adults. While the NIH Toolbox-Cognition Battery (NIHTB-CB) contains novel tests of episodic memory, executive functioning, working memory, processing speed, picture vocabulary, and reading, these tests have not been evaluated nor validated for clinical practice. However, new data on the validity of the NIHTB-CB measures in individuals with traumatic brain injury, stroke, and spinal cord injury, new initiatives to test older adults with and without a diagnosis of dementia, and research to examine demographic influences on test scores will help provide these empirical data to evaluate the clinical utility and validity of using the NIHTB-CB in clinical populations and clinical testing applications. Furthermore, recent modifications to the NIHTB-CB battery have adapted the measurement tools for iPad administration so that the measures are "portable" and could be utilized at the bedside further enhancing the clinical usability of the measures. This symposium will provide an overview of the NIH Toolbox and new research that will provide the initial studies and empirical evidence that will justify the use of the NIHTB-CB in clinical neuropsychological examination of individuals with neurobehavioral symptoms and disorders.

Correspondence: *David S. Tulsky, Center for Health Assessment Research and Translation, University of Delaware, Newark, USA. E-mail: dtulsky@udel.edu*

C.J. NOWINSKI, R. GERSHON. The NIH Toolbox for Assessment of Neurological and Behavioral Function.

Objective: The NIH Toolbox® (NIHTB) was intended for use in longitudinal and intervention studies and to serve as "common currency" across studies measuring neurologic function. This required creation of a multidimensional, standard set of brief, royalty-free measures (available in English and Spanish) that assess critical aspects of cognitive, sensory, motor and emotional function in people ages 3-85.

Participants and Methods: Measure development utilized both classical and advanced test construction methodology. Reliability and validity were evaluated in general population samples of 400-500 participants. To create national norms, 4859 English and Spanish-speaking participants (ages 3-85), representative of the U.S population based on age, gender, race/ethnicity and SES, were enrolled at 10 sites. Original normative values were subsequently enhanced by applying polynomial regression models to uncorrected scores and fully adjusting for demographic variables separately within English and Spanish language groups.

Results: A total of 108 instruments were created. Measures have demonstrated good reliability and validity. Comprised of four 30-minute batteries (Cognition, Emotion, Motor, Sensation), the core suite of measures can be administered in two hours or less, across diverse study designs and settings. Normative scores are available for each year of age from 3 through 17, as well as for ages 18-29, 30-39, 40-49, 50-59, 60-69, 70-79, and 80-85. In addition to age, the normative scores have been corrected for gender, education and ethnicity which can be invaluable to neuropsychologists and researchers.

Conclusions: The NIHTB is a set of brief, reliable, minimally burdensome measures of cognitive, motor, emotional and sensory function. It provides scores that are comparable across a broad range of age and ability levels, making it uniquely suited for use in lifespan assessment and evaluation of disorders covering an extensive spectrum of severity.

Correspondence: *Cindy Nowinski, Northwestern University, Chicago, USA. E-mail: c-nowinski@northwestern.edu*

Keywords: computerized neuropsychological testing, test development

J. SLOTKIN, R.C. GERSHON, A.J. KAAT. Adapting the NIH Toolbox for iPad Administration for Older Adults and Testing at Bedside.

Objective: The NIH Toolbox (NIHTB) was recently adapted for iPad administration, to enhance its accessibility and use in clinical, hospital, and offline settings. It is being studied with older adults with and without cogniitive impairments. Because the normative scores were developed using web-based administration, it was necessary to ensure that the national norms can be applied regardless of mode of administration.

Participants: 648 participants ages 3-89 were enrolled in the study, representing diverse ethnicities and gender balance.

Methods: Participants were randomly assigned to web- or iPad-based platform, stratified by age,

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gender, ethnicity and education. Analyses examined mean NIHTB cognition battery scores and effect sizes between modes of administration, adjusting for demographics. For tests with non-equivalent scores, optimal mean or linear equating formulas were derived.

Results: Three tests (List Sorting, Vocabulary, Reading) showed no group differences ($p > 0.05$, Cohen's d Effect Size [ES] < 0.20). Significant differences by mode of administration were observed for DCCS (ES = 0.26, 95% CI: 0.10-0.41 $p < 0.01$), Flanker (ES = 0.32, 95% CI: 0.15-0.47, $p < 0.0001$), Picture Sequence Memory (ES = -0.31, 95% CI: -0.47 to -0.14, $p < 0.001$) and Pattern Comparison (ES = -0.85, 95% CI: -1.03 to -0.65, $p < 0.001$). Mean and linear equating formulas were derived for each test to ensure score comparability across platforms.

Conclusions: Mode of administration did not influence test scores on three NIHTB tests. However, four tests required adjustment, primarily due to differences in modal speed of responding. Mean and linear equating adjustments successfully addressed these score differences across the lifespan. The norms for the NIHTB, originally developed for the web, can be confidently applied to the iPad, allowing testing in a portable platform, and such advances can facilitate implementation in clinical settings, research studies, and testing with older adults.

Correspondence: *Jerry Slotkin, Center for Health Assessment Research and Translation, University of Delaware, Newark, USA. E-mail: slotkinj@udel.edu*

Keywords: computerized neuropsychological testing, aging, normal, test validity

J.J. MANLY, A.M. BRICKMAN. Using the NIH Toolbox Measures for Research on Alzheimer's Disease Disparities.

Rates of AD are two to three times higher in the US among Hispanics and African Americans than among non-Hispanic White older adults and the prevalence of many cardiovascular and demographic risk factors for AD is higher among ethnic minorities. However, potential biological and sociocultural mediators and modifiers of family risk among racial and ethnic minorities are unknown, nor has much prior work been conducted among diverse families where data from detailed clinical and biomarker examinations on parents were available from in-person examinations. Since pathology begins to manifest in the brain in the fifth and sixth decades of life, mechanisms for racial/ethnic disparities may be more clearly revealed in middle age and thus help to clarify the determinants and pathways of ethnic disparities in cognitive impairment with aging and potential critical periods for intervention. Critical to this research is the ability to sensitively assess and track cognitive function among diverse people in this age group. This requires neuropsychological measures that: 1) are sensitive to subtle cognitive change, 2) do not have ceiling and floor effects related to age or educational experience; 3) are repeatable and sensitive to change, and 4) available in equivalent Spanish and English versions. The NIH Toolbox Cognitive Battery meets these criteria and has emerged as a powerful tool for research on disparities in MCI and AD. Preliminary data from the Offspring Study, an ethnically, linguistically, and educationally diverse cohort of 3,000 people age 45 and older whose parents do and do not have AD, shows that these measures are sensitive to social and biological risk factors for MCI and AD that may differentially moderate parental risk of AD across race/ethnicity.

Correspondence: *Jennifer J. Manly, Neurology, Columbia University Medical Center, NEW YORK, USA. E-mail: jjm71@cumc.columbia.edu*

Keywords: dementia, Alzheimer's disease, aging, cross-cultural issues

D.S. TULSKY. Validating the NIH Toolbox for use in individuals with Acquired Brain Injury.

Objective: The NIH Toolbox was developed and validated as a measurement system for research applications and had not been tested in clinical groups. This presentation will focus on new research testing the NIH Toolbox-Cognition Battery (NIHTB-CB) in a sample of individuals with Acquired Brain Injury.

Participants: Individuals with acquired brain injury (Traumatic Brain Injury, N=182; Stroke, N=210) were recruited at 3 large rehabilitation research sites. Each injury and severity of injury was confirmed by medical records.

Methods: Each participant completed the NIHTB Cognition Battery tests along with traditional neuropsychological instruments in a 2-day (8 hour) testing session. In-person training sessions were held and each examiner was observed administering the tests and certified to administer measures in a standardized fashion. A control sample matched on key demographic variables and extracted from the NIH norming sample to provide a comparison group.

Results: Confirmatory Factor analyses supported a 5-factor solution that included reading, vocabulary, episodic memory, working memory, and processing speed/executive functioning. When individuals with TBI were compared against controls, results of the multivariate analyses of variance suggest that the NIH Toolbox fluid cognitive composite and tests are highly sensitive to TBI and injury severity (e.g., $F=34.44$; $p<.001$) while crystallized composite and tests were still significant ($F=4.89$; $p<.01$).

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Moreover, correlations between NIHTB-CB measures and criterion tests demonstrated convergent and discriminant validity with tests measuring similar constructs demonstrating correlations of high/moderate in magnitude (e.g., >.40) while measures that are not similar had substantially lower correlations (e.g., <.30).
Conclusions: This research study provides evidence of the construct validity of the NIHTB-CB and evidence of the sensitivity to the effects of brain injury and severity of injury.
Correspondence: *David S. Tulsky, Center for Health Assessment Research and Translation, University of Delaware, Newark, USA. E-mail: dtulsky@udel.edu*
Keywords: assessment, Cognitive functioning, Traumatic Brain Injury

Poster Session 2. Attentional, learning, and language disorders across lifespan (ADHD, learning disorders, aphasias, language development)

10:35–12:25

A. AIERBE, M. MEJÍAS, M. MORENO, M.F. GONZÁLEZ, G. CLIMENT. Factorial Structure of the Nesplora Aquarium virtual reality test for the attentional processes.
Objectives: Attention is a basic cognitive process impaired in a broad range of mental pathologies. Nesplora Aquarium is a virtual reality test which evaluates attention in people over 16 years old. The aim of this study is to analyze the factorial structure of this test.
Participants and methods: A total of 882 people between the ages of 16 and 60 (average: 33.69; SD: 13.5; female: 50.9%) were evaluated with Nesplora Aquarium. This test is a Continuous Performance Test which consists in three tasks: AX task and two Xno Dual tasks. Both visual and auditory stimuli are presented and also some distractors appear during the test. More than 70 variables are calculated and the main measures of the test are: hits, omissions, commissions, reaction time, standard deviation of the reaction time, motor activity and switching. These variables are also calculated under different conditions: visual/auditory; with and without distractors, in the different tasks, etc.
Results: A factorial analysis following Principal Component Analysis (PCA) was carried out. The solution explains 68% of the variance and it was composed by three factors: attentional arousal, response speed and consistency, and inhibitory control and switching capacity.
Conclusions: The results of this study support the evidence that attention is composed by different components that are relatively independent each other. It also supports the fact that virtual reality neuropsychological test can assess attention and its different components.
Correspondence: *Amaia Aierbe, Nesplora S.L., San Sebastián, Spain. E-mail: aaierbe@nesplora.com*
Keywords: Attention, Cognitive Functioning, Neuropsychological assessment

M.G. YÁÑEZ-TÉLLEZ, B. PRIETO-CORONA, A. MONDRAGÓN-MAYA, A. WITT-GONZÁLEZ. Executive functions and academic performance in college adults with ADHD symptoms in childhood.
Objective: Academic failures have been described in children with ADHD. However, in adults it is not well known which are the consequences of ADHD in those who reach higher education. It has been reported that IQ is normal but lower in adults with ADHD and that also they have failures in executive functioning (EF). The objective of this study was to know if the academic performance of college students with ADHD symptoms during childhood is different of their peers without symptoms; and on the other hand, determine if it is related to IQ and EF.
Participants and Methods: The Wender-Utah Rating Scale (WURS) was applied to college students, of whom 26 that exceeded the cut-off point for ADHD were selected and 20 who did not exceed the cut-off point were considered as control group. IQ and EF were assessed and their academic achievement was officially documented.
Results: Both groups had similar school average in the approved subjects, however, the ADHD group had a higher percentage (practically threefold) of failed subjects during their school trajectory. No difference was found in EF and total IQ between groups, however, ADHD group obtained lower scores in subtests related to verbal skills, working memory, processing speed and long-term memory.
Conclusion: College students with a history of ADHD are more likely to present academic difficulties than their peers, which is not explained by lower IQ or EF deficits such as are assessed with performance tests.
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Correspondence: *Ma Guillermina Yáñez Téllez, Neurociences, FES Iztacala, National University of México, Mèxico, Mexico. E-mail: mgyt@unam.mx*
Keywords: ADHD, academic performance, executive functions

P. ARELLANO-VIRTO, M.G. YÁÑEZ-TÉLLEZ, B. PRIETO-CORONA. Psychiatric

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comorbidities and executive functioning in adults with Attention Deficit Hyperactivity Disorder.
Objective: Psychiatric comorbidities are common in adults with attention deficit hyperactivity disorder (ADHD) and deficiencies in executive functions (EF) have also been reported. Nevertheless, it is not clear how much deficiencies in EF can be attributable to the associated psychiatric symptomatology. The objective of this study was to find the relationship between psychiatric comorbidities and deficits in EF in adults with ADHD.
Participants and Methods: We studied 20 adults with ADHD (20 to 35 years old), diagnosed through neuropsychiatric interview and behavioral scales. The Personality Assessment Inventory (PAI) was applied to estimate psychiatric symptoms, two neuropsychological tests, D2 and Paced Auditory Serial Addition Test (PASAT), and the Behavior Rating Inventory of Executive Functions (BRIEF-A) to evaluate FE.
Results: Significant correlations of the PAI subscales with several BRIEF-A subscales were obtained: Anxiety with Emotional Control and Working Memory; Depression with Emotional Control, Self-Monitoring and Initiate; Personality Limit Disorder with Emotional Control, Self-Monitoring, Plan/Organize and Organization of Materials; Antisocial behavior with Inhibition and Organization of Materials; Aggressiveness with Emotional Control, Self-Monitoring, Initiation, Working Memory and Plan/Organize; Stress with Emotional Control, Self-Monitoring, Organization of Materials; Consumption of Substances with Inhibition, Emotional Control, Working Memory, Organization of Materials; Paranoia with Initiation and Plan/Organize and Mania with Organization of Materials. Mania and Antisocial Conduct with D2 Omissions.
Conclusion: No important relations were observed between D2 and PASAT with comorbidities. EF evaluated through the BRIEF-A correlate to a large extent with psychiatric symptoms in ADHD, so it is important to conduct studies to determine the influence of comorbidities on the deficiencies reported in ADHD.
Grants from PAPIIT, DGAPA, UNAM IN303018
Correspondence: *Ma Guillermina Yáñez-Téllez, FES Iztacala, National University of México, México, Mexico. E-mail: mgyt@unam.mx*
Keywords: ADHD, adults, comorbidity

A.R. BORKOWSKA. If there are specific profiles of sustain attention, timing, hyperactivity and impulsiveness in ODD, ADHD and ASD groups?

Objective: In children with a clinical diagnosis of Oppositional defiant disorder (ODD), Attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) on the behavioral level, high rates of similarity of symptoms can be observed, especially in attention and inhibition. The aim of this study was to compare the time-specific and distraction-induced dynamics of attention and inhibition processes in three clinical groups: subjects with ADHD, ODD, and autism as well as in the control group of typically- developing children.
Participants and Methods: Participants were 108 children: 21 with ODD, 21 with high-functioning autism, 19 with ADHD, and 47 in the control group. The age range of study participants was 7–12 years. The study employed the MOXO-CPT.
Results: Comparisons of clinical groups with typically-developing children on the entire test indicated differences between the control group and children with both oppositional defiant disorders and attention-deficit/hyperactivity disorder, but not with children with autism. Performance profiles varied depending on the group, i.e. the type of disorder, and the level of the test, i.e. stimulus duration and intensity. High levels of similarity in functioning for all clinical groups were found in the measures of sustained attention and timing. The hyperactivity was found only in children with oppositional-defiant disorders. Impulsiveness rates increased over time in the attention-deficit/hyperactivity disorder group, fluctuated over time in autism, while in the oppositional defiant disorder group performance was stable over time, but worse than in the control group.
Conclusions: The most distinct differences between profiles of clinical groups were observed in hyperactivity and impulsiveness.
Correspondence: *Aneta Rita Borkowska, Department of Clinical Psychology and Neuropsychology, University of Maria Curie-Sklodowska, Institute of Psychology, Lublin, Poland. E-mail: aneta.borkowska@poczta.umcs.lublin.pl*
Keywords: attention, inhibition

M. FILIPE, A. BARBOSA, A. PINTO, S. VICENTE. The Important Role of "Hot"/Affective Aspects of Executive Functioning in Children with Attention-Deficit/Hyperactivity Disorder.
Objective: Theoretical explanations about attention deficit/hyperactivity disorder (ADHD) suggest that executive control is a core deficit. Indeed, investigating aspects of executive function (EF; i.e., an umbrella term that incorporates higher-order cognitive functions such as inhibition and working memory) has been an active area of research. Recent data point to two distinct executive networks: the

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"cold executive network" that is more sensitive to conceptual rules and target-oriented behavior, and the "hot executive network" that is activated in situations that are emotionally and motivationally significant. Thus, we wanted to investigate "hot" and "cold" executive processes in ADHD.

Participants: Fifteen children with ADHD - combined type (M = 8.4 years, SD = 1.28), without comorbidities. All ADHD participants were matched to typically developing (TD) peers on age, gender, and socioeconomic level (n = 15), and all participants were required to have a standard nonverbal intelligence score.

Method: Working memory, mental flexibility, inhibition, planning, problem solving, and affective decision-making were assessed using the following measures: Digit Span, Verbal Fluency, Tower of London, Children's Color Trails Test, Behavior Rating Inventory of Executive Function, and Delay of Gratification Task (DGT).

Results: ADHD children performed significantly poorly in all EF tasks than TD. Z-scores were used to compare the different measures, and larger differences to the mean were found for "hot" EF assessed by DGT.

Conclusions: The research surrounding executive dysfunction in ADHD has mostly focused on "cool"/cognitive aspects, but the presence of impairments in motivational and reward-related processing suggests that "hot"/affective executive impairments should also be explored. The centrality of the EF deficits in ADHD, as well as the complex interactions between cognitive and affective aspects of EF in ADHD, should be further considered and discussed.

Correspondence: *Marisa Filipe, University of Lisbon, Lisbon, Portugal. E-mail: marisafilipe.rt@gmail.com*

Keywords: attention deficit hyperactivity disorder, executive functions, neuropsychological assessment

A. GRANDJEAN, I. SUAREZ, D. DAFONSECA, L. CASINI. Motivation effect on the interference control in children with attention deficit/hyperactivity disorder (ADHD).

Objectives: Anatomical and functional observations suggest a dysfunction of the prefrontal cortex and its connections with the basal ganglia in ADHD, a network also known to be involved in both interference control and motivation. Therefore, the aim of this study was to investigate the role of motivation on interference control in children with ADHD.

A deficit in interference control is commonly found in children with ADHD. This has mainly been interpreted as difficulties in inhibition, but interference control relies on both the susceptibility to activate inappropriate responses and the ability to inhibit them. The two processes can be dissociated by using distributional analyses of the performance. Motivation was manipulated by using either a positive feedback delivered after each correct trial (extrinsic motivation, Experiment 1) or a reward delivered at the end of the block of trials (intrinsic motivation, Experiment 2).

Participants and Methods: In each experiment, we compared performance of two groups of children (20 children with ADHD without medication and 20 control children) engaged in a Simon RT task. Two experimental conditions were counterbalanced between children: one with reward or feed-back, one without.

Results:

1/ The presence of a positive feed-back only seems to improve interference control in children with ADHD. More precisely, it improved inhibition but increased the susceptibility to activate automatic responses.

2/ It also deteriorated inhibition in control children.

3/ The presence of reward did not modify performance of children with ADHD but seems to make control children more susceptible to activate automatic responses.

Conclusions: The main conclusions are that 1/the interference control in children with ADHD would be more efficiently improved by using an extrinsic motivation compared with an intrinsic one, and 2/ surprisingly, the use of a positive feed-back deteriorates inhibitory processes in control children.

Correspondence: *Aurélie Grandjean, Laboratoire de Neurosciences Cognitives, Marseille, France. E-mail: aurelie.grandjean@univ-amu.fr*

Keywords: ADHD, Reward, Simon task

T. WALCZAK, A. MAŃKOWSKA, M. HARCIAREK. Disorders of the attentional system in very prematurely born preschoolers.

Objective: Recent studies indicate that premature children are at risk of cognitive problems, have increased incidence of ADHD as well as other behavioural disorders. Although the exact mechanism accounting for these children' neuropsychological abnormalities is unknown, there is evidence to suggest that the cognitive and behavioural disturbances seen in this population may result from a not fully developed and, hence, defective attentional system. However, it remains unclear whether prematurity affects the entire attentional system or rather prematurely born children present with a selective impairment of this system. Thus, this study was designed to determine

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the efficiency of the attentional system in very prematurely born children.
Participants and Methods: We compared the functionality of the attentional system of very prematurely born children (gestational age ≤ 32 weeks) and full-term controls (gestational age > 37 weeks). Children were evaluated at 5 years of age, using the Child Attention Network Task, which enables the assessment of the three attentional networks (alerting, orienting, executive/conflict).
Results: In comparison to full-term peers, preterm children exhibited less efficient orienting network ($p<.05$), whereas there was no group difference in terms of alerting and executive/conflict network.
Conclusions: Children born very prematurely may use visual cues to a lesser extent, and process stimuli more globally than their full-term peers. Although the reason for the selectively impaired orienting in this population remains unclear, it is possible that very preterm children have less efficient attentional networks that encompass superior parietal lobe, temporal parietal junction and the frontal eye field, particularly in the left hemisphere. Future neuroimaging studies are needed, however, to test this hypothesis.
Correspondence: *Michał Harciarek, Social Sciences, Institute of Psychology, University of Gdańsk, Gdańsk, Poland. E-mail: psymh@ug.edu.pl*
Keywords: attention, prematurity, executive function

A. SOLERDELCOLL, C. BOIX, X. CALDÚ, C. SERRA, J.M. SERRA-GRABULOSA, A. SANS. Cognitive and behavioural profile in children with FASD and ADHD in two age groups.
Objective: Prenatal exposure to alcohol is the cause of cognitive and behavioural disorders grouped under the term of FASD (fetal alcohol spectrum disorders). Attention deficit hyperactivity disorder (ADHD) is commonly diagnosed in FASD. The long-term evolution of subjects with ADHD associated with FASD is often unfavourable, especially the social and academic fields. The aim of this study is to analyse the neuropsychological and behavioural profile in two age groups of patients with ADHD and FASD.
Participants and Methods: The sample included 20 subjects with ADHD (age range = 6.9–14.3 years) and 20 subjects with FASD (age range = 6.9–14.3 years). Statistical comparisons between groups for neuropsychological performance and behavioural scores were performed by Mann Whitney's U test (2 factors: disease group [ADHD vs. FASD] and age group [below 11yo vs. above 11yo]).
Results: FASD group showed a lower score than ADHD group in the Theory of Mind test. In relation to IQ, behavioural and academic scores, no statistically significant differences were found. However, older ADHD subjects (above 11yo) had slightly higher scores in the BRIEF test than older FASD subjects. On the other hand, younger subjects of the FASD group (below 11yo) showed a slightly lower performance on reading performance (speed, precision and comprehension) than older subjects (above 11yo). Similar results were found in the ADHD group for reading speed. Also, younger subjects of the FASD group showed slightly higher global scores on parent's rating ADHD scale than older subjects.
Conclusions: The alteration of the Theory of Mind is consistent with some of the characteristics described in subjects with FASD, such as low empathy or social understanding. The data presented contribute to the better knowledge of the cognitive and behavioural profile of this disorder and suggests the need to perform an early therapeutic intervention in subjects with FASD.
Correspondence: *Anna Solerdelcoll, Neurodevelopmental Unit, Hospital Universitari Sagrat Cor, Barcelona, Spain. E-mail: anna.solerdelcoll@quironsalud.es*
Keywords: attention deficit hyperactivity disorder, alcohol, pediatric neuropsychology

M.C. MIRANDA, C.T. PIZA, O.F.A. BUENO. Adapting and implementing the Pre-K RTI model for early childhood education in Brazil: challenges and perspectives.
Preschool response to intervention (Pre-K RTI) may prevent language, literacy, and learning difficulties. As a relatively recent model, specific applications must be adapted to early-childhood culture and address children's developmental needs.
Objective: The purpose of this study is to describe the process of adapting and implementing Pre-K RTI in the Brazilian context, which may be useful for other countries with similar social-economic characteristics.
Methods and Results: Two studies were conducted: one took samples from 4 municipalities to apply the neuroscience-based Cognitive Development Training Program for educators and was followed by a questionnaire showing extremely high levels of satisfaction. The other deployed the Pre-K RTI model's scientifically based pedagogical practices designed to stimulate children's cognitive and social-emotional development processes with a sample of 17 teachers from early-childhood centers and schools in the city of São Paulo. At the end of this process, activity booklets for child development were compiled.

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Conclusions: Adapting the Pre-K RTI model involves a long and detailed process and this study pointed the need to extensively adapt the model to the reality of early childhood education in Brazil. The process of adaptation the Pre-K RTI in one developing country may be useful for others with similar social-economic characteristics.

Correspondence: *Monica C. Miranda, Department of Psychology; Department of Psychobiology, Universidade Ibirapuera; Universidade Federal de São Paulo, São Paulo, Brazil. E-mail: mirandambr@yahoo.com.br*

Keywords: response to intervention, early childhood, developmental neuropsychology

S. ITANI, M. ROSSIGNOL, F. LECRON, P. FORTEMPS. On the Involvement of the Limbic System in the Diagnosis of Attention Deficit Hyperactivity Disorder.

Objective: the present work aimed at developing a predictive model for Attention Deficit Hyperactivity Disorder (ADHD) diagnosis aid, based on a sample of typically developing and ADHD patients. Indeed, the advent of machine learning has given translational neuroscience research new insights, in particular as regards the issue of diagnosis aid. Yet ADHD is among neuropathologies that still need to be addressed through a more objective diagnosis.

Methods: we considered a sample of patients extracted from the ADHD-200 collection. We used decision trees as predictive models for their readability. Indeed, these models propose a sequence of questions on a patient to predict his/her medical condition. However, this readability does not necessarily ensure that the model provides consistent explanations. The study was thus achieved under a bottom-up methodology, conducted in a semi-knowledge guided framework. First, we lead a dimensionality reduction procedure on the dataset of phenotypic and resting-state functional magnetic resonance imaging features. This method raised the most significant features; the latter were then used to develop a decision tree which was interpreted to extract explanations on ADHD. This knowledge was used in the second part of the study, in selecting explicitly significant diagnosis elements (brain zones, phenotypic features) based on which a final decision tree was developed.

Results: our results suggest the involvement of the limbic system in the diagnosis of ADHD. Besides, the final prediction accuracy is better than those of the recent literature.

Conclusions: to sum up, it appears the interaction of machine learning and neuroscience is promising in the perspective of (1) developing models for diagnosis aid, (2) finding elements able to explain mental health issues like ADHD.

Correspondence: *Mandy Rossignol, Faculty of Engineering, University of Mons, Mons, Belgium. E-mail: mandy.rossignol@umons.ac.be*

Keywords: ADHD, neuropsychiatry, neural circuitry

J. BURGESS, A. DATOC, C.J. GOLDEN. Comparing Adults Diagnosed with Learning Disabilities on the Wisconsin Card Sorting Task (WCST).

Purpose: To see if WCST performance differs between those diagnosed with mathematical learning disabilities (MLD) or reading disabilities (RD).

Methods: Demographics for the MLD group (N=107) were M_{age}=29.28, SD=11.82; $M_{education}$=13.66, SD=1.74; 64% female; and 60% Caucasian. Demographics for the RD group (N=83) were M_{age}=29.68, SD=11.08; $M_{education}$=13.95, SD=2.26; 56% female; and 56% Caucasian. None of these demographic features differed significantly.

Results: Results of an ANOVA showed that of the 11 WCST measured, 7 were significantly different at the $p<.01$ level. The MLD group had a larger number of trials ($F[1,188]=9.679$), more total errors ($F[1,188]=9.787$), more total perseverative responses ($F[1,188]=9.478$), more total perseverative errors ($F[1,188]=9.670$), more non-perseverative responses ($F[1,188]=11.169$), a lower percentage of conceptual level responses ($F[1,188]=10.426$), and less total categories achieved ($F[1,188]=8.179$).

Conclusions: Results indicate that WCST performance is worse in someone with a diagnosis of MLD than someone with a diagnosis of RD. These findings, especially those of increased perseverative responses, perseverative errors, and less conceptual level responses, support evidence that executive functioning is significantly correlated with mathematical ability (Bull, R. & Scerif, G., 2001). On the other hand, learning-to-learn was not significant, which is perhaps not surprising since prior studies claim that this score can be used for detecting learning disabilities (Puente, A., 1985). Also, a non-significant difference for failure to maintain set indicates that there may not be a difference in how quickly those with MLD and RD abandon or forget a strategy when completing executive function tasks. Further research should assess MLD and RD on other tasks of executive function since the WCST tests spatial ability to a degree, which may impact those with MLD more severely.

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Correspondence: *Justin Burgess, Clinical Psychology, Nova Southeastern University, Davie, USA. E-mail: jb4017@mynsu.nova.edu*
Keywords: Learning disabilities, executive functioning

A. CAMACHO, S. GRAU, R. MATEU-ESTIVILL, A. LÓPEZ-SALA, R. COLOMÉ, C. BOIX, A. SANS, A. SOLERDELCOLL, A. ADAN, J.M. SERRA-GRABULOSA. Nummerus: a software for mathematical difficulties remediation.

Objective: Developmental dyscalculia (DD), is a specific learning disability affecting the correct acquisition of numerical skills. It interferes academic aims and numerical activities of daily life, and cannot be explained by any sensorial deficit, neurological disorder or medical disease. According previous studies, specific training of number processing and calculation can improve the spatial representation of the mental number line, speed of subitizing, performance on numerical comparison and subtraction accuracy. Our aim was to develop a software (nummerus) to remediate dyscalculia, by using exercises specifically designed to increase the performance on mental number line, exact calculation and knowledge of ten-based number system.

Methods: Sample included 17 subjects with dyscalculia, which were evaluated before intervention (age range = 7-12 years, mean age = 8.48, SD = ±1.1) on a neuropsychological battery that included number processing and calculation tests. After a period of 8 months of remediation with nummerus, they were evaluated with the same tests. Statistical comparisons between groups for neuropsychological performance were performed by Wilcoxon test.

Results: Statistical analysis for repeated measures showed that after nummerus intervention subjects showed a better performance on tests evaluating mental number line, exact calculation, ten-based number system, and resolution of word problems. However, only scores on mental number line test (range between 0-100) showed statistically significant differences (p=0.003).

Conclusions: Our results agree with results of previous studies, showing increased mathematical performance after a specific training remediation of mathematical difficulties. In this sense, nummerus software could be viewed as a tool to try to remediate dyscalculia. However, these results need to be followed up with larger samples and more controlled studies.

Correspondence: *Alejandra Camacho, Clinical Psychology and Psychobiology, University of Barcelona, Barcelona, Spain. E-mail: jmserra@ub.edu*
Keywords: learning disabilities, mathematics disability, cognitive rehabilitation

F. VIEIRA, P. FREITAS. Non-verbal working memory as a predictor of arithmetic performance.

Objective: Performance in arithmetic skills has an important influence on early childhood development. Knowledge about those variables contributing most to explain performance in arithmetic skills has implications for clinical practice. The aim of the study was to investigate the relationship between fluid intelligence, verbal and nonverbal working memory with specific performance for arithmetic operations in school children.

Participants and Methods: Quantitative, non-experimental and cross-sectional study. The participants were 126 Brazilian children from the public and private education and ages between 7 and 11 years. The instruments were the School Performance Test; Raven to evaluate fluid intelligence; Corsi Block Test and Digit Span (WISC III) to measure working memory. The data were analyzed with Multiple Linear Regression using the software R.

Results: The results showed that intelligence and verbal memory have positive and significant correlations with performance in arithmetic. After multiple linear regression, it was verified that the contribution of the Corsi to the prediction of arithmetic achievement was stronger than other variables. The Corsi Block Test scores were the most predictive variable in arithmetic performance (β = 0.46). The regression equation was statistically significant, explaining 46% of the variance of the performance in arithmetic.

Conclusions: Non-verbal operational memory has a significant contribution to students' mathematical skills acquisition. This result may be useful for the neuropsychological assessments of children learning mathematical difficulties.

Correspondence: *Patrícia Freitas, Institute of Health, Federal University of Bahia, Brazil, Vitória da Conquista, Brazil. E-mail: pmfrei@gmail.com*
Keywords: nonverbal working memory, arithmetic achievement, dyscalculia

A.V. KARAPETSAS, M. BAMPOU. Neuropsychology of Dyslexia and P300.

This presentation is focused on the case of FG, a 12 year old Greek developmental dyslexic girl who received a 6-month remediation program.

Objective: The purpose of this study was to investigate the effectiveness of the implementation

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of a 6-month intervention program, applied to the student after the diagnosis.
Participants and Methods: At the beginning, the student participated in a clinical assessment, including both *Electrophysiological* [i.e.Event Related Potentials (ERPs)] and *Neuropsychological tests*, being conducted in Laboratory of Neuropsychology, at University of Thessaly, in Volos, Greece. Initial assessment's results confirmed statistically significant lower performance for FG, compared to that of the typically achieving peer of similar age and gender. After clinical assessment, FG received *45-minute* training sessions, once a *week,* for 24 weeks. The program was consisted of structured and *individualized activities* focused in the enhancement of memory as well as visual - auditory functions and skills. *After following the intervention program*, FG underwent a new recording of ERPs (esp. P300 waveform).
Results: The electrophysiological results revealed that FG had similar P300 latency values after the remediation program, to that of the typical reader.
Conclusions: The outcomes of the current study suggest that dyslexia can be ameliorated and children may improve their reading skills (both reading fluency and comprehension) with lasting benefits, via individualized training. Meanwhile, results from the current study, offer direct evidence that ERPs is a valid and reliable clinical tool in neuropsychological assessment settings.
Correspondence: *Argyris V. Karapetsas, Department of Special Education, University of Thessaly, Volos, Greece. E-mail: akar@uth.gr*
Keywords: Dyslexia, ERPs, Remediation programme

R.M. LASKARAKI, A. KARAPETSA. Neuropsychology of Developmental Dyslexia: Assessment and Rehabilitation.
Auditory Event Related Potentials are obtained by averaging electrical impulses recorded from certain areas of the scalp in response to oddball stimuli and can be used to monitor changes in brain activity after Auditory Music Training (AMT).
Objective: The purpose of this study was to investigate the efficacy of Auditory Training including musical exercises in children with Developmental Dyslexia (DD).
Participants and Methods: 45 *third-,* and *fourth-grade* students with DD and a matched control group (n=45) were involved in this study. At the beginning, students with dyslexia participated in a clinical assessment, including both *Electrophysiological* and *Neuropsychological tests,* being held in Laboratory of Neuropsychology, at University of Thessaly, in Volos, Greece. Initial assessment's results confirmed statistically significant lower performance for students with dyslexia, compared to that of the control group. After evaluation, a subgroup of the children with dyslexia were submitted to an AMT program. Finally, students underwent a new recording of P300.
Results: The comparison between the assessments made before and after training showed a statistically significant difference among P300 latency values.
Conclusions: The current study offers direct evidence that P300 appears to be useful in screening brain activity changes after AMT. Meanwhile, this program was effective in the rehabilitation of the auditory processing skills in children with DD.
Correspondence: *Rozi M. Laskaraki, Department of Special Education, University of Thessaly, Volos, Greece. E-mail: laskaraki@uth.gr*
Keywords: Learning Disabilities, ERPs, Music

S. BAEZ, A. IBANEZ, S. MONTANO, A.M. GARCIA, M. PATIÑO-SAENZ, C. IDARRAGA, M. PINO, H. SANTAMARIA-GARCIA. Neuroanatomical correlates of emotional face-body language integration in offender adolescents.
Objective: Offender adolescents are characterized by social-norm transgression and maladaptive behaviors. These traits have been associated with alterations in socio-cognitive processes, including facial emotion recognition. However, most research on this issue has relied on context-free stimuli, thus failing to track ecological integrative processes typical of everyday cognition. The aim of this work was to assess the impact of body language on facial emotion recognition in offender adolescents and controls.
Participants and methods: 35 male offender adolescents and 30 male non-offenders controls were recruited. We assessed executive functions and fluid intelligence. Participants also completed two emotion recognition tasks. In the first one, participants viewed 4 contexts (anger, disgust, fear, sadness), with a circle covering the face and were asked to select the emotional label that best described the emotion expressed by the body language. In the second one, participants viewed a group of 80 images of subjects in which context (i.e., emotional body language) was congruent or incongruent regarding the emotions expressed by faces. Participants were asked to select the label which best matched the facial expression. We also examined the neuroanatomical markers of contextual integration.
Results: Offenders showed poorer facial-emotion categorization and increased sensitivity to body information in incongruent face-body scenarios. The latter pattern was associated with gray matter volume

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in brain regions supporting body and face recognition (fusiform gyrus), emotion processing (cingulate cortex, superior temporal gyrus), contextual integration (precuneus, superior temporal gyrus), and motor resonance (cerebellum, supplementary motor area).
Conclusions: These results pave the way for a better understanding of the neurocognitive association between contextual emotion recognition, behavioral regulation, and externalized behaviors in offenders.
Correspondence: *Hernando Santamaria-Garcia, Universidad de los Andes, Bogota, Colombia. E-mail: nanosanta@gmail.com*
Keywords: social cognition, neuroimaging, structural

E.M. SZEPIETOWSKA, B. GAWDA. Affective verbal fluency and its brain correlates.
Aim of research: Verbal fluency tasks are a classic tool used in neuropsychology. Among many types of verbal fluency tasks an emotional/affective tasks are used. During these tasks a person is asked to name as many as possible words 'coming to mind' following the criterion: *Joy, Fear, pleasant-unpleasant* (*etc*.). The neural mechanisms of emotional verbal fluency are published sparsely. The present study was focused on the description of brain mechanisms of emotional verbal fluency. It has been assumed that they are associated with brain areas involved in language processes, executive functions, memory, and affective processes.
Material and methods: Three verbal fluency tasks were used in the study: one non-emotional phonemic task, two emotional tasks: *Joy* and *Fear*. The results were analyzed for 35 healthy, Polish-speaking, right-handed adults aged 20–35. Functional magnetic resonance imaging (3T) was used to show brain activity during performance of verbal fluency tasks.
Results: The results confirmed activation of different brain regions for emotional verbal fluency comparing with neutral phonemic task: in the frontal, cingulate, temporal, and occipital areas.
Conclusions: The study provides an evidence for differentiation in neural mechanisms between neutral and emotional fluency. The emotional tasks both (positive -Joy and negative-Fear) highly involve these brain regions which are responsible for cognitive, emotional and language processing than the neutral tasks. It is consistent with data illustrating that emotional tasks are more demanding than non-emotional.
Correspondence: *Ewa Małgorzata Szepietowska, Department of Clinical Psychology and Neuropsychology, University of Maria Curie-Sklodowska, Lublin, Poland. E-mail: ewa.szepietowska@poczta.umcs.lublin.pl*
Keywords: affective verbal fluency, Fear, Joy, neuroimaging

E.M. SZEPIETOWSKA, A. KUZAKA. Verb fluency – noun fluency and the pathology of anterior versus posterior brain region.
Objectives: A few hypotheses about the organisation of semantical knowledge and its neuronal correlates were proposed. Among others, double dissociation in reminding of verbs and nouns in people with frontal lobe pathology and with damage of the posterior brain area was postulated. It posits the distinction of two grammatical classes and the relevant brain mechanisms. The research was conducted to describe the neural correlates of verbs and nouns. The aim of research was to compare performance of verbal fluency (verbs and nouns) between and within groups: people with frontal lobe pathology, with damage of the parietal-occipital lobes pathology, healthy controls. Next, we planned to identify cognitive correlates of fluency tasks.
Participants: There were three groups involving people: healthy controls (C, N=30), people with vascular pathology of the frontal area (FP, N=17) and people with vascular pathology of the posterior area of the brain (POP, N=17); in total 64 participants. Material and methods. There were two verbal fluency tasks used (nouns-*animals* and verbs – "*what does a man do?*"). MoCA Test and also a subtest from WAIS-PL were used to assess cognitive functions.
Results: The results are consistent with classical reports: after frontal lobe damage difficulties in recall verbs comparing to nouns were observed; after posterior brain area damage – difficulties in recalling nouns were observed. People from clinical groups generated less words than healthy people. Lower results in fluency tasks linked to selected cognitive deficits were found.
Conclusions: Despite classical dissociation, grammatical features of a task explain the minor percentage of difference in results. The key factor is the cognitive functioning of the participants. The pattern of difficulty in performance of fluency among people with frontal lobe and the posterior brain areas pathology, can be mainly explained by their specific cognitive problems.
Correspondence: *Ewa Małgorzata Szepietowska, Department of Clinical Psychology and Neuropsychology, Institute of Psychology, University of Maria Curie-Sklodowska, Lublin, Poland. E-mail: ewa.szepietowska@poczta.umcs.lublin.pl*
Keywords: noun/verb verbal fluency, frontal lobes, posterior region of the brain, dissociation.

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E.M. KARLSSON, P.E.G. BESTELMEYER, D.P. CAREY. Hemispheric lateralisation of emotional prosody in individuals with left and right cerebral language dominance.

Objective: Emotional prosody is thought to be lateralised to the right hemisphere. However, little is known about the frequency of this bias for right-handers (dextrals), let alone for non-right-handers (adextrals). Moreover, it is unknown if the lateralisation of emotional prosody is linked in a complementary fashion to language processing. Here, we examine the processing of emotional prosody in adextrals and dextrals with left or right hemispheric dominance for language.

Participants and Methods: Brain activity was measured in 56 participants using functional magnetic resonance imaging whilst listening to affective speech prosody. In addition, participants also performed a silent word generation task to assess hemispheric dominance for speech production. Laterality indices (LI) were calculated for each participant and task to quantify hemispheric processing.

Results: Participants were first categorised as left hemisphere dominant (20 adextral, 23 dextral) or right hemisphere dominant (11 adextral, 2 dextral) for language. Left language dominant participants were, on average, right lateralised for emotional prosody. Right language dominant participants were on average not lateralised, but no significant difference was found between average LI scores. On an individual level, 74% of individuals with left language dominance were right lateralised for emotional prosody, and this did not differ in the two handedness groups. Out of individuals with right language dominance, 54% were left lateralised for emotional prosody.

Conclusions: Although the frequency of right hemispheric processing patterns for emotional prosody is reduced in individuals who are right hemisphere dominant for language, compared to individuals who are left hemisphere dominant, we do not find that emotional prosody is lateralised in a fully complementary fashion to language.

Correspondence: *Emma M. Karlsson, School of Psychology, Bangor University, Bangor, UK. E-mail: e.karlsson@bangor.ac.uk*

Keywords: Laterality, Emotional prosody, Handedness

A. ROJCZYK, A. MARYNIAK. Language development in children diagnosed with arachnoid cysts.

Objective: The study aims to compare language development in children diagnosed with arachnoid cysts within the right and left hemisphere of the brain.

Participants and Methods: 19 children aged 4-18 were examined, 12 with cysts in the left and 7 in the right hemisphere, using a test of language development, Right Hemisphere Language Battery and Cattell Culture Fair Intelligence Test.

Results: Significant difference in levels of language development between the two groups was noted while the intelligence test results remained similar. Children with left-hemisphere cysts achieved higher scores in both language batteries, however the only subjects whose all scores remained within the normal range were four children with crossed lateralization.

Conclusions: Regardless of the malformation's size and placement in left or right hemisphere arachnoid cysts may affect the development of language skills, especially in patients with uniform lateralization.

Correspondence: *Agnieszka Rojczyk, Department of Health Psychology, Children's Memorial Health Institute, Warsaw, Poland. E-mail: agnieszka.rojczyk@gmail.com*

Keywords: language development, arachnoid cyst, lateralization

V. AMEZOLA, N. ARIAS-TREJO, J.O. EDGIN. Sleep efficiency and language acquisition in Mexican children with Down syndrome.

Objective: based on previous findings of frequent sleep problems in children with Down syndrome (DS) and of its relation with cognitive impairment, specifically in language skills, the present study aimed to explain more precisely the relationship between sleep efficiency and vocabulary scores in DS.

Participants and Methods: twenty-two children with DS (regular trisomy) and 22 with typical development (TD) matched individually by chronological age (range 2 to 5 years) and gender took part in this study. All participants were learning Spanish in monolingual environments. Each child wore an actigraph for seven days (24 hrs each), to assess their sleep efficiency. Information about vocabulary was obtained using a Spanish adaptation of the MacArthur-Bates CDI for children with DS. To determine the relation between sleep and language, we compared children with DS with low sleep efficiency (SE) (actigraphy SE < 80%) to DS children with normal SE (SE $\geq$ 80%) and their respective CA pairs with TD.

Results: the low-SE children with DS had significantly lower word production scores than the normal-SE group with DS, and their controls. No significant differences were found in CA between the two DS groups, indicating that CA did not determine sleep efficiency.

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Conclusions: these findings demonstrate the important role of sleep efficiency in children's language development but more specifically in children with DS. Although more work is needed to fully understand the mechanisms underlying the links between poor sleep and language development, these results may potentially lead us to new treatment approaches to reduce language deficits in children with developmental disorders.

Correspondence: *Vania Amezola, Laboratorio de Psicolingüística, Facultad de Psicología, Universidad Nacional Autónoma de México, Ciudad de México, Mexico. E-mail: vaniamezola@gmail.com*

Keywords: Down syndrome, language, sleep

J.B. BARRÓN-MARTÍNEZ, N. ARIAS-TREJO, J. SALVADOR-CRUZ, M. GALEOTE, O. GARCÍA, F.A. ROBLES-AGUIRRE. Word-word associations in children with Down syndrome: an eye-tracker task.

Background: From the second year of life, typically-developed (TD) children have the ability to relate words from associative lexical properties; such ability has been linked to a lexical system organization in later stages of development and to efficient processing of language. However, in children with Down syndrome (DS), the ability to associate words has not been examined, given the difficulties that they have in lexical production and particularly with their neuropsychological profile.

Objective: The aim of the current work was to inquire about the lexical organization in children with DS. Specifically, their ability to establish associative relationships -words that tend to co-occur in the same context-.

Participants and Method: Two groups of children (TD and DS), matched by sex and mental age (mean 3.8years) participated in a preferential looking test. A priming task introduced associatively related word pairs (prime-target) versus associatively unrelated word pairs. The priming task consisted of 10 trials with a duration of 4,700 ms each one. The subjects in both groups were asked to find a target image (e.g., *hen*) when they heard an associative prime that was related (e.g., *egg*) or unrelated (e.g., *door*).

Results: The mean of Proportion of Target Looking (PTL) was measured in each trial and group. The results indicated that both groups of children, DS and TD, showed an associative priming effect. It is, two groups presented greater visual preferences to related trials than unrelated trials in PTL measure.

Discussion: The results may indicate that lexical organization in the DS population occurs, at least at an associative level, despite the problems they have in terms of lexical production and specific neuropsychological profile. The present evidence represents a first step in the knowledge of the lexical network of people with DS, which is relevant in terms of lexical processing, implicit memory and learning mechanisms.

Correspondence: *Julia B. Barrón-Martínez, Psycholinguistic Laboratory, National Autonomous University of Mexico, Mexico City, Mexico. E-mail: juliabbm@comunidad.unam.mx*

Keywords: Down syndrome, Lexical organization, Eye-tracker

C. FASOTTI, C. VISSERS, J. MCQUEEN, H. KNOORS, L. VERHOEVEN, E. SEGERS. Speech perception and lexical specificity in developmental language disorder.

Objective: The aim of this study is to investigate speech perception, lexical specificity and sustained attention and their role in lexical learning in typically developing (TD) children and children with developmental language disorder (DLD). Insight into this interplay contributes to tailored assessment/treatment of children with DLD.

Participants and Methods: 27 TD kindergartners (14 boys, mean age = 69,5 months, mean IQ = 93,67) and 20 kindergartners with DLD (10 boys, mean age = 74 months, mean IQ = 94,10) participated. Phoneme discrimination of speech contrasts /ba/-/pa/; /va/-/wa/ and /ga/-/ka/ were assessed in an explicit phoneme discrimination task and in an implicit auditory oddball paradigm while EEG was recorded. Outcome measures were accuracy rates and amplitude of the mismatch negativity (MMN). Lexical specificity was examined in a task where children were taught word pairs with minimal acoustic-phonetic differences (e.g. vak/wak) and vocabulary breadth was measured with a Dutch receptive vocabulary test. Sustained attention was examined with a visual continuous performance task.

Results: Independent samples t-tests reveal that children with DLD performed poorer than TD children on lexical specificity ($t(40) = 2{,}551$, $p < .05$) and vocabulary breadth ($t(45) = 2{,}512$, $p < .05$), but not on attention and phoneme discrimination measures. Hierarchical linear regression analyses indicate that lexical specificity positively predicts vocabulary size ($\beta = .426$, $t = 2.553$, $p < .05$) and that implicit phoneme discrimination predicts lexical specificity ($\beta = .378$, $t = 2.131$, $p < .05$).

Conclusions: So far, the results indicate that children with DLD score below TD children on lexical specificity and vocabulary breadth. Moreover, lexical specificity positively predicts vocabulary size and implicit phoneme discrimination predicts lexical specificity. These findings indicate

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that interventions/assessment aimed at lexical specificity may benefit children with DLD.
Correspondence: *Chiara Fasotti, Koninklijke Kentalis, Sint-Michielsgestel, the Netherlands. E-mail: chiara.fasotti@gmail.com*

A. MARYNIAK. Non-verbal tests? Results of children with SLI in non-speech tasks.
In the diagnosis of intellect traditionally the verbal and non-verbal tests are used. As non-verbal are classified tasks in which the respondent does not have to make any statements, and in some of these tasks verbal instruction do not appear. It is believed that the non-verbal tests can be used as an objective assessment of cognitive abilities of people with language disorders.
The aim of the study was to assess the quantitative and qualitative performance of the tests regarded as non-verbal measure of intellectual functioning in children with specific language impairment SLI.
The study groups consisted of 33 children with SLI and 24 children with typical language development, age between 5 and 9 years old. To evaluate the language functioning Test of Language Development (TRJ) was used. The subjects performed three tests, coming from the battery ABC II Kaufman, representing the common tasks used in non-verbal assessment of intellectual abilities: Story Completion (completion picture stories), Triangles (stacking figures of triangles according to the presented models) and Conceptual Thinking (identifying the item non-matching to the others).
Children with SLI have obtained significantly worse results in Story ($p<0.000$) and Conceptual Thinking ($p=0.001$). There were no significant differences in Triangles ($p=0.25$). Qualitative analysis of the answers given in Conceptual Thinking indicate that the groups differ in the nature of responses and errors. Children with SLI frequently search numerical relationships and relation between objects, which causes their response to be inconsistent with the key, while logic. Children with typical development often make a classification based on the parent categories, and their errors are more random in nature.
Children with SLI get worse results in tasks in "non-verbal" tasks, in which an important role play internal speech or semantic classification.
Correspondence: *Agnieszka Maryniak, Faculty of Psychology, University of Warsaw, Warsaw, Poland. E-mail: agnieszka.maryniak@psych.uw.edu.pl*
Keywords: specific language impairment, non-verbal tasks

É. TAR, É. MÉSZÁROS. Speech and language characteristics in an adult with Moyamoya disease.
Objective: Moyamoya disease (MD) is a rare progressive cerebrovascular disorder affecting primarily children. Studies on patients with MD report difficulties in speech and language, without determination the speech profile. We aimed to follow up, and provide a detailed description of, the speech characteristics of a Hungarian-speaking adult with MD.
Participants and methods: A 46-year-old left-handed man with moderate to mild aphasia and no sign of dysarthria diagnosed with MD following an ischemic stroke, and 10 healthy controls participated. To reveal speech patterns, a 125-item repetition task was conducted; patient was administered the task five times at a 2-year period. Audio recorded speech data was transcribed, and analyzed in terms of whole-word and consonant accuracy and error pattern. Error analyses extended to speech parameters reported to associate with apraxia of speech. Besides perception based analyses, articulatory tempo was counted based on duration data of the segmentally matched words. Influence of time and word length on speech variables were examined by regression analyses.
Results: Regarding speech patterns, the rates of segmentally matched words were low, and the velar fricative was the most accurate consonant. Substitution was pervasive, with higher rate of substitutes from the target sound class in later time points than in earlier ones. Distortion and distorted substitution/addition occurred relatively frequently, with the latter decreasing notably by time. Dysfluency increased and speech rate slowed down as the proportion of segmental match increased. Errors operated primarily on consonants, with dysfluency appearing mostly on polysyllabic words.
Conclusions: Our findings suggests that besides aphasia, apraxia of speech is also present in adults with MD, and revealed quantitative and qualitative changes over time in error patterns what may associate with stages in the progression of the MD.
Correspondence: *Éva Tar, Eötvös Loránd University, Budapest, Hungary. E-mail: tar.eva@barczi.elte.hu*
Keywords: apraxia of speech, cerebrovascular disease, assessment

F. ANZAKI, S. YAMAMOTO, M. SHIBASAKI. Mechanism of Stuttering Based on Brain Activities Measured using functional Near-infrared Spectroscopy.
Objectives: Chang (2008) reported that people who stutter (PWSs) connect the speech motor area (SMA)

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and the auditory comprehensive area (ACA) in left hemisphere with difficulty. We examined a Japanese PWS, confirming that auditory information did not reach the left auditory temporal area via the right ear (Anzaki et al., 2016). We investigated the brain activities of 16 PWS. **Participants**: The PWSs were 14 males and 2 females (mean age 30 years old). The control group comprised 10 healthy persons (2 males and 8 females; mean age was 34 years).

Methods: Four audio speech files, each including Japanese speech sounds and white noise (WN), with 10 s WN interposed between 30 s passages of recorded speech were played for the participants, who were asked to listen to the clearly audible speech, first, via their right and then, via their left ears. In the repetition task, participants were asked to repeat the audible speech, which was clearly heard via their right ears and then, via their left ears. We measured relative changes in oxyhemoglobin using LABNIRS (Shimadzu Corporation), and calculated t-values from relative changes in oxyhemoglobin in the speech task and the WN period prior to it.

Results: The control group showed significantly high t-values for bilateral SMA and ACA. According to t-values, PWSs fell into four groups. Type 1 had low t-values in the bilateral SMA and ACA. Type 2 showed low t-values in their left SMA and ACA via the right ear. Type 3 produced low t-values in the left SMA with significantly high t-values in the left for the ACA. Finally, Type 4 had significantly high t-values in the bilateral SMA and ACA, although their t-values were lower than those in the control group.

Conclusions: Some PWSs had disturbances in the auditory speech pathway and others did not have them. Stuttering arises from complex mechanisms, beyond the auditory system

Correspondence: *Fumiko Anzaki, Yamato University, Suita, Japan. E-mail: fanzaki1765@gmail.com*

Keywords: Stuttering, functional Near-infrared Spectroscopy, brain function

S. UCHIDA. Neural fiber connections between the left occipitotemporal cortex and the contralateral visual cortex: insight for the mechanism of pure alexia for kanji.

Objectives: Pure alexia would be caused by a disconnection between visual cortex and orthographical word center. The Japanese writing system has two character types, kanji (ideogram) and kana (phonogram). Previous studies for alexia with/without agraphia showed dissociations between kanji and kana. Sakurai et al. (2006) reported a patient with pure alexia for kanji who had a lesion in the left fusiform gyrus (l-FG) and speculated that the lesion interrupted visual letter information from intact visual cortex to the kanji center in the left interior occipitotemporal cortex (l-IOTC). However, neural fiber paths between the l-IOTC and the contralateral visual cortex in human are unclear. The purpose of this study is to examine neural fiber connectivity with the l-IOTC using MR diffusion tractography for neuyrologically/neuropsychologically normal subjects.

Participants and Methods: 23 subjects were participated in this study. MR data were acquired using 3-Tesla MR scanner. Diffusion weighted images for tractography were 2-mm isotropic voxel size with 60-directional motion probing gradient. Tractgraphy was conducted using FSL PROBTRACKX. The seed point for tractography was placed in the l-IOTC by reference to previous activation study during kanji reading (Sakurai, et al., 2006). Estimated neural tracts were mapped onto T1 weighted images and assessed by visual inspection.

Results: All participants showed neural fiber connection between the seed point in the l-IOTC and the subcortical area in the right occipital cortex via the splenium of the corpus callosum. The estimated tracts which started from the l-IOTC ran through the subcortical area of the l-FG, passed below the paraventricular, and terminated in the splenium.

Conclusions: The lesion in the subcortical area of the l-FG may interrupt the neural fiber connection between the right visual cortex and kanji center in the l-IOTC. This disconnection would be one of possible mechanisms of pure alexia for kanji.

Correspondence: *Shinya Uchida, Department of Speech and Hearing Sciences, School of Health Sciences at Narita, International University of Health and Welfare, Narita, Japan. E-mail: suchida@iuhw.ac.jp*

Keywords: neuroimaging, structural connectivity, tractgraphy, pure alexia for kanji

C. AGUILLON-SOLIS, J. SALVADOR-CRUZ, J. MARCOS-ORTEGA. Verb-Noun dissociation in Broca's aphasia reading.

Objective: The goal of this study was to analyze the effect of grammatical category in the reading and listening comprehension of a patient with Broca's aphasia.

Participants and Methods: We assessed a patient with Broca's aphasia with two pairing tasks (reading and listening) of 120 stimuli. The results were analyzed in a single-subject experimental design 2x2: grammatical category (nouns, verbs) and modality (listening, reading). Nouns and verbs were paired by frequency. Frequency values were taken from LEXMEX corpus (Silva-Pereyra et al., 2013).

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Results: Statistical analysis showed significant main effects ($p<.05$) for grammatical category and modality and an interaction between the two factors. The overall rate of accuracy in listening (91%) was greater than reading accuracy (53%). Grammatical category influenced only reading with a better performance in nouns (68%) than in verbs (38%).
Conclusions: Double dissociation between nouns and verbs has been identified in Broca's and anomic aphasia patients. Broca's aphasia is characterized by a deficiency in verb usage while anomic aphasia is characterized by a deficiency in noun usage. Although most of the studies have described output processes (i.e. spontaneous speech and naming) (e.g. Caramazza & Hillis, 1991), this study established that verb-noun dissociation also can be found in reading processes. However, reading theories have not considered the variable of grammatical category. Empirical results suggested that reading models are not developed enough to explain verb-noun dissociations.

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Correspondence: *Cristina Aguillon-Solis, FES Zaragoza, UNAM, Mexico City, Mexico. E-mail: cristina.aguillon.s@gmail.com*
Keywords: language: aphasia, reading disorders, agrammatism

A.R. BORKOWSKA, B. DANILUK. Linguistic and communicative competences in two phases of elderly.

Objectives: In recent years, in publications on cognitive functioning of elderly people, comparisons were made mainly between elderly people treated as a homogenous group with younger people. In our research we would like to show a diversity of the group of elderly and necessity to distinguish at least two subgroups: young old (65-70 years) and old old (>71 years). We assumed that those two groups differ in language and communicative competences. The aim of the study was to analyze and compare the level of language and communicative abilities in early and late old age and to identify its determinants.
Participants and Methods: The participants were 109 individuals with physiological aging, divided into two aging groups: young old (65-70 years) and old old (>71 years). The methods used were: interview, Mini-Mental State Examination and Right Hemisphere Language Battery.
Results: In all but one (Discourse) subtests older seniors have got lower scores then younger olds. In subtests: Inferential Meaning, Lexical Semantic, Humor and Discourse the only predictor was MMSE. MMSE and High education were the predictors in subtests: Metaphor Picture. Metaphor Writing, Metaphor Picture Explanation. Age, MMSE and high education were predictors in Metaphor Writing Explanation. Age, Gender and MMSE were predictors in Emotional and Linguistic Prosody.
Conclusion: The results confirm the assumption that not mainly age, but also other factors as education and gender determine the process of deterioration of linguistic and communicative competences in elderly.
Correspondence: *Aneta R. Borkowska, Department of Clinical Psychology and Neuropsychology, University of Maria Curie-Sklodowska, Institute of Psychology, Lublin, Poland. E-mail: aneta.borkowska@poczta.umcs.lublin.pl*
Keywords: physiological aging, language, communicative skills

Y. SOMA, I. FUJITA, M. HIRAI. A Comparison of Micro- and Macrostructural Linguistic Aspects of Narrative Discourse in Healthy Elderly Adults and Young Adults.

Objective: Patients with dementia experience word-finding difficulties, and a lack of cohesion, coherence and informativeness in narrative discourse (Kemper & Goral, 2008). The study objective was to determine whether these symptoms were due to dementia or aging. A comparison was made between the healthy discourse of healthy elderly adults and that of young adults.
Participants and Methods: Eighteen cognitively healthy elderly adults with adequate cognitive function (9 males, mean age of 3.4 ± 71.1 years) and 18 young adults (6 males, mean age of 4.3 ± 22.9 years) took part in the study. The participants recounted three old tales. The discourse samples were recorded and transcribed. Microstructural linguistic aspects (type token ratio [the number of different words divided by the total number of words]; the ratio of clauses per total communication units [C-units]) were analyzed, together with macrostructural linguistic aspects (the number of essential C-units, related C-units and unrelated C-units; ordered C-units; the ratio of cohesive ties to total words).
Results: The type token ratio for the elderly adults was significantly higher than that for the young adults ($p = < 0.05$). The ratio of clauses per total C-units was the same in both groups, indicating syntactic complexity retention and greater lexical diversity in the young adults. The same number of

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essential C-units and a significantly greater number of related C-units were attributed to the elderly adults ($p = < 0.05$). No difference was seen with ordering the C-units. The ratio of cohesive ties for the elderly adults was lower than that for the young adults, suggesting that the former ordered the telling of the stories correctly and provided more information, but with less cohesion.

Conclusions: Word-finding difficulties, lack of coherence, and informativeness in narrative discourse might be due to dementia, but lack of cohesion relates to aging.

Correspondence: *Yuri Soma, Teikyo Heisei University, Tokyo, Japan. E-mail: y.soma@thu.ac.jp*

Keywords: aging, normal, discourse, language

M. HIGASHIKAWA, Y. MOTOKI, T. WATANABE, K. HADANO, T. HATTA. An Analysis of Speech Characteristics in Conduction Aphasia: Observations from Two Cases.

Objective: To investigate the nature of conduction aphasia through analysis of the characteristics of utterances made by two patients presenting with differences manifesting with respect to aspects such as approaching speech acts.

Participants and methods: Case 1 was a man in his 70s presenting with cerebral infarction. Case 2 was a woman in her 50s presenting with cerebral hemorrhaging. We analyzed speech errors in approaching speech acts in naming task and errors forming sentences made by these two patients. During our analysis of naming task, we classified speech errors into different categories including sound fragments, phonological paraphasia, verbal paraphasia, among others. For our analysis of sentence formation, errors were classified into sound fragments, phonological paraphasia, verbal paraphasia, word reduplication, usage errors, and grammatical errors.

Results: Phonological paraphasia were observed during approaching speech acts in both cases, but Case 1 exhibited a markedly greater number of sound fragments, while numerous instances of verbal paraphasia, particularly formal paraphasia, were observed with Case 2. During the analysis of sentence formation, Case 1 again produced numerous sound fragments as well as numerous conspicuous grammatical errors. No instances of verbal paraphasia were observed with Case 2, but she made many word reduplications and trial and error mistakes regarding verb use.

Conclusion: Regarding the nature of conduction aphasia, one theory relies on the theory of double articulation introduced in linguistics by André Martinet. In Case 1, the most salient errors were at the second articulation level, which forms monemes comprised of phonemes as a unit. Case 2 made numerous trial and error mistakes in her selection of monemes and their grammatical application, and errors at the level of first articulation, were most salient. We will consider the nature of conduction aphasia through our symptomatic analysis of these two subjects.

Correspondence: *Mari Higashikawa, School of Allied Health Science, Kitasato University, Sagamihara, Japan. E-mail: sthigashikawa@icloud.com*

Keywords: Conduction aphasia, paraphasia, the theory of double articulation

H. NGUYEN, L. NICKELS, J. WEBSTER, J. MORRIS. Contextual influences on the reading of naturalistic texts in people with aphasia.

Objective: Reading deficits are common in people with aphasia (PWA), contributing to reduced quality of life. Context, provided via peripheral organisers (photos, titles), has been shown to facilitate text processing and understanding in normal readers. There is also evidence that PWA's reading accuracy significantly increases when contextual information is present. However, previous studies have used researcher-made rather than naturalistic texts and so do not typically resemble real-world reading situations. In addition, it is unknown if context impacts PWA's reading speed. The objective of this study was to determine whether and to what extent prior context influences PWA's reading speed and accuracy for everyday texts.

Participants and Methods: Participants were 30 healthy controls and 11 PWA. The groups were matched for age (50-76) and years of education and had no developmental literacy difficulties. Participants with aphasia were selected to be varied in their aphasia severity and reading ability. All participants read 45 news articles of 110-150 words. Each article was preceded by either a related headline, an unrelated headline or no headline and followed by four multiple-choice questions assessing the understanding of stated main ideas, implied main ideas, stated details, and implied details.

Results: Context significantly impacted reading times of both control and aphasia groups: the related-headline condition led to significantly shorter reading times than the unrelated- and no-headline conditions, which did not differ from each other. There was, however, no significant contextual effect on overall accuracy or accuracy to a particular question type in either groups of participants.

Conclusions: The results show that context benefits skilled readers and PWA when they read everyday texts. It also suggests that advance provision of contextual information could potentially be of

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therapeutic support to increase PWA's reading speed.

Correspondence: *Hanh Nguyen, Speech and Language Sciences, Newcastle University, Newcastle upon Type, UK. E-mail: t.nguyen1@newcastle.ac.uk*

Keywords: contextual influences, reading in aphasia, naturalistic texts

A. OISHI, I. FUJITA. Effects of Context on Sentence Production in Broca's and Wernicke's Aphasia: Focusing on Perspective-Taking.

Objective: Message-level processing in speech production, which is referred to as "thinking for speaking" (Slobin 1996) or "conceptual preparation" (Levelt 1999), has been increasingly investigated in aphasia over 20 years. At this level, a speaker chooses some perspective on the context to express the scene in language. The current study aimed to investigate whether context processing is preserved in people with aphasia and whether the context has facilitating effects on sentence production, with a focus on perspective-taking.

Participants and Methods: Participants were 10 people with Broca's aphasia, 10 with Wernicke's aphasia, and 12 cognitively healthy adults as controls. Sentence production was examined in two conditions: with and without context. Target sentences were those with agent's perspective (sentences with "give"-type verbs, active sentences) and those with non-agent's perspective (sentences with "receive"-type verbs, passive sentences). Syntactic processing was analyzed in terms of correct subject–predicate combination in both conditions. In addition, in the with-context condition, whether the participants took appropriate perspective according to the context was evaluated.

Results: In the without-context condition, participants with Broca's and Wernicke's aphasia showed significantly more errors in sentences with non-agent's perspective than those with agent's perspective. In the with-context condition, participants with both Broca's and Wernicke's aphasia had appropriate perspective as the control group did, and the difference in the error rates of subject–predicate combination was mitigated between sentence production with agent's and non-agent's perspective.

Conclusions: The results indicate that participants with Broca's and Wernicke's aphasia have difficulty in syntactic processing of non-agent perspective. However, when given context, they were able to produce correct sentences through the preserved pragmatic competence of perspective-taking.

Correspondence: *Ayako Oishi, Department of Speech and Hearing Sciences, School of Health Sciences at Narita, International University of Health and Welfare, Narita City, Japan. E-mail: a.oishi@iuhw.ac.jp*

Keywords: language: aphasia, sentence production, context

O. GRINSHTEN, Z. EVIATAR. Remembering trauma in different languages: Does telling the story in a second language reduce stress? A pilot study.

This research examined the effects of telling a traumatic story in a second language (vs. first language) on stress levels among PTSD participants. It was hypothesized that when a participant's cognitive resources were invested in formulation of words in a language in which he was not fluent (i.e., the second language), telling the story may become psychologically easier, and stress levels would be reduced.

Six participants who had served as combat soldiers in the IDF were recruited for this study. They all reported suffering from PTSD, which was caused by a major event in the army. Participants were recorded individually three times. Data was collected during the interview. The experimental group was recorded first in Hebrew, then in their second language (English) and finally in Hebrew. The control group was recorded in Hebrew in all three instances.

Congruent to the research hypotheses, the results indicated an increase in levels of morbidity, intensity, emotional connection and rating of emotional words, and a decrease in filled pauses, number of words per recording, and recording time in the experimental group. Contrary to the research hypotheses, however, the results also indicated an increase in empty pauses, a decrease in number of words per second and no change in the number of emotional words.

Overall, using a second language resulted in marginal indication of anxiety reduction in six of the ten measures used. The increase in emotional connection levels in both experimental and control conditions highlights the benefits of merely telling the traumatic story for anxiety reduction, regardless of language use. As a pioneer study, examining the effects of using language on stress levels of PTSD participants, future replications are called for, and may shed light on current results.

Correspondence: *Ori Grinshten, Institute of Information Processing and Decision Making, University of Haifa, Haifa, Israel. E-mail: origrinsht@gmail.com*

Keywords: PTSD, Trauma, Language

Lunch Break

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12:00–13:00

Plenary Keynote Address. Alzheimer's Disease & Treatment: Time for a New Approach

Presenter: Kathleen A. Welsh-Bohmer

13:00–14:00

K.A. WELSH-BOHMER. Alzheimer's Disease & Treatment: Time for a New Approach.
In the last year, there have been numerous disappointments in the quest for treatments that could either delay the onset of Alzheimer's disease or slow its progression once symptoms have manifest. The diversity of compounds that have now failed in clinical trials and the striking lack of efficacy even when using promising agents have been tested early in the disease course, has caused researchers and sponsors to step back and question the basic assumptions of our approach. Are we focusing on the appropriate disease targets? Are our methods adequate for capturing treatment effects? Should we be approaching this complex disease in a different manner? In this presentation we will consider these very fundamental questions We begin by reviewing some of the recent clinical trials that have failed and consider what these trials have taught us about the pathway forward. We will then consider new conceptual models for disease modification from a personalized health approach and discuss some of the advances in technology that may make it possible to capture clinically meaningful endpoints in patients with fully expressed disease as well as in the setting of silent, emerging disease.
Correspondence: *Kathleen Welsh-Bohmer, Departments of Psychiatry & Neurology, Duke University, Durham, USA. E-mail: kwe@duke.edu*
Keywords: Alzheimer's disease, prevention, clinical trials

Poster Session 3. Acquired brain injury and rehabilitation across lifespan (TBI, cerebrovascular disease, etc.)

14:05–15:55

C. LANDRY-ROY, G. LALONDE, A. BERNIER, J. GRAVEL, M. BEAUCHAMP. Executive functioning and sleep in preschool children with mild TBI.
Objective: Traumatic brain injury (TBI) sustained during childhood is known to impact children's executive functioning. However, few studies have focused specifically on executive functioning after preschool TBI. TBI has also been associated with sleep disturbances, which are known to impair executive functions in healthy children. Therefore, the current study aimed to investigate executive functions in preschoolers with TBI, and to determine the role of sleep in the links between TBI and executive functioning.
Participants and Methods: Eighty-four children aged 18 to 60 months who sustained accidental mild TBI were recruited in an urban tertiary care paediatric emergency department and tested six months later. Additionally, 83 typically developing children were recruited in local daycares. Children completed measures of inhibition (*Delay of Gratification*) and cognitive flexibility (*Conflict Scale*). Sleep was assessed by parental ratings of sleep problems *(Child Behavior Checklist)* as well as objectively with actigraphy.
Results: There was no significant difference between the two groups on executive functioning (Delay of Gratification [$t(158) = -1.65$, $p = 0.10$]; Conflict Scale [$t(147) = -0.26$, $p = 0.80$]). However, relative to controls, children with mild TBI and short nighttime duration or increased sleep problems exhibited poorer executive functions. More specifically, children with mTBI had poorer performance on Delay of Gratification only if they had high levels of sleep problems, and they exhibited poorer Conflict Scale performance only if they had short nighttime sleep duration.
Conclusions: These results support a "double hazard" effect, whereby the combination of mild TBI and sleep disturbances results in poorer executive functions. The findings highlight the importance of assessing and monitoring the quality of sleep even after mild head injuries. Poor sleep may place children at risk for increased cognitive difficulties.
Correspondence: *Catherine Landry-Roy, Psychology, University of Montreal, Montreal, Canada. E-mail: catherine.landry.roy@gmail.com*
Keywords: traumatic brain injury, child brain injury, sleep

S. PATAEL, J. AHONNISKA-ASSA, T. SILBERG, O. HERZBERG, A. BREZNER, A. LIVNY-EZER, J. LANDA. The Underlying Brain Mechanism of Post Traumatic Mutism on Recovery from Pediatric TBI.
Objective: Post Traumatic Mutism (PTM) is characterized by short-term dysfunction of speech

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after brain injury alongside with relatively good language comprehension. Mutism is commonly documented in children after resection of a posterior fossa tumor. However, reports of mutism due to traumatic brain injury (TBI) are scarce. The few reports suggested that PTM results from diffuse cerebral trauma. Others reported the involvement of frontal lesions or brainstem structures has a key role in PTM. Yet, there has been very little research regarding the neurological basis of PTM and the sequelae of the condition, and even less pediatric studies. Thus, the aims of this study were to identify the brain mechanisms related to PTM.

Participants and Methods: A retrospective medical chart review of children between 3 to 18 years admitted with TBI between 2003 and 2016. Ischemic regions detected by CT or MRI were divided into 13 sites, including 8 cerebellar regions, as well as thalamus, cerebellum, corpus callosum, basal ganglia and brainstem. Neuropsychological assessment was performed between 1-3 years post-injury.

Results: All the children in this sample had a diffuse axonal injury. The duration of PTM ranged between 2-162 days and was only related to lesions in the cerebellum and basal ganglia. The duration of PTM inversely predicted processing speed in visual-motor domain as it was reflected by tasks of coding (r=-.73), visual-motor integration (r =-.45) and visual fine motor integration (r=-.51). However, PTM's duration was not related to measures of language or speech skills.

Conclusions: Although PTM manifests as a temporary deficit of speech and language skills, the primary lesion is not related to language or speech regions but to subcortical structures. Accordingly, this phenomenon predicts long-term visual-motor integration abilities and not language abilities. Together, PTM may result from a disconnection of cerebello-basal ganglia-cortical circuits.

Correspondence: *Smadar Patael, Sheba Medical Center, Ramat-Gan, Israel. E-mail: smadarpa@post.tau.ac.il*

Keywords: child brain injury

M. SÉGUIN, F. DÉGEILH, A. BERNIER, J. GRAVEL, M.H. BEAUCHAMP. Pediatric traumatic brain injury and temperament.

Objective: Pediatric traumatic brain injury (TBI) is a particularly prevalent problem during the preschool years and can disrupt functioning in social and behavioral domains. However, despite constituting one of the critical, early building blocks of personality, no study has explored the effect of early TBI on temperament.

Participants and Methods: Primary caregivers of preschoolers with mild TBI (mTBI; n=83), severe TBI (sTBI; n=21) and orthopaedic injury (OI; n=69) reported on their child's temperament retrospectively to assess pre-injury temperament (T0) and at 6 and 18 months post-injury. Hierarchical linear models were used to explore group effects on developmental trajectories of each domain of temperament (Surgency, Negative Affectivity, Executive Control).

Results: There was no significant effect of group on the developmental trajectories of Negative Affectivity and Effortful Control (all ps > .05). There was a significant effect of group on the Surgency trajectory ($\chi 2$ (2) = 6.77; p =.03), with a lower rate of increase in sTBI group compared to OI group.

Conclusions: Changes in temperament may be associated with documented socio-behavioral difficulties in this young age group and should therefore be further explored to identify possible intervention pathways.

Correspondence: *Marilou Séguin, Psychology, Université de Montréal, Montréal, Canada. E-mail: marilou.seguin@umontreal.ca*

Keywords: TBI, Preschool, Temperament

E. YEHENE, S. GOLAN, A. BREZNER, M. GERNER, J. LANDA. Cognitive and Behavioral Markers Associated with Grief Response Among Parents of Children with Acquired Brain Injury.

Objective: Acquired Brain Injury (ABI) in children alters many domains of functioning, primarily cognition and behaviour. These sequelae are life lasting and oftentimes lead to pronounced modifications in the child`s nature and personality. Although many parents experience an immense sense of loss, as the need to adjust to their "altered" living-child arises, studies exploring parent`s loss experience and its underlying mechanism, are still scarce. The present study aims: (a) to establish the relationship between *Parental Grief Response* (PGR) and *Parental Rating of Behavioural Changes* (PRBC); (2) to explore the interplay between cognitive and behavioural markers in the child, PGR and PRBC.

Participants and Methods: The study group comprised 40 parents of children (aged 5-18 years) who had sustained moderate to severe ABI, at least a year prior to study. The Data collected for each parent included an adapted version of the Two-Track Bereavement Questionnaire (TTBQ – Rubin, 1999), and demographic information. Data collected for each child included *Cognitive markers:* General I.Q, Information Processing Speed – Index (IPS) (WISC-IV), Assessment of Executive Functioning - (EF) (BRIEF questionnaire indexes); and *Behavioural*

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markers: (Achenbach CBCL -questionnaire indexes) and PRBC.
Results: (1) TTBQ factors were highly and positively correlated with PRBC. (2) Cognitive markers, primarily slowed IPS and EF: Behavioural Regulation- were positively correlated with 'TTBQ total score', alongside factors indicating intense and acute grief emotions: `Relational Active Grieving`, `Traumatic Perception of the Loss`. (3) PRBC and Introversion-scale (CBCL), mediated the Relationship between cognitive markers and TTBQ factors.
Conclusions: Information processing slowness and unregulated behaviour following ABI, are two strong predictive cognitive markers for intensified PGR, through their significant impact on the child`s behaviour. Clinical implications are discussed.
Correspondence: *Einat Yehene, School of Behavioral Sciences, the Academic College of Tel Aviv – Yafo, Tel Aviv-Yafo, Israel. E-mail: einat.yehene@gmail.com*
Keywords: Parental-Grief- Reaction, Childhood ABI, Behavioral changes

G. LALONDE, A. BERNIER, C. BEAUDOIN, J. GRAVEL, M.H. BEAUCHAMP. Factors Contributing to Parent-child Interaction Quality Following Mild Traumatic Brain Injury in Early Childhood.
Objective: Parent-child interactions may be affected by early childhood traumatic brain injury (TBI). Given that relational quality is the result of both parent and child emotional and behavioral dispositions, it remains unclear whether observed changes in the quality of interactions post-TBI come from one or the other of the contributing parties. The aim of this study was to investigate the factors that contribute to the quality of parent-child interactions following TBI in the preschool years.
Participants and Methods: The sample included 68 children (18-60 months; *M* age = 35.4, *SD* = 10.9 months, 38 males) with mild TBI (mTBI). The quality of parent–child interactions was assessed 6 months post-injury using the Mutually Responsive Orientation scale, an observational measure of the dyadic quality of parent–child exchanges. Potential contributing factors were assessed among parental factors (age, socioeconomic status (SES), family burden, parental stress, marital satisfaction) and child factors (age, sex, post-concussive symptoms, fatigue, adaptive/behavioral skills).
Results: SES and parental education explained 12.8% (p = .022) of the variance in parent-child interaction quality. Cognitive fatigue, post-concussive symptoms, communication skills, and social skills explained an additional 21.2% (p = .005) of the variance. SES (β = .37, p = .022) and child post-concussive symptoms (β = .43, p = .002) were found to be significant independent contributing factors.
Conclusions: This study provides the first evidence that both parental and child factors relate to the quality of parent-child interactions following mTBI. These findings are of functional importance when considering the high prevalence of TBI during the preschool period alongside evidence that young children exposed to positive relationships with their parents exhibit better social functioning later in life. These factors need to be considered in order to identify at-risk children and optimize recovery.
Correspondence: *Gabrielle Lalonde, Psychology, University of Montreal, Montreal, Canada. E-mail: gabrielle.lalonde@umontreal.ca*
Keywords: mild traumatic brain injury, early brain injury, parent-child interactions

M. VAN TUBBERGEN, A. JOHNSON, K. KOLBERG, N. SALEEM, I. ICHESCO, A. ALMEIDA, A. HASHIKAWA, J. LARSON. Differences in Concussion Knowledge Between Parents and their Children after Concussion.
Objective: Recommendations regarding the nature and risks of youth concussion significantly changed over the past decade and recently expanded to incorporate parent education materials. The current study addresses levels of concussion knowledge among parents of children and adolescents who have sustained a concussion.
Participants and Methods: The clinical sample included 36 parents of youth who have sustained a concussion and 50 youth patients (m=14.5 years +/- .3, range 10-18; 52% male) being treated for concussion at an outpatient medical clinic. Half (54%) of the youth had a history of at least one prior concussion. Parents and patients had contact with a health care provider about the concussion prior to participation. Parents and patients completed a concussion knowledge survey developed from the CDC's "Heads Up!" education program materials. Using Chi Square analyses survey results were compared among parent and patient samples, and to those published by Kurowski et al (2014) from 500 high school athletes.
Results: The parent and youth samples were equally accurate in identifying most concussion-related symptoms, except for significantly more parents correctly identifying emesis and slowed reaction time as related to concussion ($X^2 \leq .005$). When compared to the high school athlete sample, parents were significantly more accurate in identifying symptoms, with the exception of neck pain ($X^2 = .002$). Parents' general concussion knowledge

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was largely similar to the patient group, but was stronger than high school sample across most knowledge-based questions. While parent's accuracy was better than youth ratings, results revealed knowledge gaps.
Conclusions: Parents, as consumers of concussion education, are generally more knowledgeable about concussion information, yet are susceptible to misinformation affecting treatment of concussion. More robust education efforts are needed to correct misinformation that may affect recovery from concussion.
Correspondence: *Marie Van Tubbergen, University of Michigan, Ann Arbor, USA. E-mail: mvantubb@umich.edu*
Keywords: concussion, pediatrics, parent

A. LY, K.O. YEATES, B. WRIGHT, A. MIKROGIANAKIS, D. JOHNSON, A. CONRADI, R. ZEMEK, B. CLARK, K. SCHNEIDER, J. ZWICKER. Bridging Research and Practice in Pediatric Concussion Care: Exploring Clinician Perspectives on Implementing a Clinical Pathway.
Objective: This poster will present results from interviews, guided by the Theoretical Domains Framework (TDF), with clinicians regarding their perspectives on implementing a clinical pathway (CP) for pediatric concussion care.
Methods: Participants include 17 physicians and 25 nurses in emergency departments across 5 clinical sites in Alberta, Canada. Interviews were conducted with clinicians to explore their perspectives on gaps in pediatric concussion care, organizational/attitudinal barriers, and local resources/constraints. A total of 32 hours of interviews were conducted with a final sample of 42 clinicians. A thematic content analysis was conducted to identify emerging themes, patterns or contrasts across and between sites, and critical insights into translating knowledge into clinical practice.
Results: The TDF is a useful theory-based approach to engage stakeholders by eliciting their feedback and to inform strategic planning of an implementation strategy. Findings show that the 14 theoretical domains of the TDF could be collapsed into 6 overarching domains: 1) Knowledge and Skills; 2) Professional Roles and Identity; 3) Attitudes, Beliefs, and Motivations; 4) Goals and Priorities; 5) Local Context and Resources; and 6) Stakeholder Engagement. Within these domains, key themes emerged that speak to the need, opportunities, and challenges of implementing a standardized CP.
Conclusions: The TDF offered a useful framework to elicit feedback from clinicians and to guide analysis with the aim of identifying focal areas to ensure that an implementation strategy will be responsive to the needs, preferences, and local reality of clinical sites. A lesson learned from this research is that any CP implementation project ought to allow for some flexibility to respond to local needs and constraints. Variations between sites can provide valuable insight into the factors that facilitate or hinder the implementation of proposed standardized practices.
Correspondence: *Anh Ly, Alberta Children's Hospital Research Institute, University of Calgary, Calgary, Canada. E-mail: lya@ucalgary.ca*
Keywords: concussion, clinical pathway, implementation science

R.A. BASILE, A.A. SIDDIQUI, M. CORNWELL. Sensitivity of Computer-Based Neurocognitive Assessment for Pediatric Concussion.
Objective: Concussion evaluation has undergone considerable changes in the previous decade with the addition of objective computer-based assessment to complement traditional paper and pencil tests and self-report measures. Prior studies have focused primarily on sports-related concussion in adults and high-school to college-aged children. The sensitivity of these tests to concussion is critical in informing return to play and/or return to learn decisions. The purpose of this study was to investigate the sensitivity of concussion-related symptoms and computer-based assessment of cognitive functioning in pediatric patients with recent concussion or mTBI, nonspecific to sports-related injury.
Participants and Methods: Participants (N = 40) included pediatric patients with a verified concussion (7-14 days post injury) referred to outpatient neuropsychology from the ED. Patients completed a clinical interview, self-report measures of post-concussive symptoms (PCSI-P), and computerized testing (Cogstate).
Results: A one-way analysis of variance indicated no significant difference among the Cogstate subtests (Detection, One-Back Test, Identification, and One-Card Learning) despite the presence of persistent symptoms within the sample, including 85% reporting headaches, 35% dizziness, 32% photophobia, 32% irritability, and 28% phonophobia. These symptoms were significant enough that 35% of the sample required school-based intervention.
Conclusions: The results suggest that symptoms associated with concussion may be subtle and computer-based assessment may lack sufficient

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sensitivity to detect changes in cognition. Patients with subjective, self-reported symptoms of concussion did not have significant group differences on Cogstate assessment. Thus, clinicians need to utilize multiple sources of information when making determinants on return to learn and return to play.

Correspondence: *Rosemarie A. Basile, Rehabilitation Medicine, Northwell-Staten Island University Hospital, Staten Island, USA. E-mail: rbasile1@northwell.edu*

Keywords: concussion, computerized neuropsychological testing, pediatric neuropsychology

R.A. BASILE, J. RICE, C. MERENDINO, A.A. SIDDIQUI. The Impact of Pain on Neuropsychological Functioning and Community Integration in TBI.

Objective: Pain is one of the primary complaints among outpatients with a history of traumatic brain injury (TBI). The purpose of this study was to investigate whether pain significantly contributes to deficits in cognition and community functioning, which are so prevalent among individuals with a history of TBI.

Participants and Methods: Participants (N = 56) included patients with a documented history of head trauma ranging from mild to severe, with and without complaints of pain. Pain was assessed with the Visual Analog Scale and patients underwent a brief battery of tests that included an assessment of neuropsychological functions, mood, anxiety and community functions (Community Integration Questionnaire). Pain was treated as a continuous variable; and at the time of analysis, patients were grouped into four categories based on pain severity (no pain, mild, moderate and severe pain).

Results: A significant association was found between increased pain severity in this TBI sample and reduced mental processing speed, as noted by increased time on Trails B (r = .60, p=0.00312). Data also revealed that as pain severity increased, depression and anxiety also increased [Beck Depression Inventory (r= 0.49, p = 0.0003) Beck Anxiety Inventory (r=0.44, p =0.0012)]. Finally, an association between pain severity and community functioning was found to be negatively correlated such that as pain severity increased, community integration decreased (r= -0.33, p = 0.0203).

Conclusions: Pain in the TBI community was found to be associated with slowed processing speed, as well as decreased emotional functioning and community integration. By understanding the cognitive mechanisms disrupted by chronic pain, as well as the effects on emotional functioning and community re-integration, it is hoped that providers can improve the ability to tailor treatments accordingly.

Correspondence: *Rosemarie Basile, Northwell Health - Staten Island University Hospital, Staten Island, USA. E-mail: rbasile1@northwell.edu*

Keywords: Pain, TBI, Cognition

D. TRSINSKI, M. TADINAC, Ž. BAKRAN, I. KLEPO. Predictors of community integration one year after moderate to severe traumatic brain injury.

Objective: To explore cognitive, demographic and injury-related predictors of the four community integration domains as measured by the Community Integration Questionnaire-Revised (CIQ-R) following moderate to severe traumatic brain injury (TBI).

Participants and Methods: A short neuropsychological battery including tests of memory, verbal fluency and processing speed was administered to a group of 127 patients on admission to the hospital rehabilitation on average 3 months after moderate to severe TBI. The CIQ-R was sent to the participants by post 1 year after TBI. A total of 104 individuals with TBI responded to the questionnaire. A hierarchical multiple regression analysis was employed to predict four domains of the community integration, with age, education, injury severity (PTA) three neuropsychological test scores, and FIM^{TM} score at rehabilitation discharge as predictors.

Results: The full seven predictor model accounted for 43% Productivity subscale scores variance, $F(7,96) = 10.24$, $p < .001$, $R^2 = .43$. All predictor variables had significant ($p < .01$) zero-order correlations with the Productivity subscale score, but only education, age and processing speed had significant ($p < .05$) partial effects in the full model. The full model R^2 was significant for the Electronic social networking score, $F(7, 96) = 15,08$, $p < .001$, $R^2 = .52$, Social integration score, $F(7, 96) = 4.28$, $p < .001$, $R^2 = .24$, and Home integration score $F(7, 96) = 4.83$, $p < .001$, $R^2 = .26$, with no significant partial effect for any of the cognitive tests.

Conclusions: This study supports previous findings that PTA and cognitive variables are predictive of productivity following TBI and offers further evidence that early neuropsychological data could be used to predict restriction in participation.

Correspondence: *Dubravko Trsinski, Neurological rehabilitation, Specijalna bolnica za medicinsku rehabilitaciju Krapinske Toplice, Krapinske Toplice, Croatia. E-mail: trsinski1@gmail.com*

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Keywords: traumatic brain injury, neuropsychological assessment, community integration

M.K. COX, T.A. NOVACK, J. BOGNER, D. JOHNSON-GREENE, E. ROY FELIX, D. MELLICK, J.D. CORRIGAN, L.E. DREER. Barriers to Physical Activity Among Individuals with Traumatic Brain Injury (TBI) at 2-Years Post-Injury: A TBI Model Systems Study Focusing on Health and Weight Management.

Objective: Obesity represents a significant public health problem according the World Health Organization (WHO). While traditional weight management programs have focused largely on persons without disabilities, there is a scarcity of evidence-based programs that are tailored to the unique barriers facing persons with TBI. Thus, the goal of this study was to understand potential changes in physical activity (PA) behaviors and barriers related to PA among adults with a moderate-severe TBI at 2-years post-injury.
Participants/Methods: Participants included 208 adults enrolled from three participating TBI Model Systems (TBIMS) centers. Mean age at injury was 41 (*SD* = 17.02). Measures assessed demographic, body mass index (BMI), PA behaviors (Lifestyle-II PA subscale) and health information upon discharge from inpatient rehabilitation and at 2-years post-injury.
Results: The mean BMI for patients upon discharge was 25.8 (*SD* = 5.6) and significantly increased to 26.6 (*SD* = 4.9) at 2-years post-injury ($p < .001$), with 60% of individuals falling within the overweight or obese WHO classifications at 2-years post-injury. Physical Activity subscale scores were significantly lower compared to pre-injury functioning ($p < .001$). The six top barriers to regular exercise/physical activity at 2-year follow-up included: 1) lack of motivation (51.3%), 2) concerns about health (50.6%), 3) lack of energy (46.2%), 4) cost of exercise programs (43%), 5) lack of transportation (35.4%), and 6) lack of interest (35.4%). Approximately, 55.3% felt they had only some to no control over their health.
Conclusions: The findings suggest changes in PA behaviors from injury across long-term recovery, as well as highlight the barriers related to PA. These findings lend support for a focus on TBI as a chronic disease and need for a holistic approach to rehabilitation, particularly given the research showing the benefits of healthy behaviors on neurocognitive functioning and health outcomes.
Correspondence: *Molly K. Cox, Ophthalmology, University of Alabama at Birmingham, Birmingham, USA. E-mail: mollycox@uabmc.edu*

Keywords: activities of daily living/adaptive functioning, quality of life, traumatic brain injury

L.E. DREER, M.K. COX, J. BOGNER, D. JOHNSHON-GREENE, E. ROY FELIX, J.D. CORRIGAN, D. MELLICK, T.A. NOVACK. Determinants of Lifestyle Behaviors Among Survivors of Traumatic Brain Injury (TBI) at 1-Year Post-Injury: Implications for Addressing the International Public Health Issue of Obesity and Health.

Objective: According to the World Health Organization (WHO), obesity is considered one of the most significant and rising public health problems worldwide. People with traumatic brain injuries (TBI) are not immune to this health issue, particularly given changes in neurocognitive functioning and other health complications. Thus, the current study examined the relationships between lifestyle behaviors (physical activity and nutrition) and sociodemographic, health, and functional/psychosocial outcomes among survivors of TBI at 1-year post-injury.
Participants & Methods: 208 adults were recruited from three participating centers of the TBI Model Systems centers. Mean age at injury was 41 (*SD* = 17.02). Participants completed measures assessing sociodemographic, health, and injury characteristics at time of injury and 1-year post-injury: community integration (PART-O subscales), depressive symptomatology (PHQ-2), satisfaction with life (SWLS), and lifestyle habits (Lifestyle Profile-II Physical Activity and Nutrition subscales).
Results: At 1-year post-injury, lower physical activity scores were significantly ($p < .05$) related to greater depressive symptomatology, hours spent in sedentary behavior, days from injury to rehabilitation discharge, level of caregiver supervision, frequency of cigarette and alcohol use, and poorer general, physical, and emotional health. Higher physical activity scores were significantly related to greater community engagement and participation, satisfaction with life, higher education, and race. A similar pattern was observed for nutrition.
Conclusions: Individuals recovering from TBI are at risk for challenges related to healthy lifestyle behaviors needed to prevent obesity and secondary health problems. The findings lend support for greater attention to holistic/integrative medicine approaches to rehabilitation for persons with TBI, particularly given documented benefits of physical activity and nutrition on brain functioning.
Correspondence: *Laura E. Dreer, Ophthalmology & Physical Medicine & Rehabilitation, University of*

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Alabama at Birmingham, Birmingham, USA. E-mail: lauradreer@uabmc.edu
Keywords: traumatic brain injury, treatment outcome, quality of life

L.E. FITZGERALD, E. GOOTEE, D.R. SEICHEPINE. History of repeated head injury is associated with symptomatic return to physical activity after a mild traumatic brain injury.

Objective: Repeated head injury (RHI) is associated with a range of long-term health problems. Following a mild traumatic brain injury (mTBI), individuals are encouraged to rest until asymptomatic. The aim of this study was to determine if and what activities individuals with RHI return to early when compared to those without RHI (non-RHI).

Participants and Methods: Fifty six adults (28 female; mean age=20.7, SD=1.89) who reported at least 1 mTBI in the last five years participated in this study. Participants were administered the Ohio State University TBI identification method-Interview form (OSU-TBI) to determine the number of lifetime mTBIs. The OSU-TBI also assesses if an individual has ever had a time period of discrete RHIs. Participants were grouped by the presence (n=19) or absence (n=37) of RHI. Episodes of RHI occurred through military duty (n=2), abuse (n=4), and playing sports (n=19). A total of 105 mTBIs were reported and for each event participants indicated if they returned to the following activities while symptomatic: 1. school, 2. work, 3. non-impact exercise, 4. athletics, 5. reading, playing board games, crossword puzzles, etc.., and 6. using electronics.

Results: Symptomatic return was common in both the RHI (82.3%) and non-RHI groups (68.3%)Pearson chi-square tests were used to evaluate potential group differences in rate of early return across the 6 activities. Individuals in the RHI group were more likely to return to non-impact exercise (p=.006) and athletics (p=.003) while symptomatic, when compared to the non-RHI group. There were no significant differences (all p-values greater than .05) between groups on the remaining four activities.

Conclusions: Individuals with a history of a discrete time period of repeated head injuries are more likely to return to physical activity early when compared to those without this history. This group, especially athletes, should be educated on potential consequences of early return.

Correspondence: *Laina E. Fitzgerald, University of New Hampshire, Manchester, USA. E-mail: lef2002@wildcats.unh.edu*
Keywords: mild traumatic brain injury, concussion

P. PARK, H. MURAOKA, S. UBUKATA, K. UEDA, T. MURAI. Prognosis of cognitive disturbance and difficulty in everyday lives by severity in patients with diffuse axonal injury (DAI).

Diffuse axonal injury (DAI) is defined as diffusional injuries of the white matter after traumatic brain injury (TBI). Previous studies have reported that the DAI patients are impaired in cognitive functions such as laboratory-based long-term memories, frontal lobe functions and everyday memories. However, little is known about the relationship among severity in DAI, cognitive disturbance and problem in daily lives. The present study investigated this issue in adult patients with DAI and with focal brain injury in the frontal lobe (Focal). 44 TBI patients participated in this study. They were divided into 17 DAI (mean age: 38.4) and 27 Focal patients (mean age: 42.7). As an index of severity, periods of the post-traumatic amnesia (PTA) were assessed in each patient. Cognitive functions were evaluated by several neuropsychological tests. In addition, daily problems were assessed by questionnaires of everyday memory, quality of life and problems of health and disability. Results demonstrated that PTA periods in DAI were significantly correlated with deficits of laboratory-based long-term memories and frontal lobe functions, and individual scores of the long-term memories showed significant correlations with those of everyday memory and daily problems in health and disability. In the covariance structure analysis for DAI, scores of everyday memory were significantly correlated with PTA periods intermediated by scores of laboratory-based long-term memories, and that daily problems in health and disability were significantly predicted by scores of both PTA periods and long-term memories. In the analysis for Focal, PTA periods were significantly associated with impairments in laboratory-based long-term memories and frontal lobe functions, whereas cognitive deficits did not predict scores of everyday memory and daily problem in health and disability. These findings suggest that PTA periods in DAI could be one of the important factors to predict difficulties in daily lives.

Correspondence: *Paeksoon Park, Faculty of Comprehensive Rehabilitation, Kobe Gakuin University, Kobe, Japan. E-mail: parkp@reha.kobegakuin.ac.jp*
Keywords: diffuse axonal injury, traumatic brain injury, severity

E. VAKIL, S. SCHWIZER ASHKENAZI, Y. SACHER. Implicit Sequence Learning Following

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Traumatic Brain Injury, Measured by an Oculomotor-Activated Serial Reaction Time Task.

Objectives: The findings of implicit sequence learning in individuals with traumatic brain injury (TBI) are inconsistent thus far. By using a novel version of the Serial Reaction Time (SRT) with oculomotor-activated response, we aimed to bypass the manual motor component. In addition to reaction time (RT), this version allowed measurement of anticipations, which we believe to be a purer measure of sequence learning.

Participants and Methods: Twenty-five individuals with TBI and 25 matched controls were tested in performing an oculomotor-activated SRT containing an identical sequence in the first six blocks (1-6), followed by the interference block (7) with a different sequence, which was subsequently followed by the recovery block (8) containing the original sequence. Participants were instructed to look at the target dot when it appeared on one of four squares arranged as a diamond shape. The slides were oculomotor-activated. Eye movements were recorded by the SMI RED-M remote eye-tracker, with a sampling rate of 120Hz.

Results: Three phases of learning were analyzed separately: Learning (Blocks 1 to 6), Interference (Block 6 vs. Block 7) and Recovery from Interference (Block 7 vs. Block 8). Both RT and anticipations performance showed a similar pattern; in all three components of the task, individuals with TBI were slower and had a lower anticipation rate. The interactions in these phases of the task indicate that the learning rate was steeper for the controls, while individuals with TBI were less affected by the transfer and smaller recovery effect.

Conclusions: Our study demonstrates that the tested individuals with TBI show implicit sequence learning impairment - whether measured by RT or anticipation - even when the manual aspect of the task is eliminated. Thus, the impairment is not dependent on motor factors.

Correspondence: *Eli Vakil, Psychology, Bar Ilan University, Ramat Gan, Israel. E-mail: vakile@mail.biu.ac.il*

Keywords: TBI, Skill learning, eye tracking

R. HANKS, L. RAPPORT, K. SEAGLY, S. MILLIS, C. SCOTT, C. PEARSON. Non-neurologic factors associated with maintenance of post-concussion symptoms.

Objective: To examine litigation and disability compensation on symptom reporting during the first six months after concussion.

Participants and Methods: 255 adults with concussion were enrolled in a prospective study examining symptom reporting after receiving education about symptom resolution. Follow-ups assessed symptoms at one week, three months, and six months post injury. At all follow-ups, participants reported whether they were involved in litigation or applying for social security disability. A trauma comparison group (n=63) who had sustained minor non-neurologic injuries also completed the protocol at 1 week post injury. Both groups were discharged home the same day.

Results: Linear mixed modeling examined change in symptoms endorsed on the Concussion Symptom Checklist over time. Predictors included type of educational information received on concussion recovery, age, race, gender, education, employment, litigation status, and disability compensation status. Litigation ($p=.05$) and disability seeking ($p=.017$) were significant predictors of symptoms over time. On average, participants seeking disability endorsed an increase of 1.078 symptoms, whereas those seeking legal compensation endorsed an average increase of 0.803 symptoms. This is in contrast to the overall trend among participants as a whole, which indicated an average decrease of .004 symptoms per time point since injury ($p = .018$).

Conclusions: Most individuals who experience a concussion have good outcome as evidenced by symptom reporting rates that mirrored non-neurologic trauma comparison participants. Individuals involved in litigation or seeking disability related to their concussion reported a higher number of symptoms than the individuals who were not engaged in these activities.

Correspondence: *Robin Hanks, Physical Medicine and Rehabilitation, Wayne State University, Detroit, USA. E-mail: rhanks@wayne.edu*

Keywords: concussion, litigation, outcome

L. CAREY, P. STANWELL, D.P. TERRY, A.S. MCINTOSH, S.V. CASWELL, G.L. IVERSON, A.J. GARDNER. Verifying Head Impacts Recorded by a Wearable Sensor using Video Footage in Rugby League: A Preliminary Study.

Objective: Rugby league is a full contact collision sport with an inherent risk of concussion. Wearable instrumented technology is increasingly being used to observe and characterise the level of exposure to head impacts during game play. The purpose of this study is to verify the impacts recorded by the xPatch with video analysis.

Participants and Methods: Eight men's semi-professional Rugby League players (5 forwards and 3 backs; age M=25.5 years, SD=4.7) wore the xPatch sensors during the 2016 Newcastle Rugby League competition. Game day footage recorded by a trained videographer was reviewed to verify the impacts

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recorded by the xPatch. Videographic and accelerometer data were time synchronized. Play parameters were compared using Mann Whitney (MW) and Kolmogorov-Smirnov (KS) tests due to non-normally distributed acceleration data. Effect sizes (d) were used to quantify the magnitude of differences.

Results: The xPatch sensors recorded a total of 779 impacts ≥20g during game play, 732 (94.0%) of which were verified on video. In addition, 871 impacts were identified on video that did not record an impact on the sensors. There was no significant difference in linear acceleration between verified and non-verified impacts (KS z=0.96, p=.32, d=-0.27). Forwards sustained impacts at a higher rate than backs [t(7)=1.58, p=.16; d=1.15]. There were 6 concussions diagnosed. The linear acceleration of the impacts that resulted in a diagnosed concussion was greater than impacts that did not result in a concussion (MW U=183.50, p<.001, d=2.39).

Conclusions: The vast majority (94%) of head impacts ≥20g captured by the xPatch sensor were video verified in semi-professional rugby league. More research validating wearable sensors is needed to understand the significance of impacts not recorded by the sensor (i.e., potential false negatives), clarify game events, and reduce the number of false-positive impacts.

Correspondence: *Douglas P. Terry, Centre for Stroke and Brain Injury, School of Health Sciences, Faculty of Health, University of Newcastle, Callaghan, Australia. E-mail: dterry@mgh.harvard.edu*

Keywords: brain injury, concussion, sports-related neuropsychology

R. KENNY, V. SCARAPICCHIA, C. MAYO, M. GARCIA-BARRERA, B. CHRISTIE, J. GAWRYLUK. Does repetitive soccer heading cause changes in brain structure and function?

Introduction: Soccer players routinely head the ball as part of the game. Recently, the effects of repetitive, intentional heading have been called into question and some youth soccer associations have banned heading altogether. The current study aimed to prospectively investigate whether there are sub-concussive effects of heading in soccer practice on brain structure and function, using a within-subjects design.

Methods: Participants included 10 soccer players (20.5±2.84) that were examined immediately pre and post a controlled heading practice that included heading the soccer ball 10 times. Diffusion (DTI) and resting state functional magnetic resonance imaging data (rsfMRI) were acquired on a 3T GE scanner. An accelerometer was used to measure the force of the heading impact. FSL's Tract Based Spatial Statistics were used to analyze DTI data for microstructural changes in white matter (using fractional anisotropy (FA) and mean diffusivity (MD) as metrics). FSL's randomise was used with threshold-free cluster enhancement and correction for multiple comparisons to examine changes in rsfMRI blood oxygen level dependent (BOLD) variability.

Results: Results indicated that heading impacts were not greater than 10g. At this level of impact, there were no significant pre-post heading differences in brain structure, as measured by DTI metrics, or brain function, as measured by rsfMRI BOLD variability.

Conclusions: The current work shows initial evidence that repetitive heading in a soccer practice setting does not have negative implications for brain structure or function. These findings have implications for guidelines set on heading the ball in soccer.

Correspondence: *Jodie Gawryluk, Psychology, University of Victoria, Victoria, Canada. E-mail: gawryluk@uvic.ca*

Keywords: sub-concussive, neuroimaging, structural, neuroimaging, functional

A.A. FEDIO, C. ROPER, S. CUMMINGS, P. FEDIO. Benefits of Group Logotherapy following Traumatic Brain Injury: Case Reports.

Objective: The present study examined benefits to individuals with traumatic brain injury (TBI) who completed two 12-week courses of group therapy based on Viktor Frankl's principles for living life with meaning (logotherapy).

Participants and Methods: Group therapy focused on individuals' values and motivation to find meaning in life post TBI, patients' functional changes, and formulating and accomplishing specific goals. Two adult females (mean age: 60) who had experienced multiple mild TBIs completed measures before (P) and after each treatment program (T1 and T2). Measures included the Outcome Rating Scale, State Shame and Guilt Scale, Creative Domain Questionnaire-Revised, Ruff Neurobehavioral Inventory, and an experimental measure of recovery satisfaction.

Results: Mean *z*-scores are reported (P to T1 to T2) for measures on which both clients improved. The total ORS (-0.9 to 0.9 to 0.5) and ratings on each of its subscales improved primarily from P to T1. Shame (2.2 to -0.1 to -0.1) and guilt (0.7 to -0.6 to -0.5) decreased, while authentic pride increased (-1.7 to -1.1 to -0.8). Creativity improved modestly from P to T1(-2.9 to -2.3), as did spirituality and a sense of meaningfulness. Both clients selected and accomplished a specific goal during T1 and enacted their creative pursuits during T2. Satisfaction with

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recovery improved only during T2 (raw scores of 13.0 to 12.5 to 20.5).
Conclusions: Findings reveal that group therapy based on logotherapeutic principles improved clients' perceptions of their overall functioning, self-conscious emotions, creativity, and activity levels. Greatest improvement was observed from P to T1, and continued gains were recorded from T1 to T2, particularly regarding personal satisfaction with recovery. Focusing on one's values and discussing life's meaning appeared to have a positive effect as individuals adjust to their new normal. Future studies with larger samples of individuals with TBI are planned.
Correspondence: *Alison A. Fedio, Clinical Psychology, American School of Professional Psychology at Argosy University Northern Virginia, Arlington, USA. E-mail: afedio@argosy.edu*
Keywords: traumatic brain injury, treatment outcome

B. DIMECH-BETANCOURT, J. PONSFORD, J. CHARLTON, P. ROSS, J.R. GOODEN, R.J. STOLWYK. Assessing the efficacy of driving simulation for driver rehabilitation following acquired brain injury.
Objective: Return to driving is a common rehabilitation goal and enables functional recovery, positive psychological outcomes and community reintegration for survivors of acquired brain injury (ABI). Driving simulators approximate real world driving and offer the potential for rehabilitation in safe conditions. This pilot study aimed to examine the impact of driving simulators on driver assessment outcomes, driver confidence and anticipatory self-awareness of driving skills following ABI.
Participants and Methods: Participants were randomly assigned to a simulator-training group (n=7), who completed eight 30-minute simulator sessions over four weeks, or a control group (n=5), who completed treatment as usual. The simulator program was designed to re-train operational driving skills (e.g. braking, steering) within scenarios which incorporated a range of tactical skills (e.g. hazard avoidance, adaptation of speed to traffic) and driving manoeuvres (e.g. merging, roundabouts). The program was tailored to individual strengths and weaknesses and was adaptive to driver skill level. At four weeks post-baseline, all participants completed an on-road occupational therapy driving assessment (using an adapted version of the Driver Observation Schedule [DOS]), with blind assessors. Other measures included the Day Driving Comfort Scale (i.e., confidence) and the Brain Injury Driving Self Awareness Measure.
Results: Compared to controls, the simulator group reported higher confidence ratings at four weeks, when controlling for gender and baseline confidence ratings ($p=.04$; $\eta_p^2=0.41$). Groups did not significantly differ on DOS score ($p=.42$; $d=0.45$) or anticipatory self-awareness ratings over time ($p=.25$; $\eta_p^2=0.13$).
Conclusions: Driving simulators may act as a starting point for drivers who lack confidence in their driving skills and, as a result, can facilitate increased engagement in driver rehabilitation post-ABI. Further investigations using larger sample sizes are in progress.
Correspondence: *Bleydy Dimech-Betancourt, Monash Institute of Cognitive and Clinical Neurosciences, School of Psychological Sciences, Monash University, Melbourne, Victoria, Australia. E-mail: bleydy.dimech-betancourt@monash.edu*
Keywords: brain injury, driving, rehabilitation

N. KAHANA-LEVY, E. VAKIL, A. BOROWSKY, Y. SACHER. The effects of repetitive presentation of a specific video based hazards on drivers after Traumatic Brain Injury and age matched experienced drivers' hazard awareness abilities.
Objective The ability to perceive hazards is integral to safe driving and impaired hazard awareness has been associated with the occurrence of road accidents. However, little is known on the contribution of hazard anticipation to the hazard awareness ability among TBI survivors. The current study aims to examine the differences in hazard awareness skills in TBI survivors in comparison to non-injured age and driving experienced matched controls, as well as the relationship between an implicit training method of repetitive presentation of hazardous situations and improvement in hazard awareness ability in both groups.
Participants. Participants were 20 persons with moderate to severe TBI who had a driving license prior to the injury, and 20 non-injured age and driving experience matched drivers.
Method. Hazard awareness was assessed by monitoring participant's eye movements while watching a video clips. The task displayed videos of genuine traffic scenes filmed from the driver's perspective, and participants had to response as soon as they anticipate a traffic hazard in a scene. Participants were asked to press a key representing either a response to immediate danger or potentially dangerous situation.
Results. Prior to the training procedure, TBI survivors consistently resembled their age and experience matched healthy peers in the detection of hazards. Nevertheless, when repeatedly presented

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the same hazardous scenarios, they failed to discover additional hazards, to react earlier toward hazards, and to adapt their scanning behavior according to the upcoming hazards.
Conclusions: Since hazard awareness ability is a skill that acquired threw driving experience it is preserved in TBI survivors. Nevertheless, TBI survivors failed to assist a repeated presentation of hazardous situation in order to learn and adjust their scanning and behavioral reaction toward hazards, and therefore did not benefit from the implicit training procedure compare to their healthy peers
Correspondence: *Naomi Kahana-Levy, Psychology Department, Bar-Ilan University, Ramat-Gan, Israel. E-mail: naomile11@gmail.com*
Keywords: Traumatic brain injury, eye movements, driving

D. BERTENS, I. SCHEPER, I. BRAZIL, R.P.C. KESSELS. Errorless learning using the Drawer task in individuals with executive deficits after brain injury.
Objective: Studies investigating the efficacy of errorless learning (EL) have predominantly involved patients with memory impairment. However, a more recent perspective on the mechanism underlying the EL advantage draws on executive processes such as the inability to detect and monitor errors and to adjust behaviour on the basis of feedback. The aim of the present study is to investigate whether an errorless learning approach is beneficial for brain-injured persons with executive deficits for learning object locations using a computerized experimental task.
Participants and methods: In this study a newly designed computerized 'Drawer task' was administered in 15 executively impaired patients with acquired brain injury referred for outpatient rehabilitation and 15 healthy controls. In this task, participants were asked to find the correct drawer in which a particular item (e.g. a teddy bear) was stored. The number of errors committed before finding the correct drawer was predetermined, that is 0 errors (errorless learning condition) for some items and 2, 3 or 5 errors for other items (errorful learning condition). During the recall phase, participants were asked to place each item in the correct drawer.
Results: Analyses revealed that errorless learning compared to erroful learning contributed to a better performance in the recall phase over both groups (a mean score of 7.0 (sd=2.9) and 4.3 (sd=2.7) correct drawers respectively; p=.00, eta^2=.615). There was no significant interaction effect between condition and group (F(1,28) = 1.394, p = .248, eta^2 = .047).
Conclusions: The findings indicate that individuals with brain injury and executive deficits benefit from an errorless learning approach. However this advantage is not larger in the participating patients compared to the healthy control group. More studies investigating the role of executive control in errorless learning are recommended.
Correspondence: *Dirk Bertens, Rehabilitation Centre Klimmendaal, Arnhem, the Netherlands. E-mail: d.bertens@donders.ru.nl*
Keywords: executive function, learning, brain injury

S. KRAKOVSKA, P. BRANDOBUROVA. Utility of neuropsychological assessment in evaluation of cognitive stimulation therapy.
Objectives: Acquired brain injury (ABI) requires an individualized rehabilitation approach, which needs to involve a neuropsychological rehabilitation of impaired cognitive functions and activities of daily life. An objective of the study is to evaluate the clinical utility of neuropsychological assessment of the cognitive stimulation therapy (CST) outcomes, with emphasis on the first experiences with neuropsychological test battery Neuropsy.
Participants and Methods: Four patients with ABI – brain tumour, brain hypoxia, vascular injury and stroke – underwent 10 sessions of personalized neuropsychological rehabilitation carried out by psychologist certified in CST. All patients were examined pre- and post- intervention by neuropsychological test battery Neuropsy, which is currently being adapted in Slovakia, including overall 19 methods spanning across relevant cognitive and emotional domains. Data were analysed as the case studies in order to preliminarily evaluate the suitability of Neuropsy battery for capturing the changes in the post-injury state over time.
Results: The battery appears to be flexible in assessment of various profiles of cognitive impairment, sensitive to emotional state. Retest was able to identify changes in isolated cognitive domains. Preliminary analysis on four model patients has revealed the need of more specific adaptation of Neuropsy battery for purposes of intervention evaluation. Development of further alternative versions for several methods and measures that assess global functional status are proposed.
Conclusion: This analysis serves as first base for achieving one of the objectives in the Neuropsy project – development of a battery able not only to diagnose the impairments, but also to evaluate intervention outcomes. Future directions involve above mentioned modifications of the battery and longitudinal assessment of its ecological validity.
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Correspondence: *Simona Krakovska, Medical unit, Memory Centre, Bratislava, Slovakia. E-mail: simona@krakovska.sk*
Keywords: acquired brain injury, neuropsychological test battery, neuropsychological rehabilitation outcome

Y. CHO, S. KWAK, D. LEE, J. CHEY. The Effect of Multicomponent Training of Cognitive Control on Task-Evoked Functional Connectivity.

Objectives: Cognitive control is a multifaceted construct that involves a flexible allocation of mental resources in order to attain goal-directed behavior, while inhibiting automatic responses. Sensation seeking and impulsive behavioral problems are known to peak in adolescence, and it has been suggested due to lower or immature cognitive control ability. Thus, there are several attempts to increase cognitive control ability of adolescents through cognitive interventions. However, neural effects or mechanisms of the cognitive training on cognitive control in adolescence remain unclear.
Participants and Methods: Fifty-one healthy adolescents (mean age=12.69) from urban communities in South Korea participated in the study. Participants were randomly assigned to either training or active control group (training:n = 25, control:n = 26). We investigated whether 6 weeks of practice with Multicomponent Training of Cognitive Control(MTCC) produces changes in neural interactions. fMRI task measuring cognitive control was conducted at the baseline and at the end of the study.
Results: After the practice, we found that compared to the control group, the training group showed a significant increase in functional connectivity between left lateral prefrontal cortex(LPFC) and right inferior frontal gyrus(IFG) during Multi-Source Interference Task. Moreover, behavioral training gains in inhibition component were positively correlated with the connectivity changes.
Conclusions: Increased functional integrations within cognitive control network imply more efficient feedback exchange between key regions involved in cognitive control. These findings suggest that the multi-domain cognitive training may induce changes in the adaptive neural systems underlying gains in inhibitory control.
Correspondence: *Jeanyung Chey, Seoul National University, Seoul, Korea. E-mail: jychey@snu.ac.kr*
Keywords: Task-evoked functional connectivity, Cognitive control, Adolescence

I. SUAREZ, C. DE LOS REYES, T. IGLESIAS, E. DIAZ, N. SUAREZ, L. CALDERON, L. CASINI. RITMO: A Rhythm-based music intervention to reduce attention and impulsivity impairment in ADHD patients.

Cognitive impairment has frequently been reported in clinical populations such as Attention Deficit Hyperactivity Disorder (ADHD). Most frequently, the symptoms include deficits in temporal processing, attention and impulsive behavior that share common brains structures and circuitries. Based on the recent neuroscientific literature, we hypothesized that a rhythm music-based intervention could improve cognitive impairment in ADHD patients.
Objective: In the present study, we investigated whether a designed rhythm-based music intervention can improve the various aspects of temporal processing, attention deficit and impulsivity behavior in ADHD patients.
Participants: 21 children diagnosed with ADHD were divided into two groups. Both groups received a music-based intervention based on a series of exercises involving sensory (visual and auditory) and motor systems. However, interventions differed on the rhythm synchrony controlled by a metronome.
Method: Interventions were carried out for 32 hours during 8 weeks. Patients were evaluated in a test-retest design using neuropsychological measures and detailed cognitive tasks. Additionally, we used distributional analyses and psychophysical functions to better decipher the involved cognitive mechanisms.
Results: Both groups of patients significantly improved attention skills, and impulsive behavior. In attentional tasks, patients were significantly slower and committed less errors. Importantly, distributional analyses showed that after the intervention patients were less impulsive, due to a less automatic capture.
Conclusion: The results are discussed in the framework of recent cognitive models and provide new arguments for using music-based interventions in ADHD patients.
Correspondence: *Isabel Suarez, Psychology, Universidad Del Norte, Barranquilla, Colombia. E-mail: delchiaroi@uninorte.edu.co*
Keywords: attention deficit hyperactivity disorder, cognitive rehabilitation, cognitive functioning

D. VILLALOBOS, Á. BILBAO, F. LÓPEZ-MUÑOZ, F. MAESTÚ, J. GARCÍA-PACIOS. Improving self-awareness after acquired brain injury leads to an amelioration in patients' functional outcome.

Objective: To explore whether the improvement in self-awareness induced by a structured intervention programme in patients who had suffered acquired

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brain injury (ABI) may lead to an amelioration in their functional outcome.
Method*:* This study used a pre-test-post-test control group design with a sample of fifty-eight patients with ABI, randomly assigned to an experimental and a control group. Pre and post intervention measures were self-awareness (using an ad-hoc questionnaire, Villalobos et al., 2018) and functional outcome (using the Lawton Instrumental Activities of Daily Living Score), both compared using a two-way Analysis of Variance (ANOVA).
Results*:* Patients who received the intervention programme showed significant improvement in their level of self-awareness, as well as in their functional outcome. In addition, correlation analyses between improvements at both measures showed a relation between improvement in self-awareness and improvement in functional outcome, especially when the pre-treatment self-awareness level were taken into account.
Conclusions*:* Implementing an intervention programme in self-awareness, in the context of a global rehabilitation process of patients with ABI, is useful for improving not only the level of self-awareness, but the patient's functionality in their daily living activities.
Correspondence: *Dolores Villalobos, Psychology, Camilo José Cela University, Madrid, Spain. E-mail: mdvilallobos@ucjc.edu*
Keywords: self-awareness, brain injury, cognitive rehabilitation

M. TAYLOR-ROWAN. Prevalence of pre-stroke depression and its association with post-stroke depression; a systematic review and meta-analysis.
Objective: Depression is a common post-stroke complication. Pre-stroke depression may be an important contributor to post-stroke depression; however, the epidemiology of pre-stroke depression is less well understood than post-stroke depression. Using systematic review and meta-analysis we described prevalence of pre-stroke depression and its associations with post-stroke depression.
Method: We searched multiple cross disciplinary databases from inception to July 2017 and extracted data on prevalence of pre-stroke depression and association with post-stroke depression. We assessed risk of bias using the Critical Appraisal Skills program cohort tool. We described summary estimates of prevalence using random-effects models and summary odds-ratio for association with post-stroke depression. We performed subgroup analysis describing effect of depression assessment method. We used funnel plots to describe potential publication bias. Strength of evidence presented in this review was summarised using the GRADE approach.
Results: Of 11884 potential studies identified, 29 were included (total participants n=164993). Pre-stroke depression pooled-prevalence was 11.6% (95%CI:9.2-14.7,random-effects); range:0.4%-24%(I^2:95.780). Prevalence of pre-stroke depression varied by assessment method with clinical interview suggesting greater pre-stroke depression than case-note review or self-report (p=0.02). Pre-stroke depression was associated with increased odds of depression after stroke; summary OR:3.0 (95%CI:2.3-4.0). All studies were judged to be at risk of bias in some form.
Conclusions: Around 1 in 9 stroke patients have had pre-stroke depression. Reported rates may be underestimated due to limitations around assessment. Pre-stroke depression is a significant predictor of post-stroke depression.
Correspondence: *Martin Taylor-Rowan, University of Glasgow, Glasgow, UK. E-mail: m.taylor-rowan.1@research.gla.ac.uk*
Keywords: stroke, depression, aging disorder

C. ESPARZA FIGUEROA, A.R. DÍAZ VICTORIA, A. PALACIOS BUSTAMANTE, O.R. MARRUFO MELENDEZ. Language and Memory localization of a AVM in Wernicke area using fMRI at 3T and neuropsychological evaluation.
Several studies of fMRI have demonstrated the ability of the brain to change its typical functional organization against congenital lessions such as AVMs, in addition, it allows to define the relationship between vascular injury and functional cortex leading to a better understanding of the compensation mechanisms that are generated, which is also reflected in the patients' neuropsychological profile.
Objective: Describe the neuropsychological and neuroimaging evidence of brain functional reorganization due to the presence of an AVM in the Wernicke area.
Method and participants: We present the data of two patients with a diagnosis of AVM in the Wernicke area. The analysis by case of the neuropsychological profile is done through a neuropsychological evaluation and the activation pattern of language and verbal memory processes, through the application of paradigms during a fMRI study.
Results: Both neuropsychological profiles are observed within normal ranges. Contrary to what is expected, in the first case the fMRI shows a pattern of bilateral activation of the medial temporal lobe (MTL) and lateral within the language paradigm on

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the other hand. In case 2, a greater activation of the right MTL is presented during the same paradigm. Within the task of verbal memory, in the first case the right MTL is activated, while in case 2, the activation is bilateral.

Conclusions: In the study of fMRI different activation patterns are registered among patients, however, in both cases, an atypical functional organization is presented not only of the function dependent on the area of the lesion but also in functions of adjacent areas. In the neuropsychological evaluation, qualitative differences are detected that cannot be detected within the quantitative data, so it is suggested to carry out more detailed analyzes on the execution of the patients in order to identify characteristic cognitive traits of this population.

Correspondence: *Carla Liliana Esparza Figueroa, National Autonomous University of Mexico / National Institute of Neurology and Neurosurgery, Mexico City, Mexico. E-mail: carla.sprz@gmail.com*

Keywords: cerebral AVM, fMRI, Wernicke Area

S. LUGTMEIJER, E.H.F. DE HAAN, R.P.C. KESSELS. Visual Working Memory and Episodic Memory Performance in Stroke Patients.

Objective: Studies indicate that memory impairment is frequent after stroke with prevalence estimates between 13% and 50%. However, it is difficult to compare the effects of stroke on different memory systems, because working memory (WM) and episodic memory (EM) are typically studied with different paradigms that have different task demands. Here, we developed a novel paradigm in which WM and EM can be assessed using similar task demands, validated against widely used paper and pencil tasks.

Participants and Methods: 72 stroke patients (mean age 60.4) and 30 healthy controls (mean age 72.0) completed a short neuropsychological assessment and experimental memory tasks. A paradigm was developed in which visual WM and EM performances were measured using the same stimuli. A 2-back WM task was followed by a surprise subsequent recognition memory task that assessed incidental encoding of object locations of the 2-back task.

Results: Patients with impaired (N=17) and unimpaired (N=55) performance on the Digit Span (≤5th percentile) did not differ significantly in their 2-back task performance. Patients with impaired (N=22) performance on the Rey Auditory Verbal Learning Test (RAVLT) performed worse on the subsequent memory task compared to those who performed unimpaired on the RAVLT (N=43), $t(63)=2.88$, $p=.005$. Six patients performed lower than two SD below the mean performance of healthy older adults on the 2-back task, and seven patients and one control subject on the subsequent memory task, one patient performed impaired on both tasks. Performance on WM and EM tasks did not correlate with each other, neither for the paper-and-pencil nor the experimental tasks.

Conclusions: In line with the literature, we find that the N-back task does not show convergent validity with the Digit Span task. By using one design to measure Wm and EM we show that these memory systems can be separately affected by stroke. We will extend these findings by investigating lesion behavior relations.

Correspondence: *Selma Lugtmeijer, Neuro- and Rehabilitation psychology, Donders Institute, Nijmegen, the Netherlands. E-mail: s.lugtmeijer@donders.ru.nl*

Keywords: Stroke, Working Memory, Subsequent Memory

A.M. BUUNK, R.J.M. GROEN, J.M. SPIKMAN. Pay attention! The importance of mental speed and complex attention for return to work after subarachnoid hemorrhage.

Objective: It is unclear how different cognitive domains affect patients' ability to return to work (RTW) after subarachnoid hemorrhage (SAH). As everyday life is complex, with high demands being placed on rapid and concurrent decisions, mental speed and attention might be important factors in the prediction of RTW. This study aims to investigate the degree to which acute clinical factors of SAH, demographic variables, basic processing speed and complex attention contribute to RTW in the chronic stage.

Participants and Methods: 72 SAH patients completed neuropsychological tests at 6 months post-SAH. The Trail Making Test part A (TMT-A) and Stroop Word Card were used to measure basic speed of information processing. The TMT-B and Stroop Interference Card were used as measures for complex attention (inhibition, set-shifting). RTW was assessed in the chronic stage (>1 year post-SAH) with the Role Resumption List. Between-group comparisons (Mann-Whitney U) and binary logistic regression were performed.

Results: 66.7% of all patients reported incomplete RTW. Patients with incomplete RTW had a significantly lower performance on the Stroop Interference Card, TMT-A and TMT-B, compared to patients with complete RTW ($p < 0.05$), with a moderate effect size. Logistic regression revealed that age, gender, acute clinical factors, and basic

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information processing speed accounted for 34% (Nagelkerke R^2) of the variance in RTW. Entering complex attention measures (TMT-B and Stroop Interference Card) into the model significantly increased explanatory power to 48%. Individual significant predictors in the final model were external drainage for hydrocephalus, Stroop Word Card, and Stroop Interference Card.
Conclusions: Our results show the need to assess cognition, and specifically complex attention, to better predict problems in work resumption in the chronic phase post-SAH. This may help guide interventions that ultimately improve RTW and long-term outcome of SAH patients.
Correspondence: *Anne M. Buunk, Neuropsychology, University Medical Center Groningen, Groningen, the Netherlands. E-mail: a.m.buunk@umcg.nl*
Keywords: subarachnoid hemorrhage, attention, outcome

L. KRAMSKA, M. KOVAR, L. HRESKOVA, P. MENCL, Z. SONKOVA. Neuropsychological performance after carotid endarterectomy – preliminary results.
Objective: The aim of the study is to assess cognitive performance of patients treated by carotid endarterectomy (CEA) in patients with ≥ 70% internal carotid artery stenosis. Our study is part of multicentric SONOBIRDIE Trial. This is a randomized, double-blind, sham-controlled study designed to demonstrate the safety and effectiveness of sonolysis in reduction of risk of stroke or transient ischemic attack (TIA), brain infarctions and cognitive decline, by the activation of endogenous fibrinolytic system during CEA.
Participants and methods: Between November 2016 and October 2017 we evaluated 25 patients before and one month after CEA. RBANS Index Scores were compared before and after intervention. All patients underwent standard preoperative neurological and radiological evaluation.
Results: Improvement after CEA was found in preliminary results in following domains: Language ($p < .001$), Delayed Memory ($p = .026$) and Total Scale ($p = .006$). No cognitive deterioration was found in any patient.
Conclusions: Many patients indicated for CEA due to internal carotid artery stenosis are affected by cognitive impairment. The CEA not only reduces the long-term risk of ischemic stroke but also improves neuropsychological performance. There is a risk of an embolization stroke and silent microembolization due to the surgery in a small percentage of cases, which may also have a negative effect on cognitive functioning. Our results showed no cognitive impairment after CEA.
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Correspondence: *Lenka Kramska, Neurocenter, Clinical Psychology, Na Homolce Hospital, Prague, Czech Republic. E-mail: kramska.lenka@icloud.com*
Keywords: carotid artery disease, carotid endarterectomy, cognitive functioning

M.J. MOORE, N. DEMEYERE. Neglect Dyslexia as a Central Dyslexia: A Single Case TIA Study.
Objective: Neglect Dyslexia is a neuropsychological syndrome in which patients commit consistently lateralised letter omission, addition, and substitution errors when reading individual words. Neglect dyslexia is generally categorised as a peripheral dyslexia caused by visuospatial neglect rather than an independent cognitive deficit. Here we aimed to investigate whether neglect dyslexia is only a satellite symptom of hemispatial neglect.
Participants: Patient AB is a 75-year-old retiree who was hospitalised in December 2017 following a TIA where she reported mild right-sided weakness and difficulty reading.
Methods: AB completed the Oxford Cognitive Screen and an original reading assessment in which she read 302 words, pseudowords, and numbers presented normal, vertical, and mirror-reflected orientations.
Results: AB was found to commit consistent right neglect dyslexia errors (e.g. SHOWN misread as "show" or RELATED misread as "relate"). This impairment occurred independently of both object-centred or hemispatial neglect, on which AB performed at ceiling. AB was also found to commit neglect dyslexic reading errors affecting the terminal portions of words when the lateralised spatial bias was eliminated by presenting words vertically. Additionally, AB consistently misread the terminal portions of mirror-reflected words, meaning that AB's neglect dyslexia affected terminal letters (originally right-lateralised) even when words were presented so that these letters were presented in the left side of space. AB committed no neglect dyslexia errors when reading normally, vertically, or mirror-reflected numbers, suggesting that AB's neglect dyslexia was a content-specific impairment.
Conclusions: The results of this investigating suggest that neglect dyslexia can occur after TIA, and that in this case, it cannot be accurately understood as a side-effect of domain general visuospatial impairments but rather involved a content-specific, higher order cognitive deficit.

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Correspondence: *Margaret Jane Moore, Department of Experimental Psychology, University of Oxford, Oxford, UK. E-mail: margaret.moore@psy.ox.ac.uk*
Keywords: neglect dyslexia, visuospatial neglect, cognitive impairment

Symposium 8. Pathological Ageing: from Subjective Cognitive Decline to Dementia

Sponsored by the Federation of European Societies of Neuropsychology (FESN)

Chair: Roy P.C. Kessels

14:10–15:40

R.P.C. KESSELS. Pathological Ageing: from Subjective Cognitive Decline to Dementia.

Symposium Summary: Subjective cognitive decline (SCD) is increasingly considered a risk factor for developing dementia. However, to date it is unclear what the predictors are for conversion to later dementia. Also, the classification of such a 'pre-MCI' stage can be criticised from a clinical perspective, especially if cognitive function does not decline in the subsequent years. The current symposium, sponsored by the Federation of European Societies of Neuropsychology (FESN) first presents longitudinal data from a large group of Norwegian patients with SVD, in whom only a minority developed dementia. Still, many patients with SCD worry about their memory problems and express the need for an intervention to improve their cognitive function. A Swiss study examined the feasibility of the BrainCoach program, aimed to increase cognitive activity in patients with SCD in a primary-care setting, showing promising results. In those patients who do develop dementia, a large-scale community based study from the United Kingdom argues that the interpretation of illness symptoms or the diagnosis is relevant for targeted interventions, showing that most participants used descriptive terms rather than diagnostic ones when describing their condition, with a focus on emotional and practical consequences. One such targeted intervention is presented in the final talk, in which the results of a Dutch randomized-controlled trial on the cognitive outcomes after physical exercise with or without cognitively challenging tasks are presented in community-dwelling dementia patients. In all, this symposium shows caution is needed when using SCD as a diagnostic entity, while subjective accounts of symptoms and diagnosis in people with dementia are not always understood in terms of specific medical diagnoses. Still, nonpharmacological interventions aimed at improving cognitive function are feasible in SVD and dementia in a community setting.

Correspondence: *Roy Kessels, Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, the Netherlands. E-mail: r.kessels@donders.ru.nl*

E. HESSEN. Slightly Different Outcome in Two Longitudinal Studies of Subjective Cognitive Decline Based on the Gothenburg-Oslo MCI Study Cohort.

Objective: In the quest for prevention or treatment there is a need to find early markers for pre-clinical dementia. The present studies observed memory clinic patients with subjective cognitive decline (SCD) and normal cognitive function at baseline. The primary aim was to address SCD as a potential risk factor for cognitive decline. The secondary aims was to address the potential relation between baseline CSF biomarkers and subsequent cognitive decline.

Participants and Methods: 235 and 81 patients respectively, were recruited from university based memory clinics in Gothenburg and Oslo and followed for 4 to 6 years.

Results: In the larger cohort 39% declined cognitively and 10% converted to clinical dementia over 4-6 years. In the smaller cohort 14% declined cognitively and 5% converted to clinical dementia over 6 years. In both studies, CSF Aβ42 predicted conversion to dementia. In the larger study, NIA-AA stage 2 was successful in predicting cognitive decline, dementia and AD dementia. In the smaller cohort memory decline during the first two years also predicted dementia after 6 years.

Conclusions: Cognitive stability for the majority in both cohorts suggests that SCD for many persons may be a benign condition with regard to neuropathology. In a memory-clinic setting CSF Aβ42 and NIA-AA stage 2 at baseline is of relevance in prediction of subsequent dementia in patients with SCD. Somewhat different outcome between the two studies may be related to small differences in inclusion criteria, especially test batteries, cut-off scores and norms.

Correspondence: *Erik Hessen, Department of Psychology, University of Oslo, Oslo, Norway. E-mail: erik.hessen@nevropsykologi.no*

Keywords: aging disorders, dementia, neuropathology

A.E. THOMANN, A. MONSCH. Brain Coach – a Program of Cognitive Activation in Primary Care Settings.

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Objective: Due to the worldwide aging of populations there is a need to initiate preventing strategies to delay the onset of cognitive decline and dementia. Based on the cognitive reserve hypothesis, the "BrainCoach program" aims to increase cognitive activity in individuals with subjective cognitive decline or very early mild cognitive impairment and thus modify one of the risk factors for (further) cognitive decline.
Participants and Methods: We created the "BrainCoach program", which includes the technique of Motivational Interviewing and provides a "cognitive buffet" for those patients who have difficulties to come up with own ideas for cognitive activities. Five Swiss-German and five French-speaking general practitioners (GPs) participated in a pilot (feasibility) study and used the "BrainCoach program" on 22 of their patients (12 women and 10 men, age (median) = 74.5 years, education (median) = 14 years). Information concerning the program's feasibility was gathered from GPs and patients with a structured questionnaire.
Results: The "BrainCoach program" was judged as comprehensible, informative and time-adequate (time needed (median) = 20.5 minutes). In 58% of the Swiss-German patients the motivation to engage in cognitive activities could be increased using the program. The other 42% of patients reported that they were already very active and would thus not need any further stimulation. In French-speaking patients the motivation increased in 80% of patients. Taken together 82% of participants would recommend the "BrainCoach program" for family members and friends and 80% of the GPs would like to use the program in their clinical routine.
Conclusions: In this pilot study, the "BrainCoach program" proved as easy-to-administer in a primary care setting and was met with great interest. An increase of motivation to become cognitively more active could be achieved in individuals who were rather inactive.
Correspondence: *Alessandra E.. Thomann, Memory Clinic, University Center for Medicine of Aging, Felix Platter Hospital, Basel, Switzerland. E-mail: alessandra.thomann@fps-basel.ch*
Keywords: aging disorders, cognitive rehabilitation, cognitive reserve

R. MORRIS, C. QUINN, L. CLARE. Measuring Subjective Accounts of Symptoms and Diagnosis in People with Dementia: The Development of the RADIX.

Objective: The way in which people with dementia interpret their symptoms or diagnosis can impact on their adaptation to their illness. Whilst this has been partially understood previously in frameworks concerning lack of awareness of dementia, it has not been considered in terms of models concerning how a person may develops a mental representation of their illness. The aim on this study was to measure such illness representations (IRS), in this case focusing on 'dementia representations' (DRs), leading to the development of the Representations and Adjustment to Dementia Index (RADIX). The development and validation of this index is described, including outlining the types of DRs found in people with dementia.
Participants and Methods: A sample of 385 community-people with mild to moderate dementia were investigated, as part of the IDEAL cohort study. Their DRs were elicited using the RADIX questionnaire, including items concerning identity and timeline.
Results: The study showed that participants tended to use descriptive rather than diagnostic terms when referring to their condition and only 56.9% of participants were of aware of a specific medical diagnosis. Factor analysis indicated that understanding of the consequences of the condition split into two main types, emotional and practical.
Conclusions: Knowledge of DRs may help people with dementia in terms of how to better provide information and support as well improving targeted interventions or psychological therapies that consider the person's understanding of their condition.
Correspondence: *Robin Morris, Institute of Psychiatry, King's College London, London, UK. E-mail: Robin.Morris@kcl.ac.uk*
Keywords: dementia, awareness

R.P.C. KESSELS, E.G.A. KARSSEMEIJER, J.A. AARONSON, M.G.M. OLDE RIKKERT. The Cognitive Effects of Physical Exercise with or without Cognitive Stimulation in Dementia: A Randomized Controlled Trial.

Objective: Exercise is often proposed as a non-pharmacological intervention to delay cognitive decline in patients with dementia. However, the magnitude of the effect of exercise on cognitive functioning in dementia remains unclear. Exergaming combines physical exercise with cognitively challenging tasks in a single session. We investigated the effect of exergaming and single aerobic training on cognition in older adults with dementia.
Participants and Methods: A randomized controlled trial (RCT) was performed comparing aerobic training, exergame training and an active control group (relaxation and flexibility exercises). Community-dwelling patients with mild to moderate dementia (N=115, age=79.2±6.9 years,

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MMSE=22.9±3.4) were randomized and individually trained 3 times a week during 12 weeks. Cognitive functioning was measured at baseline and after the 12-week follow up (executive function, episodic memory, working memory, and psychomotor speed). Between group differences were analysed with analysis of covariance (ANCOVA).

Results: The intervention was feasible, with a a low drop-out rate (12%) and high adherence (84.6% ±13.5). Improvements were found on psychomotor speed in the aerobic and exergame groups compared to the active controls (aerobic *versus* control: p=0.021; exergame *versus* control: p=0.047). No significant differences between the intervention and control groups were found on executive functioning, episodic memory, and working memory.

Conclusions: This is the first RCT investigating cognitive effects of exergaming and aerobic exercise in community-dwelling patients with mild to moderate dementia. We demonstrated that exergaming is feasible in patients with dementia, also showing that both exergaming and aerobic training improve psychomotor speed. Therefore, this study provides insight in the potential of exergaming and aerobic exercise as non-pharmacological interventions for dementia.

Correspondence: *Roy P.C. Kessels, Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, the Netherlands. E-mail: r.kessels@donders.ru.nl*

Keywords: dementia, cognitive rehabilitation, randomized controlled trial

Paper Session 10. Innovative technologies: Toward improving patients' lives

Moderator: Justin Miller

14:10–15:40

L.E. DREER, M.K. COX, K. CROWELL, T. SOLEYMANI, L. VOGTLE, S. TREFETHEN, T.A. NOVACK. Feasibility and Usage of a Telehealth, Web-Based Lifestyle Program (Project LIFT) for People with Traumatic Brain Injuries and Their Caregivers.

Objective: Traditional rehabilitation efforts have focused largely on efforts to promote independence and functioning, particularly immediately following a traumatic brain injury (TBI). In this paper, the objective is to 1) describe an adaptive, telehealth-based lifestyle program for persons with TBI 1-year or more post-injury and their caregivers, 2) establish feasibility of the program, and 3) present preliminary data on usage from an ongoing randomized clinical trial (RCT).

Participants & Method: Seventeen adults (47% TBI survivors and 53% caregivers) participated in the evaluation of the Project LIFT website and testing of program materials (content, tools, newly developed website, and adherence tools) using the Delphi process. Participants reviewed the website in person and at a second time, remotely, after their initial feedback was integrated.

Results: General ratings on the second evaluation were very favorable (e.g., extremely, very much so) for ease of use, ability to access the website, ability to read health information, presentation of content (bullets), video clips, and other context. Additionally, 100% of participants indicated that the program would help others with a TBI better manage their weight. Other comments included that

Conclusions: The study provides preliminary data on the feasibility and relevance of a telehealth, web-based lifestyle program. This offers implications for promoting healthy lifestyles for persons with TBI post-injury.

Correspondence: *Laura E. Dreer, Ophthalmology, University of Alabama at Birmingham, Birmingham, USA. E-mail: lauradreer@uabmc.edu*

Keywords: activities of daily living/adaptive functioning, quality of life, traumatic brain injury

B. O'NEILL, C. FARRELL, E. DALZIEL, K. TURNER, G. CORNELIUS, E. MAGILL. Predicting Aggressive Episodes in Adults with Acquired Brain Injury from Wearable Sensor Data.

Objective: To understand how emotional dysregulation, which is a common feature following acquired brain injury, predicts challenging behaviours such verbal and physical aggression. Individuals with frequent overt aggression require close levels of supervision, security, risk assessment, and specialist multidisciplinary team involvement. This study aimed to predict episodes of challenging behaviour from physiological data gathered from smartwatch sensors of indicative of arousal and emotional state, such as galvanic skin response, skin temperature, heart rate and movement (from which sleep metrics were derived).

Participants and methods: Two patients with histories of acquired brain injury (secondary to severe traumatic brain injury, and severe hypoglycaemic brain injury respectively), co-morbid epilepsy, and chronic challenging behaviour were recruited during specialist in-patient neuro-rehabilitation stays. Challenging behaviour was

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measured using an observer rated overt aggression scale. Data on the aggressive episodes, and physiological data were added to a secure database. Machine learning classifiers were trained to predict the occurrences of challenging behaviour. The resultant classifiers were tested, on the second half of the data collected.

Results: The approach achieved a typical prediction accuracy up to 82% (aggressive episodes) or up to 68% (normal behaviour), anticipating episodes up to 4 hours ahead (physical data) or up to 4 days ahead (sleep data).

Conclusion: These first-reported results allow cautious optimism that problematic behaviours after brain injury can be reliably predicted. This predictive identification of elevated risk has many potential applications. The classifier may be used on real time data to create alerts. These alerts might be routed to the system user, to enable self-regulation of emotional state, or to staff, to increase therapeutic support. Further research is planned to draw more robust conclusions.

Correspondence: *Brian O'Neill, Graham Anderson House, Brain Injury Rehabilitation Trust, Glasgow, UK. E-mail: brian.oneill@thedtgroup.org*

Keywords: brain injury, arousal, aggression

T.R. WAAGE, C. HATLESTAD, T. MOBERGET, T. ELVSÅSHAGEN, S. ANDERSSON. Stimulus-specific response modulation - association to learning and memory function.

Objective: Recent studies suggest that stimulus-specific response modulation (SRM) of visual evoked potentials (VEP) following tetanic visual stimulation might index LTP-like synaptic plasticity in humans. The functional significance, how SRM plasticity might be related to neurocognitive function including learning and memory is not known. Linking SRM-induced plasticity and declarative memory would strengthen the hypothesis associating LTP-like plasticity to learning and memory processes. The objective for the current study is to (1) replicate earlier studies of visual SRM, and (2) explore the association of SRM-plasticity to higher level of cognitive function, especially learning and memory.

Participants and Methods: EEG were recorded in 74 healthy participants engaged in a SRM paradigm consisting of two baseline (BL) blocks, one tetanic stimulation block, and four post-tetanus (PT) blocks. Neuropsychological assessment included tests for visual (Aggie) and verbal (RAVLT) learning and memory. VEP components C1, P1 and N1 were extracted and a peak-to-peak P1-N1 were calculated. Modulation effects were calculated by subtracting average baseline VEP amplitudes from post-tetanic amplitudes.

Results: Repeated measures ANOVA showed highly significant modulation effects from BL to PT stimulation blocks for the C1, P1, N1, and P1-N1 peak-to-peak components (F=8.39 to 55,69; all p-values <0.001). Correlation analysis showed significant associations between several variables of the Aggie visual memory test and modulation of P1, N1, P1-N1 peak-to-peak (p: 0.005 – 0.047). For the RAVLT there were no significant associations with any SRM plasticity indices.

Conclusions: Earlier studies displaying significant modulation of VEPs after tetanic stimulation were replicated. Significant associations with visual learning and memory performance indicate that LTP-like SRM-induced plasticity have functional, and possibly modality-specific, connections to higher level cognitive function.

Correspondence: *Trine R. Waage, Department of psychology, University of Oslo, Oslo, Norway. E-mail: t.r.waage@psykologi.uio.no*

Keywords: event related potentials, memory, synaptic plasticity

R. PTAK, F. TURRI, R. RICCI, R. GAMMERI. Adaptation to virtual prisms and its relevance for neglect rehabilitation: a single-blind dose-response study with healthy participants.

Objective: Prism adaptation (PA) has been applied with mixed success as a rehabilitation method of spatial neglect. We here report for the first time transfer effects of *rightward* PA in healthy participants, by inducing large adaptation effects in the virtual reality (VR).

Participants: Forty eight healthy participants were randomly attributed to one of four groups: no deviation, 10-, 20-, or 30-degrees rightward deviation.

Methods: Adaptation was induced by asking participants to point with a controller to a sphere presented in VR. A rightward shift was progressively induced between the real position of the controller and its image as seen through the goggles. Participants performed two variants of the bisection and the Landmark task to measure cognitive transfer of adaptation effects: line bisection, space bisection, line landmark and space Landmark. Finally, participants responded to a questionnaire measuring their awareness of the induced adaptation effects.

Results: Leftward pointing error was directly related to the degree of optical deviation (effect of group, [F (3,44) = 8.99, p < .001]), and was greatest immediately following adaptation, but decayed rapidly (effect of time, [F (3,44) =178.24, p < .001]). Significant transfer effects were only observed in the

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two bisection tasks, and only in the 30-degrees group (line bisection, [t (11) = 2.59, p < .05]; space bisection, [t (11) = 2.9, p < .05]. Due to the gradual induction of the spatial deviation only three out of 36 adapted participants showed some awareness of the adaptation effects.

Conclusions: Leftward PA is known to induce pseudo-neglect in healthy participants. Our findings show that large rightward deviations may affect sensorimotor performance in healthy participants similarly to neglect patients. Moreover, the fact that only participants adapted to 30-degrees showed biased bisection performance suggests that a critical threshold is required for the induction of significant visuomotor transfer.

Correspondence: *Radek Ptak, Division of neurorehabilitation, University Hospitals of Geneva, Geneva, Switzerland. E-mail: radek.ptak@hcuge.ch*

Keywords: neglect, visuospatial, cognitive rehabilitation

A.L. FARIA, M.S. PINHO, S. BERMÚDEZ I BADIA. Personalized virtual reality simulations of activities of daily living for cognitive rehabilitation: a study with stroke patients.

Objective: Cognitive impairments after stroke are not always given sufficient attention despite its impact in activities of daily living (ADL's). Current cognitive rehabilitation methods mostly rely on paper-and-pencil tasks targeting isolated domains, which is not consistent with everyday-life tasks. Besides limited ecological-validity, these tasks are not accessible for patients whose dominant arm is paretic. Virtual Reality (VR) has shown to be a solution for the development of accessible and ecologically valid rehabilitation programs. Many tools were developed, however, most of times they lack personalization guidelines and clinical validation.

Participants and Methods: We have followed a participatory approach with 20 health professionals for the design of a personalized rehabilitation program through quantitative guidelines: the Reh@City. This VR tool integrates cognitive tasks in ADL's simulations (e.g.: shopping calculations, action sequencing at home, newspaper information recall) to be solved through paretic arm movements using an accessible interface. To assess the clinical impact of Reh@City we have performed a trial with 12 chronic stroke patients, comparing our VR-based cognitive intervention (6 participants) with standard therapy (6 participants). The intervention comprised 12 sessions of 30 minutes, 3 times per week and all patients went through neuropsychological assessment pre and post intervention.

Results: A within groups analysis revealed significant improvements in executive functions, attention, processing speed, visual memory and stroke self-perceived cognitive impact in the VR group. The control group only improved in abstract reasoning. A between groups analysis showed significantly greater improvements in executive functions when comparing VR to standard therapy.

Conclusions: Reh@City, a personalized and ecologically valid intervention, had more impact in cognitive rehabilitation than standard methods in a small sample of stroke patients.

Correspondence: *Ana Lúcia Faria, Madeira Interactive Technologies Institute, Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra, Funchal, Portugal. E-mail: anasantosfaria@gmail.com*

Keywords: cognitive rehabilitation, stroke, virtual reality

Symposium 9. The Locked-In Syndrome: Some recent reflections and some challenges

Chair: Barbara A. Wilson

14:10–15:40

B.A. WILSON. The Locked-In Syndrome: Some recent reflections and some challenges.

Symposium Summary: This symposium is concerned with the Locked-In Syndrome (LIS). The first talk, presented by the chair, sets the scene by addressing the questions What is LIS? What causes it? Who is most at risk? Do people recover from this condition? The second talk considers the challenges of diagnosing LIS following traumatic brain injury, a less common cause of the syndrome, when additional cognitive problems are present. The third presentation considers quality of life (QoL) in people with LIS. Using the World Health Organisation's definition of QoL, studies are summarised looking at whether or not people with LIS report a good QoL. The final presentation presents views from a man diagnosed with LIS following a brain stem stroke at the age of 56. This talk is entitled "Living within my head" and was spelled out by the man using eye blinking to communicate. The discussant will address some pressing questions which should be asked by physicians, psychologists and therapists working in the field.

Correspondence: *Barbara Wilson, Neuropsychology, The Oliver Zangwill Centre, Ely, UK. E-mail: barbara.wilson00@gmail.com*

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B.A. WILSON. What is Locked-In Syndrome? What causes it? Who is most at risk? Do people recover from this condition?

The earliest report of a patient with Locked-In Syndrome (LIS) in the medical literature comes from Darolles (1875). However, Alexandre Dumas had described the condition even earlier in "The Count of Monte Christo" (Dumas 1844-45). LIS is a rare consequence of brain damage. Patients are fully conscious but unable to move or speak due to paralysis of nearly all voluntary muscles except the eyes. Communication is with movement of the eyes. LIS is caused by damage to the pons, a part of the brainstem that contains nerve fibres that relay information to other areas of the brain. Most LIS patients have sustained a stroke in the basilar artery or suffered a pontine haemorrhage but it can also be caused by trauma, tumour, encephalitis, toxins and multiple sclerosis. About 60% of people with LIS have sustained a brain stem stroke. LIS can affect people of all ages including children. Males and females appear to be affected in equal numbers. Although prognosis is generally poor and death can occur through pneumonia or thrombosis, with the right care, people with LIS can live for many years and a few make a good or even a complete recovery. Some of these are highlighted in the presentation. Some patients survive for 18 years with a five year survival rate of 81 per cent. One study looked at LIS patients three to six months following neurorehabilitation. Motor recovery was seen in 21%; return of swallowing in 42%; verbal communication in 28%; bladder and bowel control in 35%; and weaning of the ventilator in 50% of the patients. Many people, however, remain with LIS for ever. A few of these are described including probably the most famous patient with LIS Jean-Dominic Bauby who helped write "The Diving Bell and The Butterfly".

Correspondence: *Barbara A. Wilson, Neuropsychology, The Oliver Zangwill Centre, Ely, UK. E-mail: barbara.wilson00@gmail.com*

Keywords: Locked-In syndrome, basilar artery stroke, pontine haemorrhage

N.U. MISTRY, B.A. WILSON, A.E. ROSE. The challenges of diagnosing Locked-in syndrome following TBI and the story of Simon.

Background and aims: Locked-in syndrome (LIS) is a rare neurological disorder, Patients with LIS are awake, conscious and have normal or nearly normal cognitive functioning, yet they are unable to produce speech, facial or limb movements. There is complete paralysis of all voluntary muscles except for those controlling eye movements. LIS is commonly localised to specific areas of brain damage, the lower brain and brainstem (pons). The main causes of LIS arise from haemorrhage or infarct; reported incidence of LIS in traumatic brain injury (TBI) is rare. There is no standardised assessment approach to diagnosing LIS and subsequently, it is clinically challenging to differentiate from similarly presenting disorders.

Method: This study discusses the case of Simon, a 42 year man admitted following TBI. A CT scan at the time showed a traumatic subarachnoid haemorrhage with a pre-pontine bleed. He was awake and conscious, presenting with right sided paralysis and severe left sided paresis. Arousal was evident through voluntary eye movement; tracking people and stimuli of interest as communicative intent. Vertical eye movements appeared to emerge later, reading simple written instructions and following commands.

Results: Simon could also use eye brow movements for "yes" and head shake for "no"; discovered by his wife approximately two and half years following TBI. Although Simon could read some written instructions, his non-verbal responses were inconsistent, sometimes unreliable.

Discussion: Based on assessments from speech and language therapy and neuropsychology carried out with Simon, we discuss the possible diagnosis of LIS plus additional cognitive problems and address the difficulties in diagnosing pure LIS in patients following TBI.

Correspondence: *Nimisha U. Mistry, Speech and Language Therapy, The Raphael Hospital, Tonbridge, UK. E-mail: SALT2@raphaelhospital.co.uk*

Keywords: Locked-in syndrome, Traumatic Brain Injury, Differential diagnosis

A.E. ROSE. Quality of Life in people with Locked in Syndrome: a review of the literature.

The World Health Organisation propose that QoL is "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment" (The WHOQOL Group,1995). In considering this proposition of QoL in the context of a significant, chronic disability such as LIS it could be argued that a positive adjustment to their disability would be indicative of a good QoL. However it could equally be argued that it is not possible for an individual diagnosed with LIS to have a high quality of life due the significant levels of

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physical disability. Understanding QoL and the factors for QOL in LIS is important as it has implications for care management, ethical issues and intervention.
This talk will present a review of the literature considering QoL in LIS patients and will highlight that reported QoL in LIS appears to be similar to that of healthy people and patients with non-terminal chronic disease. QoL does not appear related to physical impairment nor could it be predicted by this factor. QoL in LIS remains stable over time. People with LIS appear to believe life is worth living despite their diagnosis despite what others around them perceive their QoL to be. This presentation will question the supposition among healthcare professionals and others that LIS is intolerable and leads to end of life decisions. Suggestions to support QoL in LIS patients will be discussed.
Correspondence: *Anita E. Rose, Neuropsychology, The Raphael Hospital, Hildenborough, Tonbridge, UK. E-mail: draerose@btinternet.com*
Keywords: Quality of life, Locked in Syndrome

B.A. WILSON, P. ALLEN. Living within my head: reflections from a man with LIS.
No one expects to have a stroke and I was no exception. Yet, on 3rd July 2012, that is exactly what happened to me. In the early hours of the morning I awoke with a tingling sensation all down one side and a headache on the other. I must have dozed off because when I woke up again, the pain and tingling reversed to the other side. Liz, my wife, was very concerned so she phoned for an ambulance. By the time the paramedics had arrived, I had started vomiting so they rushed me into hospital. Once I arrived I was assessed and sent for a CT scan. After the scan, I was waiting in a corridor for a porter to take me back, when I had a massive stroke. A nurse found me and took me to a doctor in the Accident and Emergency department (A & E) where I had yet another stroke. I stopped breathing. Luckily, A & E were quick to act, they resuscitated me, attached me to a ventilator and put me in a medically induced coma. I woke up five days later in the Intensive Care Unit. I spent seven weeks in ICU, paralysed and unable to speak. During this time I was told that what I was suffering from what is called "Locked in Syndrome". From the age of 10 until 56, when I had my stroke, I was a singer. My early years were singing in my church choir where I became lead chorister. From my 20s onwards I sang with many amateur operatic groups playing the lead in about 60 operas, operettas and musicals. My claim to fame was I sang with the Kings College Cambridge Choir and several times in the Royal Albert Hall. My message to other people with LIS is "Don't give up, keep trying". I hope I am going to recover or else to become an author. I would like to be able to sing solo again. I feel my brain is getting better as I have learned a few words in 26 languages. When I am alone I think about concerts, I sing in my head, I can remember all the parts I sang and everyone elses part too. I have also designed a big house for myself with a music room, a home cinema and a swimming pool.
Correspondence: *Barbara A. Wilson, Neuropsychology, The Oliver Zangwill Centre, Ely, UK. E-mail: barbara.wilson00@gmail.com*
Keywords: Locked-In Syndrome, stroke, music

Symposium 10. Process-based Approach to Neuropsychological Assessment: from screening tools to comprehensive evaluation

Chairs: Unai Diaz-Orueta, David J. Libon

14:10–15:40

U. DIAZ-ORUETA, D.J. LIBON. Process-based Approach to Neuropsychological Assessment: from screening tools to comprehensive evaluation.
Symposium Summary: The Process-Based Approach to neuropsychological assessment is based on the premise that analysis of errors and focus on the process by which individuals perform a task yields important information about brain-behavioural relationships. This symposium will present a perspective on the present and future of the process-based approach to cognitive screening and comprehensive evaluation of cognition in MCI and dementia, and will highlight ongoing developments derived from a more qualitative approach to neuropsychological assessment that has been nurtured from more than 50 years, from the initial works of Dr. A.R. Luria in Europe and Dr. E. Kaplan in the USA. Dr. Alberto Blanco-Campal (clinical neuropsychologist at the Health Service Executive, Ireland) will discuss the developments on a process-based approach to cognitive screening by detailing the most relevant features of a modified version of the Montreal Cognitive Assessment, the MoCA-PA. Dr. Unai Diaz-Orueta (Lecturer in Neuropsychology, Maynooth University, Ireland) will present preliminary findings with the MoCA-PA in a sample of healthy older adults. Moving from screening tools to further test developments, Dr. Ana Belen Navarro-Prados (Lecturer in Psychology, University of Salamanca, Spain) will present the

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latest developments in the construction of a Spanish version of the Philadelphia (repeatable) Verbal Learning Test (Price et al., 2009). Finally, Prof. Teresa Burke (Chair of Psychology, Dublin City University, Ireland) will present results on the What-Which-Where Test, a process-based approach test for evaluation of visuospatial memory. Ultimately, the audience will leave this symposium with a better appreciation for how the Process-Based Approach to neuropsychological assessment is advancing from a focus on broad cognitive screening for MCI and dementia to a focus on specific cognitive tests for evaluation of different memory processes.

Correspondence: *Unai Diaz-Orueta, Department of psychology, Maynooth University, Maynooth, Ireland. E-mail: unai.diazorueta@mu.ie*

A. BLANCO-CAMPAL, T. BURKE, U. DIAZ-ORUETA, A.B. NAVARRO-PRADOS. MoCA-Process Approach Version (MoCA-PA): Latest developments of an 'organic' test adding qualitative analysis to cognitive performance.

Objective: To describe the development and modifications of a process approach version of MoCA (MoCA-PA, Blanco-Campal et al 2016), an evolving test aiming to assist examiners segregate the multiple *'layers'* of cognitive skills required for successful test performance, identify examinees' 'favoured' approach or strategy to test solution and isolate the 'neurocognitive carrier' of defective aggregate scores.

Methods and Participants: Using the 'satellite' paradigm of the methodological framework of the PA, MoCA-PA introduces complementary conditions to existing subtests to explore the relative contribution of individual cognitive processes in the 'deceivingly' simple but multifaceted original cognitive task. Using a series of qualitative error classifications and the 'composition paradigm' MoCA-PA generates a series of qualitative indices for several subtests to help examiners extract a deeper clinical analysis and interpretation of test taking performance. We examined the utility of MoCA-PA to capture the propensity of a relatively homogenous clinical sample to exhibit a distinct quality of error on these indices.

Results: Ten subtests from MoCA were 'enhanced' by introducing: a) complementary tasks to help clarify the relative contribution of specific cognitive functions; and b) new qualitative indices and error classifications in order to help interpret data using the standard administration procedures.

Conclusions: Without adding significant burden on examinees, MoCA-PA intends to facilitate the concurrent assessment of multiple cognitive processes within each subtest of the original MoCA and assist examiners differentiate the cognitive profile of distinct clinical samples. As our understanding of the cognitive processes involved in these cognitive tasks and our knowledge of error types in specific clinical groups increases, we expect that new indices and satellite conditions may be added, making MoCA-PA an evolving 'organic' cognitive screening instrument.

Correspondence: *Unai Diaz-Orueta, Health Service Executive, Navan, Co. Meath, and Ardee, Co. Louth, Ireland. E-mail: unai.diazorueta@mu.ie*

Keywords: cognitive screening, mild cognitive impairment, dementia, Alzheimer disease

U. DIAZ-ORUETA, A.B. NAVARRO-PRADOS, A. BLANCO-CAMPAL, T. BURKE. MoCA-Process Approach Version (MoCA-PA): Preliminary findings in a non-clinical sample.

Objective: To examine cognitive performance shown by a sample of healthy cognitive ageing individuals on the Montreal Cognitive Assessment – Process Approach version (MoCA-PA, Blanco-Campal et al., 2016).

Participants and Methods: Thirty older adults (12M, 18F), 63-85 y.o. (mean age = 71.43, SD = 5.95) were recruited. The MoCA-PA test was administered and responses were recorded verbatim.

Results: Seven individuals showed different types of errors in the Trail Making Test (TMT), while 10 showed different errors in the copy of the cube. For the Clock Drawing subtest, those who anchored the clock numbers (writing 12, 3, 6, 9 and then others) showed fewer errors in the Clock Drawing command version (c^2= 4.658, p<. 05) and in the copy version (c^2 = 3.968, p<. 05). Performance in Digit Span forward showed significantly higher performance in repeating of items in ANY order versus SERIAL order (z = -2.536, p <.01); the same trend was observed for digit backwards (z = -3.709, p <.001), which could be evidence of different cognitive processes being involved. In Verbal Fluency, as observed in previous studies, most of the answers were provided in the first 15 seconds, showing a trend of significantly higher performance in semantic fluency when compared to phonetic fluency (z = -3.302, p<.001). Twelve individuals showed abstraction errors (mainly, in-set subordinate errors: "*both have wheels…*" for the "train-bicycle" item). Those who made abstraction errors spent more time to complete the TMT; (U = 17, z = -3.165, p <.001); and produced significantly fewer words in the phonetic fluency task (U = 55.5, z = -2.226, p<.05).

Conclusions: A process-based approach to cognitive screening may provide useful additional information about the underlying neurocognitive brain-behaviour relations involved in test performance beyond the

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mere consideration of total scores. Where observed, defective performance may have clinical relevance not inherent to a healthy cognitive ageing process.
Correspondence: *Unai Diaz-Orueta, Department of Psychology, Maynooth University, Maynooth, Ireland. E-mail: unai.diazorueta@mu.ie*
Keywords: aging, normal, cognitive screening, test development

A.B. NAVARRO-PRADOS, U. DIAZ-ORUETA, A. BLANCO-CAMPAL, D.J. LIBON. Spanish adaptation of the PrVLT: a process-based approach to brief memory evaluation.

Objectives: To adapt and construct a Spanish version of the 12 word Philadelphia (repeatable) Verbal Learning Test (PrVLT: Libon et al., 2009; Price et al., 2009) for use with older adults.

Participants and Methods: A group of 55 older individuals (20M, 35F), with an age range from 58 to 88 (mean age = 70.42, SD = 6.21) was recruited for the word frequency study. All participants were attending the University of Seniors in Salamanca (Spain). Each participant was given 90 seconds to provide as many written exemplars as possible for each of 15 categories: animals, fruits, bathroom items, carpenter tools, kitchen tools, furniture, cleaning supplies, clothing, meats, fish, vegetables, flowers, beverages, desserts, and office supplies under 20 euros, resembling the procedure followed by Bezdicek et al. (2014) for development of the Czech version of the test.

Results: For each category, a mean rank and standard deviation were calculated across all participants for each word. The mean rank was used to select free recall test items and semantic recognition foils for a "shopping list". Different mean rank intervals were used for List A "Monday" and List B interference "Tuesday" shopping lists. In addition to mean ranks, word lists were balanced for the number of syllables and word length, and, based on the CVLT-II prototypicality study, in which the original PrVLT was based, *"the four most frequent, or prototypical, members of a particular category were excluded"* (Bezdíček & Preiss, 2009; Delis et al., 2000). After test construction, evaluations are now underway to obtain normative data with a wide sample of older adults in Spain.

Conclusions: The Spanish version of the PrVLT will, we believe, add value to the early detection of memory impairment by using a process-based approach to memory assessment with Spanish samples. It is expected that normative data for Spanish older adult samples will be available soon.
Correspondence: *Unai Diaz-Orueta, Developmental and Educational Psychology, University of Salamanca, Zamora, Spain. E-mail: unai.diazorueta@mu.ie*
Keywords: test development, neuropsychological assessment, cross-cultural issues

T. BURKE, C. GALLAGHER, U. DIAZ-ORUETA, A. BLANCO-CAMPAL. The What-Which-Where test: a process-based approach to visuospatial memory assessment.

Objective: To describe the development and refinement of a visuospatial memory test [What-Which-Where test (WWW) - Gallagher, 1998; Burke & Gallagher, 2000] designed to allow evaluation of distinct components of visual and spatial memory.

Participants and Methods: For initial development (Study 1), 117 adults (60M, 57F) completed a 3-D WWW, the RCFT and the Logical Memory subtest of the WMS). For Study 2, 40 adults (16M, 14F) completed the same test battery but with a 2-D version of WWW. For clinical validation, 20 patients who had undergone unilateral left (n=8) or right (n=12) selective amygdalohippocampectomy were tested on the 2-D WWW.

Results: *Study 1:* Both exploratory and confirmatory factor analysis confirmed that the test battery could be characterised as assessing visual memory (Which-component of WWW, spatial memory (Where-component of WWW), complex visuo-spatial processing/memory (RCFT) and verbal memory (Logical Memory). *Study 2:* The four-factor model comprising visual memory, spatial memory, complex visuo-spatial processing/memory and verbal memory remained a good fit for the data. *Study 3:* Relative to controls, both patient groups exhibited deficits in memory for location (Where-component of WWW) (left: $p<.05$ IR, $p<.005$ DR; right: $p<.05$ IR, $p<.005$ DR) but not for item recall (What- component WWW) or visual detail (Which-component of WWW).

Conclusions: Our results confirm that visual and spatial memory must be considered distinct constructs and ought, therefore, to be assessed clinically as distinct components of memory rather than as a single construct of visuospatial memory. This can, we propose, be achieved by employing a process-based approach to assessment of visuospatial memory using tests such as the WWW that permit dissociation of the distinct components. Such an approach will yield valuable information about the integrity of underlying distinct cognitive processes involved in successful performance of complex visuospatial memory tasks.
Correspondence: *Unai Diaz-Orueta, School of Nursing and Human Sciences, Dublin City University, Dublin, Ireland. E-mail: unai.diazorueta@mu.ie*

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Keywords: visuospatial, test development, neuropsychological assessment

Afternoon Coffee Break

15:40–16:00

Plenary Keynote Address. Impact of cognitive science on neurorehabilitation

Presenter: Stephanie Clarke

16:00–17:00

S. CLARKE. Impact of cognitive science on neurorehabilitation.

Over the last three decades neuropsychology and neuroimaging brought new understanding of brain organization, its disruption by lesions and of the ways to promote its re-organization, which strongly benefits neurorehabilitation. These advances in cognitive neuroscience contrast with the low level of evidence for cognitive rehabilitation, which is often reported by systematic reviews and meta-analyses. Are we then all wrong? The answer is no, and the solution is to foster the link between cognitive models and clinical trials. We need to take into account the mechanisms by which therapeutic interventions affect cerebral re-organization. An interesting example is the use of prismatic adaptation in hemispatial neglect (1, 2). A better understanding of the mechanisms that underlie its effect is likely to help us to define more precisely which type of neglect will respond to this treatment, so that more focused randomized controlled trials can be performed (3-6).

(1) Rossetti Y, Rode G, Pisella L, et al (1998) Prism adaptation to a rightward optical deviation rehabilitates left hemispatial neglect. Nature 395:166–169

(2) Clarke, S., Bindschaedler, C. (2014) Unilateral neglect and anosognosia. In Selzer M. E., Clarke S., Cohen L. G., Kwakkel G., Miller R.H. (eds) Textbook of Neural Repair and Rehabilitation. Volume II, 2nd edition, Cambridge University Press, 463-477

(3) Clarke S, Crottaz-Herbette S (2016) Modulation of visual attention by prismatic adaptation. Neuropsychologia, 92:31-41

(4) Clarke S, Bindschaedler C, Crottaz-Herbette S (2015) Impact of cognitive neuroscience on stroke rehabilitation. Stroke 46:1408-13

(5) Crottaz-Herbette S, Fornari E, Clarke S (2014) Prismatic adaptation changes visuospatial representation in the inferior parietal lobule. Journal of Neuroscience 34: 11803-11

(6) Tissieres I, Elamly M, Clarke S, Crottaz-Herbette S (2017) For better or worse: The effect of prismatic adaptation on auditory neglect. Neural Plasticity, Volume 2017 ID 8721240

Correspondence: *Stephanie Clarke, Service de Neuropsychologie et de Neuroréhabilitation, CHUV, Lausanne, Switzerland. E-mail: Stephanie.Clarke@chuv.ch*

Keywords: attention, neglect, stroke recovery

Awards Ceremony

17:00–17:45

Remembering Anne-Lise Christensen

Moderator: Gordon Chelune

17:45–18:30

FRIDAY, JULY 20, 2018

Paper Session 11. Cognitive rehabilitation: The current state of the science

Moderator: Holly Miskey

7:40–8:35

S. AHMAD, A. WEATHERLY, L. WEHRLE, C. SANTIAGO, I. TOURGEMAN. Group Cognitive Rehabilitation: A Systematic Review.

Objective: The current review sought to summarize the effectiveness of different group therapy techniques utilized for the cognitive rehabilitation in individuals with acquired brain injuries (ABI).

Participants and Methods: Articles were found using established databases. Inclusion criteria were: peer-review, published after 2007, at least quasi-experimental design, and outcome data including measures of executive functioning, emotional regulation, anger, aggression, emotional well-being and treatment satisfaction. Articles were excluded if they featured comorbid conditions, failed to provide

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outcome statistics, were pilot or case studies. This initially returned approximately 1200 articles. Of these, 13 met criteria.

Results: Across all studies, 450 participants were included with 17 different interventions reviewed. The interventions utilized single or multi-modal approaches, with various group modalities of CBT, cognitive rehabilitation, occupational therapy, social skills training, self-awareness rehabilitation, emotion regulation training, computer-based training, and multifamily treatments. Participants included outpatients and inpatients at rehabilitation facilities, veterans, and web-based patients. They presented with post acute and chronic symptoms. Outcomes that were assessed and treated included: overall neuropsychological and psychosocial functioning, emotional and cognitive symptom severity, and therapy effectiveness.

Conclusions: Review illustrated that different techniques can be successfully implemented to treat post-ABI symptoms in the group setting. With the exception of social skills training and one of the interventions that were geared towards memory rehabilitation, all the therapies showed significant improvements in the outcome measures of interest. Participants also reported that the group setting has many key benefits that ease the rehabilitation process. These benefits include increased social support, feedback, and self-awareness.

Correspondence: *Isaac Tourgeman, Barry University, Miami Shores, USA. E-mail: itourgeman@dncneurology.com*

Keywords: Acquired Brain Injury, Cognitive Rehabilitation, Group Intervention

A. GERALDO, A.R. DORES, A. CASTRO-CALDAS, F. BARBOSA. Impact of cognitive rehabilitation programs on functional connectivity: a review.

Objective: We intended to understand the contribution of neurophysiological outcomes in the assessment of the efficacy of cognitive rehabilitation programs (CRPs), by exploring the impact of those programs in the brain functional connectivity. Additionally, we examined the relation between neurophysiological and behavioral measures.

Methods: We conducted a systematic search on EBSCO, Web of Science and PubMed databases. Twenty-one empirical studies with the main purpose of analyzing the effects of CRPs in the functional connectivity of the participants were considered. Reviews, case studies and studies that analyzed other neurophysiological outcomes were excluded.

Results: The technique used more often to measure functional connectivity was functional magnetic resonance imaging, with resting-state acquisition protocols. Despite that, two studies performed data acquisition during task performance, one study used electroencephalography and other used magnetoencephalography as measurement technique. In what concerns to the influence of CRPs, 16 studies reported significant positive improvements in the participants' behavioral performance. All studies mentioned significant changes in functional connectivity patterns of the participants who underwent cognitive rehabilitation, both in comparison to baseline and control groups. Additionally, 15 studies have found significant correlations between neurophysiological and behavioral outcomes, with changes in functional connectivity being associated to improvements in the performance of the participants at behavioral tasks. Two studies reported a significant correlation between changes in functional connectivity and measures of quality of life and depression.

Conclusions: The relation found in most studies between neurophysiological and behavioral data suggests that functional connectivity provides important cues to assess the efficacy of CRPs.

Correspondence: *Andreia Geraldo, Laboratory of Neuropsychophysiology, Faculty of Psychology and Education Sciences, University of Porto, Porto, Portugal. E-mail: g.andreia9@gmail.com*

Keywords: Cognitive rehabilitation, Neurophysiology, Functional connectivity

L. FU, S.M. DASELAAR, R.P.C. KESSELS, J.H.R. MAES. Who can benefit more from working memory training: older adults with poor or strong executive abilities?

Objectives: Previous research on the question who will benefit most from cognitive training has revealed some support for both the magnification and compensation accounts. The first account states that individuals that already have strong cognitive abilities benefit most. The second account instead assumes more benefits for individuals with relatively poor cognitive capacities. A recent study with older adults revealed a behavioural pattern that was in accordance with the Compensation-Related Utilization of Neural Circuits Hypothesis (CRUNCH), which fits a magnification account. However, only few studies so far have examined training gains and transfer effects of working memory (WM) training as a function of initial level of cognitive functioning, specifically executive functioning (EF), in older adults. The aim of the present study was to further assess the role of individual differences in EF on WM training benefits.

Participants: Twenty-four high EF older adults and 24 low EF older adults were used as participants.

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Methods: All participants performed a 20-session adaptive WM updating training program involving three different WM tasks. Transfer effects were assessed by two ecologically valid memory tasks.
Results: The high EF older adults continued to improve their performance on all three training tasks and significantly performed better on one of the memory tasks after training. However, the low EF participants displayed a clear CRUNCH pattern in the training progress on one of the training tasks and no transfer effects.
Conclusions: These results support the magnification account and suggest that in providing cognitive training programs it is important to match the difficulty of the training task to the cognitive ability of the trained individual. Especially when conducting training studies on elderly participants, a close performance monitoring is essential to assess the individual's CRUNCH threshold.
Correspondence: *Joseph H.R. Maes, Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, the Netherlands. E-mail: r.maes@donders.ru.nl*
Keywords: aging, normal, executive abilities, normal, memory training

Paper Session 12. Functional imaging: Advances and challenges

Moderator: Marc Norman

7:40–8:35

S.M. RAJTMAJER, F.G. HILLARY, M. HALLQUIST. Networks in crisis: the reproducibility of resting-state fMRI findings in clinical neuroscience.
Introduction: Over the past two decades, resting-state functional connectivity (RSFC) methods have provided new insights into the network organization of the human brain. There have been increasing concerns, however, regarding the reproducibility of findings both within samples and between studies.
Methods: To examine within-subject reliability, we present reproducibility findings from network analysis for consecutive fMRI data collection runs in traumatic brain injury and healthy samples in order to examine within-subject and within-sample reliability. We also reviewed the clinical network neuroscience literature, summarizing methodological details from 106 RSFC studies with the goal of conducting a meta-analyses. This review identified four primary challenges for RSFC methods in clinical neuroscience.
Results: Our data in TBI converge with wider evidence in the literature demonstrating within-sample reliability. We also show similar reliability in dynamic connectivity modeling using an established processing stream (GIFT, spatially constrained ICA). However, our literature review revealed that between-study comparisons are a primary challenge for greater integration RSFC methods in clinical neuroscience. We outline four important findings from this review. First, the composition of networks varied remarkably. Second, many studies equated the number of connections across graphs, which is conceptually problematic in clinical populations. Third, few graph metrics were reported in common. Fourth, some studies tested hypotheses about connectivity without a clear neurobiological rationale.
Discussion: There is converging evidence that RSFC methods measures reveal robust, reliable networks. However, the methods used to create and examine networks remain unconstrained resulting in a literature that cannot be aggregated. Based on these themes, we offer suggestions for promoting convergence across clinical studies in order to facilitate progress in this important field.
Correspondence: *Frank G. Hillary, Pennsylvania State University, State College, USA. E-mail: fhillary@psu.edu*
Keywords: replication crisis, fMRI, connectivity

D. CRIVELLI, M.D. SABOGAL RUEDA, M. BALCONI. Multiple representations for complex everyday gestures: hemodynamic (fNIRS) correlates of action observation, execution, and listening.
Objective: Actions are complex events characterized by multimodal representations. Following the common coding theory, perceptual and motor representations of actions are linked by a common computational code and share common neural substrates. Further, according to the embodied semantics theory, even coding of linguistic material may be fostered by perceptual and motor systems. The present work thus aimed at exploring potential associations of perceptual, motor and linguistic representations of complex real-life actions. In particular, we were interested in hemodynamic activation patterns within sensorimotor areas induced by the observation of such motor acts or the listening to their verbal description.
Participants and Methods: Twenty volunteers took part in the study. The experimental design included five blocked conditions: action execution; action observation; listening to brief verbal descriptions of actions; action observation coupled with listening to their verbal description; and action execution

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coupled with listening to their verbal description. Hemodynamic activity in premotor and sensorimotor cortical regions was monitored and recorded via optical imaging (functional Near-Infrared Spectroscopy – fNIRS).
Results: Hemodynamic data analysis showed that activation in left cortical regions was the lowest during observation of complex actions and observation coupled with listening of description of actions, greater during simple listening of verbal description of actions, and maximal when participants actually executed complex actions and when execution was coupled with listening to consistent verbal descriptions.
Conclusions: Findings began hinting at potential practical implications of using verbal description of actions to modulate the activation of specific structures constituting the sensorimotor network and at their potential for prompting the access to stored action representations via alternative neural pathways.
Correspondence: *Davide Crivelli, Research Unit in Affective and Social Neuroscience, Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy. E-mail: davide.crivelli@unicatt.it*
Keywords: fNIRS, action understanding, language

V. OSWALD, Y. ZEROUALI, A. CRAIG-BOULET, M. KRAJINOVIC, C. LAVERDIÈRE, D.L. SINNETT, P. JOLICOEUR, S. LIPPÉ, K. JERBI, P. ROBAEY. Neural oscillations from resting-state MEG showed specific patterns correlated to verbal learning and memory.
Objective: In this study, we used resting state MEG (and not a task paradigm) to explore neural oscillations patterns correlated with the performance in a standardized verbal learning test.
Participants and methods: We recorded 5-min eyes-open resting-state MEG data and administered the California Verbal Learning Test-II (CVLT-II) in 28 healthy subjects. In the CVLT-II the subject was asked to recall words from a list read aloud over five learning trials (List A), then from another List B presented once. A free-recall of List A was tested immediately and again after 20 min. A T1-weighted MRI images was used to generate a cortical surface model. Forward modeling of magnetic field activity was performed. We calculated means of Power Spectrum Density for different frequency bands (delta, 1-4Hz; theta, 4-8Hz; alpha, 8-13Hz; beta, 13-30-Hz; gamma, 30-120Hz) and correlated normalized MEG power in each frequency band with the performance in the CVLT-II across trials, and trial by trial. In order to control multiple comparisons, we used a non-parametric cluster mass approach.
Results: Based on the sequential detection of clusters for each trial, we identified three sets of correlations between CVLT performance and (1) auditory associative areas for the gamma band, (2) auditory associative and premotor areas for lower frequencies (mainly alpha and beta), (3) auditory associative and parietal areas across all frequencies. The first type of correlation clusters was mostly detected during List A trials 2 to 4, the interference List B trial, and the long-delay free recall trial. The second type was observed in trial 3 of List A, and in the short- and long-delay free recall trials. Finally, the third type was detected in trials 3 and 4 of List A.
Conclusions: Resting state MEG can identify different processes involved in verbal learning, including semantic processing in the auditory associative areas and subvocal rehearsal distributed between the parietal and the premotor areas.
Correspondence: *Victor Oswald, Neuroscience, University of Montreal, Montreal, Canada. E-mail: gonnaride@gmail.com*
Keywords: semantic memory, Magnetoencephalography, Resting state

Paper Session 13. Neuropsychological challenges faced by children and teens in developing countries

Moderator: Tedd Judd

7:40–8:35

L. KALUNGWANA-MAMBWE, S. MALCOLM-SMITH, L. SCHRIEFF-ELSON. Mental Health, Adaptive Functioning and Academic Achievement among school aged children living with HIV in Zambia.
Objective: To investigate mental health, adaptive functioning and academic outcomes of HIV-infected children as compared to HIV uninfected school-aged children in Zambia.
Participants: The sample had 127 children aged 6-12 (*M: 9.8; SD: 1.8*) years, with 58 (45.7%) HIV infected children and 69 (54.3%) HIV-uninfected children. 77 (55.9%) of the total sample was female.
Methods: The study employed a cross sectional quasi-experimental design that compared two pre-existing groups, a HIV-infected group and a HIV-uninfected control group. HIV-infected and uninfected children were recruited from Anti-Retroviral Therapy (ART) centres in health facilities in Lusaka. The Vinelands Adaptive Behaviour Scale Parent Interview Form was used to collect information on adaptive functioning, and the

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Connors Parent Rating Scale Short Form provided information on mental health. Academic Achievement was assessed using the Zambia Achievement Test (ZAT). Data was analysed using SPSS version 25. Appropriate tests were used to establish whether there were significant differences between the HIV-infected and HIV-uninfected children.

Results: Significant differences were found on tests of mental health and adaptive functioning with HIV-infected children experiencing more problems with regards to peer relations scoring lower in the domain of receptive language on the Connors Parent Rating Scale and the VABS, respectively. Parents of HIV-infected children also reported significantly more internalising and externalising behaviour. Further, HIV-infected children had significantly lower scores than the HIV-uninfected children on the ZAT.

Conclusions: This is the first study that has examined functioning across multiple domains among HIV-infected school-aged children in Zambia. Results suggest that HIV-infected children are prone to some mental health, adaptive functioning and academic difficulties that may affect how they relate with peers and impact their social functioning and school progression.

Correspondence: *Lisa Kalungwana-Mambwe, Psychology, University of Cape Town, Cape Town, South Africa. E-mail: kalungwana.lisa@gmail.com*

C. LIMA, N. ABREU. Neuropsychological effects of mercury exposure in children and adolescents in the Madeira River region.

The Madeira River region has high levels of mercury in the soil, due to human action and natural issues.

Objective: to investigate the relationship between the performance of neuropsychological functions and exposure to the mercury (Hg) from fish consumption.

Method: 263 children and adolescents aged between 06 and 14 years old, from riverside and resettled communities of the Madeira River region. instruments: intelligence (WASI), working memory (Corsi Blocking test and Span Digits), verbal fluency and semantic knowledge (Producing words - NEPSY II), inhibitory control (Inhibitiing responses - NEPSY II), cognitive flexibility (Trial Making Test) and motor function (Grooved Peg Board Task). The mercury measurement of the participants was collected through hair samples.

Results: t Differences were found in the performance of the participants, comparing four groups wiht Hg level. The group with higher Hg concentration, when compared to the group with lower concentration, presented lower scores for tasks that evaluate Verbal IQ, Estimated IQ, visuospatial operational memory, semantic knowledge and phonological verbal fluency. A Spearman correlation analysis reported negative correlations between mercury and Verbal IQ, Executive IQ and Estimated IQ, semantic knowledge, phonological verbal fluency, visuospatial operational memory, and positive with increased errors of inhibitory control test. A regression analysis, controlled for covariates, showed that each 10ug/g increase, are presented decrease of half standard deviation for Verbal IQ, Estimated IQ, phonological verbal fluency scores and visuospatial operational memory.

Conclusions: High concentrations of Hg in hair were associated with a lower performance in neuropsychological measures. environmental exposure to mercury from the consumption of fish, is associated to the losses in the neuropsychological performance of children and adolescents' riverside and resettled of the Madeira River region.

Correspondence: *Neander Abreu, Psychology, Universidade Federal da Bahia, Salvador, Brazil. E-mail: neandersa@hotmail.com*

Keywords: executive abilities, abnormal, cognitive functioning, neurotoxicology

Paper Session 14. Bi- and multi-lingualism: Is there a cognitive advantage?

Moderator: Gordon Chelune

7:40–8:35

L. OLABARRIETA-LANDA, I. BENITO-SÁNCHEZ, D. RAMOS-USUGA, A. GAILHAJANET, A. PÉREZ-CORDÓN, G. LASECA-ZABALLA, A. SALDAÑA, M. ALEGRET, J.C. ARANGO-LASPRILLA. Does knowledge of multiple languages improve verb fluency task performance?

Objective: To compare performance on letter, semantic, and verb fluency tasks (FT) among groups of monolingual, bilingual, trilingual, or multilingual participants.

Participants and Methods: 364 adults from the Basque Country and Catalonia, Spain participated in the study. Inclusion criteria were 18-85 years of age, completed primary school, a score of ≥27 on the Mini-Mental State Examination, a score of ≤4 on Patient Health Questionnaire–9 and able to speak Spanish. 62% of the sample were women, the mean age was 48.49, and the mean years of education 13.20. 24% of the sample (n=89) were monolingual, 39.8% bilingual (n=145), 24.5% trilingual (n=89),

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and 11.3% multilingual (n=41). All participants completed the letter (P), and verb FT in Spanish.
Results: Multivariate analyses of variance revealed significant differences between groups in age (p<0.001) and education (p<0.001), such that monolingual and bilingual groups were significantly older and less educated than trilingual and multilinguals (p's<0.001). Multivariate analysis of covariance (MANCOVA) controlling for age and education did not showed significant differences among groups in letter FT. However, MANCOVA controlling for age and education revealed significant differences in verb FT (p<0.001), such that monolingual and bilingual groups achieved significantly lower scores compared to trilingual and multilingual groups in verb FT total score (p's<0.01).
Conclusions: Verb FT is more complex than letter FT since verbs are more complex than nouns and require a deeper knowledge of the language. Trilingual and multilingual participants achieved higher scores than monolingual and bilinguals on verb FT. More research is needed to determine if knowledge of more than two languages might be associated with higher metalinguistic awareness and thus improve the performance on verb FT in a dominant language.
Correspondence: *Laiene Olabarrieta-Landa, University of Deusto, Bilbao, Spain. E-mail: laieneolabarrieta@gmail.com*
Keywords: Multilingualism, Verb fluency, Phonological verbal fluency

F. AVELEDO, Y HIGUERAS, A. MELDAÑA-RIVERA, M.L. MARTÍNEZ-GINÉS, T. MARINIS, A. BOSE, C. PLIATSIKAS. The bilingual advantage hypothesis in multiple sclerosis: a pilot study on Spanish monolingual and bilingual native speakers.
Objective: Based on new evidence suggesting that bilingualism has healthy benefits on individuals: from enhancing cognition to delaying onset of dementias in older bilinguals, we aimed: -to study the effect of bilingualism on cognition in people with multiple sclerosis (MS), specifically, executive control tasks (EC), and to compare their execution against healthy control participants' performance; and -to identify whether bilingual patients with (MS) show cognitive advantages over monolingual patients with MS.
Participants: we recruited 20 participants for each group (MS and controls) and split them into 10 monolinguals and 10 bilinguals. Bilinguals were fluent and frequent-user speakers of at least 2 languages.
Methods: This is a cross-sectional observational pilot study with two groups (MS patients and healthy controls), paired by sex and educative level. Following, Costa's et al. 2009 methodology, we tested participants' EC using two flanker tasks that required different monitoring levels. Based on the assumption that languages remain active in bilinguals, and speakers need to monitor and inhibit conflict information coming from the non-intended language, we hypothesized that bilinguals would show advantages in such EC tasks compared to monolingual. To measure these effects, we analyzed response time to congruent and incongruent items in the Flankers and calculated the conflict effect between groups.
RESULTS: when comparing within groups, bilinguals responded always faster than monolinguals in both MS and controls and for both congruent and incongruent conditions. When using the same linguistic group and comparing MS versus controls, the latter always responded faster than the former in both languages (monolingual and bilingual) and conditions (congruent versus incongruent).
Conclusions: results replicated those from literature (i.e. bilinguals have a cognitive advantage in EC tasks over monolinguals. This advantage seems observed also in MS patients.
Correspondence: *Yolanda Higueras, Reading University, Reading, UK. E-mail: yolandahigueras@googlemail.com*
Keywords: Bilingualism, Executive function, multiple sclerosis

M. CALABRIA, N. GRUNDEN, M. SERRA, C. GARCÍA SÁNCHEZ, A. COSTA. Lexical retrieval and semantic interference in fluent bilingual aphasia.
Objective: Individuals with aphasia frequently show lexical retrieval deficits due to increased interference amongst competitors during word selection. This has been demonstrated in tasks where this competition originates at a semantic level, such as naming pictures grouped by semantic category. To what extent lexical retrieval in semantic interference conditions affects a second language (L2) has not been extensively explored. Moreover, there is little agreement over the degree of language independence in semantic processing, possibly suggesting similar deficits between two languages in bilinguals.
Participants and Methods: In this study we explore the naming performance of bilinguals with aphasia (n=12) and age-matched healthy controls (n=14) in a semantically blocked cyclic naming task for the two languages. Also, we explore whether lexical deficits extend to comprehension by testing participants in a

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word-picture matching task during a mixed language condition. All the participants were early bilinguals and high proficient in Catalan and Spanish with a balanced use of the two languages.
Results: In the semantically blocked cyclic naming task, the semantic interference effect was similar in bilingual patients with aphasia and healthy controls when required to perform the task in their first language (L1). However, bilingual patients showed a larger semantic interference effect than controls when naming stimuli in their L2. Similarly, in the word-picture matching task, patients suffered more delay than controls when the task required to switch from L1 into L2 than vice versa.
Conclusions: Taken together, these results suggest that L2 retrieval may be selectively impaired in bilinguals during those conditions in which semantic competition is higher. Moreover, these lexical deficits extend to those demanding conditions in which both languages are involved, as well as when words are not intentionally retrieved for production.
Correspondence: *Marco Calabria, Center for Brain and Cognition, Pompeu Fabra University, Barcelona, Spain. E-mail: calabria.marc@gmail.com*
Keywords: aphasia, bilingualism, semantic processing

Poster Session 4. From normal aging to dementia (MCI, AD, FTD, DLB, etc.)

8:35–10:25

R. HEISSLER, M. CERVENKOVA, M. KOPECEK. Stability of SuperAgers phenotype over four years.
Objective: In older age, cognitive performance decreases. However, some individuals grow to be "SuperAgers" (SA), who are resistant to this decline. Longitudinal data show the variability of the cognitive performance of SA. The aim is to assess the stability of SA phenotype over 4 years.
Participants: 101 individuals aged 80 and above, participants of NANOK study (2012-2015) were divided into two groups: the SA and non-SA groups. The SA were defined following the criteria of Harrison et al. (2012): older adults who recalled ≥ 9 words on the delayed recall of Philadelphia Verbal Learning Test and had performance within or above one standard deviation from the age-appropriate average in the non-memory tasks such as the 30-item Boston Naming Test, the Trail-Making Test Part B and Category Fluency (Animals). Cognitive performance was assessed in year 1 and year 4.
Methods: Mann-Whitney U test was used to assess the difference in demographic variables (age, gender, education) for SA and non-SA groups. McNemar´s test was used to assess the change in proportions between SA and non-SA in years 1 and 4.
Results: In year 1, SA criteria were met by 19 individuals; in year 4, by 16 individuals. No statistically significant change in the proportions of individuals in SA and non-SA groups was found. There was no difference between demographic variables among groups. 85.1 % participants remained in their initial cognitive status groups. For the initial non-SA group, 92.7 % continued as non-SA and 7.3 % were SA in year 4. For the initial SA group, 52.6 % continued as SA and 47.4 % declined to non-SA.
Conclusions: SA defined by Harrison et al. (2012) criteria was a stable phenomena in our longitudinal study. Long-term observation may lead to the identification of factors that influence the potential trajectory of successful cognitive aging ("cognitive maintenance"). Our study may help to plan adequate sample sizes for next longitudinal superaging studies.
Funding: GAČR 18-06199S
Correspondence: *Radek Heissler, Experimental Neurobiology, National Institute of Mental Health, Klecany, Czech Republic. E-mail: radek.heissler@nudz.cz*
Keywords: aging, normal, cognitive functioning

G. FRONDA, D. CRIVELLI, I. VENTURELLA, M. BALCONI. Neurocognitive enhancement in early ageing in managerial professional contexts.
Objective: Recently, neuropsychological interest has been focusing on mindfulness-based interventions effects on the improvement of specific functions such as attention and cognitive abilities, which could be compromised by ageing process. The present study observed potential impact of an intensive empowerment intervention, based on awareness practices supported by a wearable brain sensing device, on psychological, neuropsychological, cognitive measures and on stress levels in a professional management context. Indeed, management contexts are usually characterized by environmental and performance distress that entail professionals to elevated stress conditions, causing a worsening of cognitive abilities.
Participants and Methods: In the present research, a sample of 16 managers over 50 were assessed at the beginning, during and at the end of a mindfulness treatment, consisting of 14 daily practices based on focusing on breathing and related bodily sensations. During the assessments, cognitive performances and

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resting-state/task-related electrophysiological measures (electroencephalography and biofeedback) were collected.
Results: After mindfulness treatment emerged a decrease of anxiety and perceived stress and an increase of control and inhibition processes during performances implementation. Moreover, electroencephalographic measures showed an increase of the alpha/beta index due to a higher activation during cognitive performances development. Finally, an increase of the cardiac variability index was observed, suggesting a more concentration level on stressful conditions.
Conclusions: This study demonstrates the efficacy of mindfulness treatment in neurocognitive enhancement. The training effectiveness in cognitive processes improvement allows to hypothesize, together with existing rehabilitation measures, the use of mindfulness trainings in order to enhance cognitive abilities, prevent cognitive impairment and reduce cognitive worsening following ageing processes
Correspondence: *Giulia Fronda, Research Unit in Affective and Social Neuroscience, Catholic University of the Sacred Heart; Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy. E-mail: giulia.fronda@unicatt.it*
Keywords: cognitive enhancement, early ageing, mindfulness

H.T. CHANG, M.S. HUA. Aging Facilitates Boundary Extension among Normal Adult Individuals.
Objective: Boundary extension (BE) is a phenomenon that individuals tend to overestimate the scope of a previously perceived scene, and may be related to schematic processing of the experience. Aging tends to enhance schemas. Few previous researchers have investigated effects of aging on quantitative and qualitative aspects of BE.
Participants and Method: This study examined BE effects quantitatively and qualitatively among cognitively healthy younger (YA) and older (OA) adults.
Results: Compared with the YA group, OA group displayed larger BE. In addition, the qualitative analysis revealed that the contents recalled by the OA contained less features than those recollected by the YA. These patterns remained after controlling effects of education.
Conclusions: The preliminary findings demonstrated that elderly individuals' BE and schematic processing are prone to be augmented and general respectively. The enhanced BE and schematic processing features thus might be used as cognitive markers to differentiate normal from pathological aging.
Correspondence: *Mau-Sun Hua, Department of Psychology, Asia University, Taichung, Taiwan. E-mail: huams@ntu.edu.tw*
Keywords: aging, normal, memory, false, memory, normal

D. TALAMONTI, D.P.A. CLARK, D. BRUNO. Memory Strategies and Ageing: Differences for spatial and temporal clustering in episodic memory.
Objective: Older adults typically perform more poorly than younger adults in memory tests of recall (Kahana et al., 2002). This age-related deficit was investigated in the present study by exploring whether a preference for a specific memory strategy (i.e., temporal vs. spatial clustering) was influenced by age differences.
Participants and Methods: Performance was compared between 45 younger and 45 older participants on a free recall task, where either a temporal or spatial strategy (but not both simultaneously) could be employed to retrieve semantically unrelated stimuli.
Results: The results show that older adults have a preference for spatial rather than temporal clustering, whilst younger participants displayed the opposite pattern. This finding was qualified by conducting further analyses on the older group: participants with potential cognitive impairment (MOCA < 26) were more reliant on spatial clustering than individuals with better overall cognitive ability.
Conclusions: Our findings support that temporal organization in memory is affected by ageing, and suggest that shifting from temporal to spatial clustering may compensate for the age-related decline. Future research should consider whether loss of temporal organization in older adults may be an early sign of medial-temporal lobe pathology and possible neurodegeneration.
References: Kahana, M. J., Howard, M. W., Zaromb, F., & Wingfield, A. (2002). Age dissociates recency and lag recency effects in free recall. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 28*(3), 530.
Correspondence: *Deborah Talamonti, Natural Sciences & Psychology, Liverpool John Moores University, Liverpool, UK. E-mail: D.Talamonti@2016.ljmu.ac.uk*
Keywords: Memory, Cognitive functioning, Aging

S. BOEDEKER, G. SAMMER, T. BEBLO, M. DRIESSEN, M. TOEPPER. Symbol processing in normal and pathological aging.

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Patients with Alzheimer's disease (AD) often show impaired orientation and navigation abilities especially in unknown environments. Symbols and signs seem to offer an opportunity to compensate for these deficits and facilitate wayfinding. However, there are only few studies examining whether and how AD patients benefit from symbols and the same applies to seniors suffering from major depressive disorder (MDD).

To address these issues, 40 AD patients, 30 patients with mild cognitive impairment (MCI) and 30 MDD patients performed a symbol-processing task (SPT). The SPT requires the correct semantic attribution of pictograms to a target pictogram in four different item categories. The impact of these item categories on SPT performance accuracy was examined using a 4 x 4 (group x item category) repeated measures ANOVA including post-hoc t-tests to further specify differences between groups. In addition, SPT scores were correlated with neuropsychological test scores. Repeated measures ANOVA revealed significant main effects of group and item category as well as a significant group x item category interaction effect. Healthy controls showed the highest and AD patients the lowest SPT performances. AD patients performed best at concrete symbols with visual cues and worst at symbols with visual distractors. Moreover, AD patients displayed a disproportional decline in performance accuracy across these item categories. MCI patients showed a similar but less pronounced pattern, whereas MDD patients profited most from ordinary symbols used in everyday life. Furthermore, correlational analysis indicated that a global symbol processing dysfunction in AD was associated with semantic memory and executive task performance.

The current results highlight the effectiveness of concrete symbols across different patient groups. Most importantly, our findings suggest avoiding distracting or abstract symbols in patients with AD and in prodromal stages of the disease (MCI).

Correspondence: *Sebastian Boedeker, Research Departement, Evangelisches Klinikum Bethel, Bielefeld, Germany. E-mail: sebastian.boedeker@evkb.de*

Keywords: dementia, Alzheimer's disease, depression, visual imagery

M. MATSUI. Age-related cognitive change in Japanese normal adults from 20 to 98 using RBANS.

Objective: The goal of the present study was to examine the properties of cognitive change in adults who participated in Japanese Repeatable Battery for the Assessment of Neuropsychological Status (RBANS-J) standardization project. Data from samples of adults selected to be representative of the Japanese population were examined to investigate age-related effects on cognitive functions. Key questions to be addressed were the relations of age with the properties of cognitive change, including not only the mean value of change, but also its variability, and comparisons with changes in other cognitive abilities.

Participants and Methods: Participants were 371 Japanese healthy adults (164 men, 207 women) from 20 to 98 years old. A sampling plan was included representative populations of adults according to each selected demographic variable (age, geographic region and occupational classification). Census data provided the sampling plan target percentages for their variables. The average years of education was 13.2 ± 3.5 (SD) years, and the mean IQ by abbreviated version of the Wechsler Adults intelligence Scale revised was 102.4 ± 16.2 (SD). We administered RBANS-J to each participant. Individual test scores and composite scores were converted to z-score units based on the test score mean and standard deviation.

Results: The relations of cognitive change to age appeared to be primarily linear. In addition, cognitive change after 60 years was more than that before 60 years. In particular, age-related changes of immediate memory, processing speed and delayed memory were large. Standard deviation after 60 years except language was more than that before 60 years.

Conclusions: Previous cross-sectional comparisons have consistently revealed that increased age is associated with lower levels of cognitive performance. We confirmed our results in Japanese sample were in line with previous studies. It also suggests that individual difference becomes bigger for older people.

Correspondence: *Mie Matsui, Laboratory of Clinical Cognitive Neuroscience, Kanazawa University, Kanazawa, Japan. E-mail: miematsui@staff.kanazawa-u.ac.jp*

Keywords: aging normal, neuropsychological assessment, cognitive

A. IWAHARA, Y. HASEGAWA, E. ITO, A. KAWAKAMI, T. HATTA. Association between cognitive function and physical function in middle-aged and older adults.

Objective: Physical performance decline on gait and mobility tasks has implications for accelerated cognitive decline. However, few studies examine the relationship between functional gait or mobility and cognitive decline. This study aimed to ascertain if performance on physical function tests are associated

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with indicators of cognitive functions among community-dwelling middle-aged and older adults.
Participants and Methods: Participants were 314 community-dwelling middle-aged and older persons without dementia. The cognitive functions were measured by means of logical memory test, Money road test, Stroop test, D-CAT (digit cancellation test) and verbal fluency test. Physical performance was assessed using the Timed Up and Go (TUG) test, 10-Meter Walk Test (10MWT), Two Step Walk, and One-leg standing.
Results: We constructed a series of linear regression models to examine the association of functional gait or mobility with cognitive functions. In analyses controlling for age, sex and education, lower performance in D-CAT1 (attention function) was related to lower level of balance, gait speed, and functional capacity estimated by 10MWT. In addition, lower performance in D-CAT3 (executive function) was related to lower level of physical functions estimated by TUG and10MWT. However, other cognitive functions estimated by logical memory, verbal fluency, Money road test and Stroop test were not associated with physical functions.
Conclusions: The results suggest that physical performance was associated with cognitive function, especially with executive function after adjusting for age, sex, and education in middle-aged and older adults. These mobility tasks are sensitive predictors of cognitive decline in community-dwelling sample. Further research is needed to determine mechanisms and early intervention strategies to slow functional decline.
Correspondence: *Akihiko Iwahara, Department of Education, Kyoto Women's University, Kyoto, Japan. E-mail: iwahara@kyoto-wu.ac.jp*
Keywords: aging, normal, motor function, cognitive reserve

A.F. VILLALVA-SÁNCHEZ, J. BERNAL, J.A. GÚZMAN-CORTÉS, H. SALGADO-CEBALLOS. Comparative analysis of neuropsychological performance of healthy older adults who practice aerobic exercise vs. theater.
Objective: Evaluate and compare neuropsychological performance such as attentional span, planning, working memory, cognitive flexibility, inhibition and learning, among healthy older adults who practice aerobic exercise vs theater.
Method: 20 healthy older adults are Spanish-speakers, with corrected vision and right-handed, 10 in Aerobic Group (*AG*) and 10 in Theater Group (*TG*), between 60 and 78 *y*, education 10.8 *y*. The groups were matched for age, gender, and education. Both groups performed a training session of 60 min per session, three times a week, were directed by expert instructors. The exclusion criteria were, depressive symptoms (GDS), functional dependence (ADL-S & IADL) and cognitive alterations (CASI, MMSE). Neuropsychological test was used to assess executive functioning (Stroop, TOL, FDT, Block's Corsi) and learning (RAVLT).
Results: Both groups obtained better scores compared with the standardized norm and the exercise group scored significantly higher than the AG on planning, working memory and learning. The comparison between groups showed a better performance in learning, attention, planning and memory working of the AG compared to the TG. Regarding the inhibition process, although no statistically significant differences were found between the groups. Finally, no significant differences were found between the groups in cognitive flexibility.
Conclusions: Several studies indicate that the macrostructural cerebral affectations during aging are more evident in the dorsolateral areas of the frontal and temporal lobes, if one considers that the cognitive functions associated with these areas were benefited in the present study, we could say that the realization of the activities studied can improve or stop the cognitive deterioration associated with aging. This suggests that both aerobic physical exercise and performing theater benefit the cognitive functioning of older adults, although aerobic physical exercise could offer greater cognitive benefits.
Correspondence: *Angel Fernando Villalva-Sánchez, FES Iztacala Neurometry Lab, Universidad Nacional Autónoma de México, Mexico City, Mexico. E-mail: angel.villalva@ired.unam.mx*
Keywords: neuropsychological assessment, aging, normal, brain plasticity

T. HATTA, K. KATOH, T. HATTA, J. HATTA, A. IWAHARA, K. FUJIWARA, E. ITO. Relations between Exercise Habit and Visual Attentional Ability in Elderly Community Dwellers: Evidences from the Yakumo Study.
Objective: Relation between mild everyday exercise and cognitive ability in healthy older people was examined using cohort study database.
Methods*:* Individually calculated linear regression coefficients in digit cancellation task performances for 11 years age from 65 to 75 years old were compared between exercise habit holders and non-holders.
Results*:* Exercise habit holders showed significantly smaller age-related decline than non-holders, irrespective of task difficulty.
Discussion*:* The results suggested that even mild exercise habit for long years give benefits on

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sustaining cognitive function in older people as well as the reported benefits of physical activities such as programmed in a sport gym. It also becomes clear that it is difficult for ordinary elderly people to continue exercising habits for many years, Therefore, more substantial ways are required for local health officials to advertise the effectiveness of mild exercise habits, and to devise the necessary work to become a habit.

Correspondence: *Takeshi Hatta, Health Sciences, Kansai University of Welfare Sciences, Kashiwara, Japan. E-mail: hatta@tamateyama.ac.jp*

Keywords: Exercise habit, cognitive decline, longitudinal study

B.H. LEE, J. CHIN, M.K. SUH, H.J. KIM, S.W. SEO, D.L. NA. Effects of depression and APOE genotyping on verbal and visual memory in male and female subjective cognitive decline.

Objective: Subjective cognitive decline (SCD) may be the preclinical stage of Alzheimer's disease (AD). Apolipoprotein E (APOE) genotyping and depression are considered important factors in the transition from SCD to mild cognitive impairment or AD. This study investigated the effects of depression and APOE genotyping on the verbal and visual memory in SCD, and the gender differences of these effects.

Participants and Methods: The participants were 593 SCD patients (428 females and 165 males) aged 50 years or above who visited the memory clinic from 2013 to 2017. Seoul verbal learning test (SVLT) and Rey Complex Figure test (RCFT) were used as verbal and visual memory tests. Depression was assessed using the short form of Korean version of geriatric depression scale (GDS). The effects of APOE genotyping and depression on the memory performances were analyzed by regression analyses with age and education as covariates in males and females.

Results: In female SCD (APOE e4 noncarrier n = 334, carrier n = 94), APOE genotyping and GDS scores did not predict RCFT memory scores, but GDS scores significantly predicted the scores of immediate and delayed recall of SVLT. The higher the GDS scores, the lower the memory performance was. In male SCD, while APOE genotyping and GDS scores were not relevant with SVLT scores, there was the interaction effect of APOE genotyping and GDS scores on the immediate recall of RCFT. Whereas the immediate recall score of RCFT decreased as the GDS score increased in APOE e4 noncarriers (n = 126), in APOE e4 carriers (n = 39) the recall score increased as GDS score increased.

Conclusions: The effects of depression and APOE genotyping on verbal and visual memory differed between male and female SCD. Depression had negative effects on verbal memory performances in female SCD regardless of APOE genotyping. In male APOE e4 carriers, on the other hand, more depression was related to the better visual memory.

Correspondence: *Byung H. Lee, Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea. E-mail: byuryhan@hanmail.net*

Keywords: Subjective cognitive decline, Apolipoprotein E, Depression

K. CECHOVA, R. ANDEL, H. MARKOVA, A. FENDRYCH MAZANCOVA, T. NIKOLAI, M. VYHNALEK, J. LACZO, V. MATOSKA, J. HORT. Impact of genetic variant of APOE and BDNF (Val66Met) on cognition in patients with amnestic mild cognitive impairment.

Objective: Amnestic mild cognitive impairment (aMCI) is considered to be a prodromal stage of Alzheimer's disease (AD), but it represents a clinically heterogenetic group. One of the predictive markers of the disease development can be a genetic evaluation, which is relatively inexpensive and minimally invasive to the patient. The carriage of Apolipoprotein (APOE) ε4 is a well-known risk factor for late-onset AD. However, other AD-related gene polymorphisms have been studied recently, such as polymorphism in the gene for brain-derived neurotrophic factor (BDNF). Carriage of BDNF Val66Met has been associated with faster cognitive decline and greater hippocampal atrophy in the healthy elderly. The aim of this study was to assess the influence of the combination of APOE/BDNF gene polymorphism on cognitive performance in aMCI group.

Methods: Patients with aMCI (N=105) from the Czech Brain Ageing Study were stratified based on their gene polymorphism into 4 groups ($\varepsilon4^-BDNF^{Val/Val}$, $\varepsilon4^-BDNF^{Met}$, $\varepsilon4^+BDNF^{Val/Val}$, $\varepsilon4^+BDNF^{Met}$). All patients underwent neurological examination, magnetic resonance imaging and Unified Data Set neuropsychological battery enriched by Auditory Verbal Learning Test. Composite scores were computed for each cognitive domain. The between-group differences were compared using an analysis of covariance (controlled for gender, education, and age) with post-hoc Tukey's test.

Results: There were no differences in years of education, sex, MMSE scores and GDS scores between all APOE/BDNF groups. However, $\varepsilon4^-BDNF^{Val/Val}$ were older than $\varepsilon4^+BDNF^{Val/Val}$ ($p<.05$). Patients with $\varepsilon4^+BDNF^{Met}$ had worse delayed memory recall ($p<.05$) compared to other groups. No

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significant differences were found in scores across groups in other cognitive domains.
Conclusion: The carriage of $\varepsilon 4^{+}BDNF^{Met}$ appears to selectively impair memory compared to other gene polymorphism. The greatest impairment was found in delayed free recall, suggesting episodic memory dysfunction, which is typical for AD.
Correspondence: *Katerina Cechova, Memory Clinic, Department of Neurology, 2nd Faculty of Medicine, Charles University and Motol University Hospital, Prague, Czech Republic. E-mail: cechova.katerina@gmail.com*
Keywords: Mild cognitive impairment, Brain-derived neurotrophic factor, Apolipoprotein E

P. BRANDOBUROVA, M. HAJDUK, S. KRAKOVSKA, A. HERETIK. JR., V. CVIKOVA, E. SMOLEJOVA, M. ABRAHAMOVA. Negative affectivity and somatic symptoms and their associations with cognitive functioning in older age.
Objective: Symptoms of affective and anxiety disorder often cooccur with cognitive impairment in older age. Clinical presentation of depression in older age is characterized by a lot of somatic complaints. The aim of the research was to evaluate how negative affectivity and somatic symptoms are associated with cognitive functioning in older age.
Participants: Symptoms of affective and anxiety disorder often cooccur with cognitive impairment in older age. Clinical presentation of depression in older age is characterized by a lot of somatic complaints. The aim of the research was to evaluate how negative affectivity and somatic symptoms are associated with cognitive functioning in older age.
Methods: As a measure of negative affectivity, GAD-7, PHQ-9 and Geriatric Depression Scale were used. PHQ – 15 was utilized as a measure of severity of somatic symptoms. For evaluation of cognitive functioning MMSE, MoCA and Frontal Assessment Battery were used.
Results: Measures of negative affect and somatic symptoms were moderately to strongly intercorrelated. MMSE score was not related to negative affectivity nor somatic symptoms. We found moderate negative relationship between severity of anxiety symptoms and Frontal Assessment Battery (rs=-0,312, p=0,005) and MoCA (rs=-0,226, p=0,044). Severity of depression measured by PHQ-9 was not related to any cognitive screening measures. Marginally significant association was found between MoCA and Geriatric Depression Scale (rs=-0,216, p=0,057). Severity of somatic symptoms was related to Frontal Assessment Battery (rs=-0,234, p=0,036).
Conclusions: Results of research supported weak to moderate association between negative affect and cognitive functioning in older healthy controls.
Research was supported by Agency for Research and Development (Grant no: APVV-15-0686).
Correspondence: *Petra Brandoburova, Centre MEMORY, Bratislava, Slovakia. E-mail: petra.brandoburova@gmail.com*
Keywords: affective processing, cognitive functioning, aging

S. CELIK, A. PAPADOGIANNAKI, M. NEWSON. An examination of psychological factors related to impaired cognitive performance in healthy older adults: Simulation study.
Objective: Several studies have demonstrated that some patients who are referred to memory clinics present with impaired cognitive performance and symptoms that are poorly explained by identifiable general medical or mental health condition. The current study aimed to identify underlying factors for impaired test performance by examining the potential role of low motivation and health anxiety on symptom validity testing (SVT) measures, cognitive tests and symptom questionnaires in a simulation study design.
Participants: A total of 60 healthy older adults were included in the study.
Methods: Participants were randomly allocated to one of the three experimental conditions. Low Motivation (LM), in which they were instructed to perform as though they had dementia in order to obtain financial gain from an insurance company; Health Anxiety (HA), in which they were asked to imagine that they were preoccupied with excessive worry that they had dementia; and Normal Control (NC), in which they were asked to imagine that they had been referred to a memory clinic for assessment and encouraged to do their best.
Results: LM had a detrimental effect on SVT measures and on each cognitive test. Interestingly, LM group also reported more symptoms of functional memory disorder and health anxiety than NC group. Contrary to expectation, no significant differences were found in cognitive test performances between HA and NC groups and Health Anxiety Inventory was the only measure that discriminated well between these two conditions.
Conclusions: These findings highlight the importance of considering secondary influences, as well as self-report measures in the assessment of cognitive functioning of older adults in clinical settings. In addition to the studies with TBI patients, the results of this study add further support for the role of financial incentive as a motivational factor on

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exaggeration of self-reported symptoms and poor cognitive test performance in healthy older adults.

Correspondence: *Simge Celik, The Network Aging Research, University of Heidelberg, Heidelberg, Germany. E-mail: celik@nar.uni-heidelberg.de*

Keywords: aging, normal, memory complaints, effort

M. NEWSON, C. TRIANTAFYLLOU, E. COULTHARD. Subjective Cognitive Decline and Functional Cognitive Disorder: Variations on a theme?

Objective: In this study we described the demographic, cognitive and psychological characteristics of people with Subjective Cognitive Decline (SCD) and Functional Cognitive Disorder (FCD) with the aim of identifying markers of these conditions. Also, we analysed relationships among the variables to examine if psychological characteristics were related to cognitive function in these groups.

Participants and Methods: The participants were recruited for a project designed to assess whether a lifestyle intervention or mindfulness meditation had an impact on behaviour, cognition and wellbeing. Ninety participants with SCD were recruited via advertisements and our volunteer panel and 10 participants diagnosed with FCD were recruited from our cognitive disorders clinic. At baseline, all participants completed a battery of cognitive tests and questionnaires. The results of these baseline tests were used for this study.

Results: We found that the FCD group was more likely to be overweight, meditate and intending to change level of exercise. The SCD group was more likely to have a family member with dementia. The only cognitive test that reliably differentiated between the groups was a symptom validity test (SVT). The FCD group was more likely to fail a SVT. There were no differences between groups on the psychological questionnaires. There were negative correlations between level of psychological symptoms and some aspects of verbal memory, fluency, and cognitive flexibility.

Conclusions: This preliminary study found few differences between people with SCD and FCD. There may be a continuum of symptoms related to both conditions. However, SVT failure may be a sign of FCD. More research is warranted in this area; it may be possible to develop a cognitive test to identify FCD. The groups did not differ on psychological symptoms, but we found negative correlations between psychological symptoms and some aspects of cognitive test performance in these participants.

Correspondence: *Margaret Newson, Neuropsychology, North Bristol NHS Trust, Bristol, UK. E-mail: margaret.newson@nbt.nhs.uk*

Keywords: subjective cognitive decline, functional cognitive disorder

O. GELONCH, M. VANCELLS, N. CANO, N. CUENCA, G. DE OLIVEIRA, P. RADEVA, M. GAROLERA. Could the stimulation of autobiographical memory modify the perception of self-efficacy and subjective well-being in people with Mild Cognitive Impairment?

Objective: To assess whether exposure to autobiographical episodes captured by a lifelogging wearable camera generates an improvement in the subjective well-being and perception of self-efficacy in people with amnestic-MCI (aMCI).

Participants and Methods: Eleven aMCI patients (5 men, 6 women) with a mean age of 74.4 years (SD 3.02) and 6.9 years of schooling (SD 2.27) were included in the study. The mean MMSE score of the sample was 27 (SD 1.60). Participants wore a wearable camera that automatically takes pictures every 30 seconds while performing their daily activities. The images captured by the camera were subsequently analyzed and an episode that contained significant information was chosen. The images captured by the camera were summarized by Computer Vision tools, eliminating non-informative images and generating a 3-minute film with the most relevant information. Each patient received one exhibition session that consisted of 4 consecutive views of the film in which they were given indications to pay attention to different details of the episode. Before and after the viewing session, patients answered a self-questionnaire with 10 questions about subjective well-being and self-efficacy for memory (score ranges 0-100).

Results: The mean scores in the questionnaire before the visualization was 79.9 (SD 14.9), while after the visualization was 83.8 (SD 13.5). The non-parametric statistic Wilcoxon signed rank test showed significant differences between the 2 scores ($p=0.012$), with significant better scores after visualization.

Conclusions: A single visualization session of an autobiographical episode generates an increase in subjective well-being and the perception of self-efficacy in people with aMCI. The stimulation of autobiographical memory through the visualization of personal biographical episodes captured through a lifelogging camera can be a powerful tool to improve the personal identity and self-concept, and also the quality of life in aMCI patients

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Correspondence: *Maite Garolera, Consorci Sanitari de Terrassa, Terrassa, Spain. E-mail: mgarolera@cst.cat*
Keywords: autobiographical memory, self-efficacy, lifelogging

Y. HA, S. KWAK, D. LEE, J. CHEY. Residual cognitive reserve moderates the relationship between white matter integrity and delayed memory in healthy older adults.

Objective: Cognitive Reserve (CR) refers to the individual differences in the effect of brain damage on cognitive function. Traditionally, it has been estimated by education and premorbid IQ, which are often termed as CR proxies. Recently, a novel method of measuring CR through memory decomposition has been proposed, namely residual CR. However, no studies have yet compared the two estimated CRs in their roles in moderating the relationship between white matter integrity and delayed memory.
Participants and Methods: Thirty healthy female older adults (age=72.47±6.17) completed neuropsychological tests, such as Vocabulary of K-WAIS-IV, the Elderly Verbal Memory Test (EVLT), and the Korean Dementia Rating Scale-2 (KDRS-2). Years of education and the vocabulary test score were used to estimate the 'Proxy CR.' Participants also underwent structural MRIs, including DTI. 'Residual CR' was estimated from the residual variance of episodic memory score that results after regressing out brain structural measures of medial temporal lobe and white matter lesion using partial least square. Fractional anisotropy (FA) and mean diffusivity (MD) of white matter tracts were calculated through probabilistic tractography.
Results: Residual CR showed significant correlation with proxy CR (r=0.407, p=0.026). Both CR variables were positively correlated with verbal memory and naming ability. Finally, residual CR moderated the relationship between FA of uncinate fasciculus and delayed recall of EVLT; the relationship between the two was negative with higher residual CR, while it was positive with lower residual CR. Proxy CR did not show moderation effect between brain structures and cognitive measures.
Conclusion: The results show that higher residual CR has a moderation effect against the impact of weakened white matter integrity on cognitive function in healthy older adults. It suggests residual CR captured additional explanatory aspects that proxy CR could not.
Correspondence: *Jeanyoung Chey, Psychology, Seoul National University, Seoul, Korea. E-mail: jychey@snu.ac.kr*
Keywords: Cognitive Reserve

M. TOEPPER, G. SAMMER, T. BEBLO, M. DRIESSEN, E. BAUER. Age, performance level and grey matter volume modulate the neural response to increasing working memory load.

Objective: There is growing evidence that the neural response to increasing working memory (WM) load is modulated by age and performance level. For a valid interpretation of these effects, however, it is important to understand, whether and how they are related to grey matter volume.
Participants and methods: In the current work, we therefore used functional magnetic resonance imaging (fMRI) and voxel-based morphometry (VBM) to examine the association between age, performance level, spatial WM load-related brain activation and grey matter volume in 18 younger high-performers (YHP), 17 younger low-performers (YLP), 17 older high-performers (OHP), and 18 older low-performers (OLP).
Results: In multiple sub regions of the prefrontal cortex (PFC), load-related activation followed a linear trend with increasing activation at increasing load in all experimental groups. Results did not reveal differences between the sub groups. Particularly. older adults additionally showed a pattern of increasing activation from low to medium load but stable or even decreasing activation from medium to high load in other sub regions of the PFC (quadratic trend). Quadratic trend related brain activation was higher in older than in younger adults and in OLP compared to OHP. Only in OLP, quadratic trend related brain activation was negatively correlated with both performance accuracy and prefrontal grey matter volume.
Conclusions: The results suggest an efficient upregulation of multiple PFC areas as response to increasing WM load in younger and older adults. However, older adults and particularly older low-performers additionally show dysfunctional response patterns in other PFC clusters indicating limited neural resources being associated with grey matter atrophy.
Correspondence: *Max Toepper, Department of Psychiatry and Psychotherapy, Research Division, Evangelisches Klinikum Bethel, Bielefeld, Germany. E-mail: max.toepper@evkb.de*
Keywords: aging, fMRI, VBM

M.M. LAVALLÉE, G.T. VALLET, P. SÉVIGNY-DUPONT, M. JOANNETTE, H. CHERTKOW, C. BOCTI, S. JOUBERT. Poorer cognitive performance in healthy older individuals is associated with the presence of

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beta-amyloid burden and white matter hyperintensities.

Objective: This study aimed to assess and characterize the heterogeneity of cognitive functioning in healthy elderly (HE) by focusing on age, education, beta-amyloid burden (AB), white matter hyperintensities (WMH), and cortical thickness.

Participants and Methods: 104 HE carried out a detailed neuropsychological assessment of processing speed, visual attention, visuospatial abilities, working memory, executive functions, episodic memory, semantic memory and language. AB was measured using PIB-PET, while cortical thickness and WMH were assessed using structural MRI. A hierarchical cluster analysis was carried out to determine the different patterns of cognitive performance. Performance of different groups was then examined using one-way ANOVAs.

Result: The cluster analysis revealed 4 cognitive profiles. The 1st group (19.6% of the sample) showed better performance in all cognitive domains (z-scores > 0.5 in all domains). The 2nd group (34% of the sample) showed average performance in most domains (z-scores between -0.12 and 0.6) but relatively weaker performance in episodic memory. The 3rd group (22.7% of the sample) showed low-average performance in most domains (z-score between -0.6 and 0.2) but was relatively better in episodic memory. The 4th (23.7% of the sample) showed the weakest cognitive performance overall (z-scores between -0.7 and -1.1). The four profiles differed in terms of age, AB burden and WMH, but did not differ in terms of education and cortical thickness. Participants in the 1st group were younger and had the least AB and WMH, while those in the 4th group were older and had the most AB and WMH burden.

Conclusion: Results of this study suggest that different patterns of cognitive decline occur in normal aging and that poorer cognition in various domains is associated with the presence of specific biomarkers such as AB and WMH. Future studies are required to disentangle the respective contributions of age and biomarkers on cognitive decline in HE.

Correspondence: *Marie Maxime Lavallée, Psychology, Université de Montréal, Montréal, Canada. E-mail: marie.maxime.lavallee@umontreal.ca*

Keywords: aging, normal, dementia, Alzheimer's disease, Cognitive profile

H. MARKOVA, A. FENDRYCH MAZANCOVA, T. NIKOLAI, K. CECHOVA, J. LACZO, J. HORT, M. VYHNALEK. Potential of Memory Binding Test to differentiate subjects at risk of dementia – data from the Czech Brain Aging Study.

Objective: Older adults reporting subjective cognitive complaints (SCC) are at higher risk of developing dementia. A very subtle memory impairment may be reflected by a lack of semantic memory binding. It can be assessed using the recently developed challenging Memory Binding Test (MBT). The aim was to explore the potential of the MBT to differentiate subjects with amnestic mild cognitive impairment (aMCI) and subjective cognitive decline (SCD) from cognitively healthy older volunteers (HV) and to identify MBT scores showing the best differentiating characteristics.

Participants and Methods: A sample of 232 non-demented older adults from the Czech Brain Aging Study referred to Memory Clinic for SCC was classified as aMCI (n=135; mean MMSE=27.61) or SCD (n=97; mean MMSE=28.91) based on clinical evaluation and comprehensive neuropsychological assessment applying the Unified Data Set protocol. In addition, 28 HV (mean MMSE=29.21) without significant SCC were recruited. All subjects were administered the MBT, a measure employing controlled learning of two lists of 16 words using a shared semantic category cue and both cued (CR) and free recall (FR) conditions.

Results: The aMCI group scored significantly lower than the HV group on all MBT scores (all ps≤0.001). The "Total FR" score reached the largest size of the area under the ROC (AUC=0.89) to discriminate between the aMCI and HV (reference) groups, with the cut-off score 14/32 showing the 87% sensitivity and 82% specificity; followed by "FR List 1" score (AUC=0.89; cut-off 7/16, 80% sensitivity and 82% specificity). The sizes of the AUCs were comparable for scores in immediate and delayed conditions. The SCD group did not differ from the HV group in any of the MBT scores.

Conclusions: In our sample, MBT showed a good diagnostic accuracy to differentiate between aMCI and HV, but it couldn't differentiate between SCD and HV. Screening potential of free recall scores was slightly superior to cued recall scores.

Correspondence: *Hana Markova, Department of Neurology, 2nd Faculty of Medicine, Charles University and Motol University Hospital, Memory Clinic, Prague, Czech Republic. E-mail: hana@markovaa.cz*

Keywords: memory binding, challenging memory test

H.I.S. MOREIRA, J. SILVA, A.S. COSTA, A. MACHADO, S.L. CASTRO, C.F. LIMA, S. VICENTE. The clinical utility of the INECO Frontal Screening (IFS) for the differential

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diagnosis between Mild Cognitive Impairment and both Healthy Aging and Alzheimer's disease.
Objective: The main goal of our study was examining whether the performance in a screening tool of executive functions, the INECO Frontal Screening (IFS), can accurately differentiate patients with Mild Cognitive Impairment (MCI) from healthy elderly (HE) and mild Alzheimer Disease (AD) patients. Additionally, we aimed to identify which IFS subtests better contribute for the distinction among these three groups. The influence of age, years of education, and global cognition (Montreal Cognitive Assessment) on IFS performance was also analyzed.
Participants: IFS total scores were compared between 26 HE participants, 32 MCI and 21 mild AD patients. The three groups were matched for age and education. The diagnosis of MCI and AD were established by a neurologist and a neuropsychologist, according the widely reported international guidelines.
Results: Higher global cognition and education predicted higher IFS scores. MCI patients had lower IFS scores than HE but higher than AD patients. IFS showed high diagnostic accuracy for the detection of MCI (AUC = .89, $p < .001$) and for AD (AUC = .99, $p < .001$). The cut-off below 20 yielded the best sensitivity (92%) and specificity (81%) in discrimination between HE and MCI. Regarding the differentiation among HE and AD patients, the IFS showed excellent sensitivity (100%) and good specificity (81%) at the optimal cut-off below 15 points. A discriminant analysis identified the "Modified Hayling Test", the "Proverbs", and the "Backward digit span" as the subtests that contributed most to the variation on IFS performance.
Conclusions: To our knowledge, this is the first study that analyzes how MCI patients perform on the IFS. This screening tool accurately distinguished MCI patients from both healthy elderly and AD patients and seems to be a brief and informative contribution for their differential diagnosis.
Correspondence: *Helena Isabel S Moreira, Centre for Psychology, Faculty of Psychology and Education Sciences, University of Porto, Porto, Portugal. E-mail: helenamoreira@fpce.up.pt*
Keywords: Mild Cognitive Impairment, Executive abilities, abnormal, Cognitive screening

M.J. CHASLES, É. COGNÉ, S. JOUBERT, J.F. GAGNON, I. ROULEAU. Draw me a clock: a study of patients with mild cognitive impairment of various aetiologies.
Objective: To determine the value of the Clock Drawing Test (CDT) in differentiating mild cognitive impairment (MCI) patients of various aetiologies. The performance of patients with amnestic MCI (aMCI), at risk of conversion to Alzheimer's disease, was compared to the performance of MCI patients with rapid eye movement sleep behavior disorder (RBD-MCI), at risk of conversion to dementia with Lewy bodies.
Participants and Method: A total of 82 participants [26 aMCI, 26 RBD-MCI, and 30 healthy subjects (NC)] were included in the study. The MCI groups were matched on the Montreal Cognitive Assessment (MoCA) test. The CDT was scored according to a 10-point scale (Rouleau I et al, 1992) and a qualitative error analysis was performed. Non-parametric analyses (Kruskal-Wallis followed by Mann-Whitney and Chi-square tests) were used because of ceiling effects.
Results: The groups differ on the CDT total score, X^2 (2) = 7.56, $p < .05$ (aMCI = RBD-MCI < NC), clockface score, X^2 (2) = 11.22, $p < .01$ (RBD-MCI < aMCI = NC), and position of the hands, X^2 (2) = 7.12, $p < .05$ (aMCI = RBD-MCI < NC). The groups also differ in the total number of errors, X^2 (2) = 7.38, $p < .05$ (RBD-MCI < aMCI = NC). Errors observed include stimulus-bound errors, conceptual errors, perseveration, planning deficits, errors in the spatial layout of numbers, and numbers written outside the clockface. The groups differ on two measures, errors in the spatial layout of numbers, X^2 (2) = 23.38, $p < .001$ (more frequent in the RBD-MCI group), and conceptual/stimulus-bound errors, X^2 (2) = 6.46, $p < .05$ (more frequent in the aMCI group).
Conclusions: Results suggest that qualitative analysis is more sensitive than quantitative score for differentiating between MCI subgroups of various aetiologies. RBD-MCI spatial disturbances are similar to those observed in dementia with Lewy bodies, whereas aMCI conceptual deficits are close to those reported in Alzheimer's disease.
Correspondence: *Isabelle Rouleau, Psychology, Université du Québec à Montréal, Montréal, Canada. E-mail: rouleau.isabelle@uqam.ca*
Keywords: Clock Drawing Test, mild cognitive impairment, REM sleep behavior disorder

A. BARTOS. Written picture naming and immediate recall (PICNIC) as a brief and effective test for mild cognitive impairment.
Objective: Patients with Alzheimer disease (AD) have simultaneous impairment in language and in several types of memory (long-term semantic, short-term episodic). Therefore we prepared a brief and easily administered screening instrument to examine these deficits in a single test in mild cognitive impairment which often precedes Alzheimer dementia.

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Participants and Methods: The first task in our new test was to write down and simultaneously remember the names of 20 line drawings (long-term semantic memory, language). Then participants were immediately asked to recall and write down as many picture names as possible (immediate short-term episodic memory). We tested 100 normal elderly people (NEP) (MMSE 29±1, MoCA 25±3 points) and age-matched 124 patients with early mild cognitive impairment (MCI) (MMSE 27±2, MoCA 22±4 points). We counted a number of pictures wrongly named or left unnamed at all (naming errors). Only a number of correctly recalled pictures (without confabulations or repetitions) in one minute was considered.
Results: The NEP made significantly less naming errors than MCI patients (0,5 vs 1 error) ($p = 0.001$). Conversely, the NEP recalled significantly more picture names than MCI patients (9±1 vs 6±3) ($p < 0.00001$). When comparing the NEP and MCI group according to ROC analysis we found an optimal cut-off score > 0 naming error or ≤ 8 correctly recalled picture names. The area under the curve was 0.66 for naming and 0.79 for recall.
Conclusions: The novel and original test to name and recall pictures is a short (up to five minutes), yet difficult assessment of several types of memory and language and may contribute to the identification of MCI. Therefore it may be easily used in various clinical situations and applied in other countries due to visual nature.
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Correspondence: *Ales Bartos, Department of Cognitive Disorders, AD Center, National Institute of Mental Health, Klecany, Czech Republic. E-mail: ales.bartos@nudz.cz*
Keywords: test development, mild cognitive impairment, dementia

A. BARTOS. The gesture test (TEGEST) as a novel simple evaluation of episodic memory in mild cognitive impairment.
Objective: Impairment of episodic memory is the first and the most prominent feature of Alzheimer disease (AD). A quick and simple examination can detect early impairment of episodic memory. The aim of the study was to develop an original Czech test which would simulate episodic memory and could be administered without any aids anytime and anywhere. A brief and simple test using gestures was prepared to evaluate it.in mild cognitive impairment (MCI) which often precedes Alzheimer dementia.
Participants and Methods: Participants demonstrated six gestures symbolic for all human senses (twice for sight) as instructed by the administrator in a new test of gestures (TEGEST). Then, they were asked to carry them out in again immediately without distraction. The TEGEST was administered to 124 MCI individuals (MMSE 27±2, MoCA 22±4 points) and 100 socio-demographically normal elderly controls (NEC) (MMSE 29±1, MoCA 25±3 points).
Results: Individuals with mild cognitive impairment recalled a significantly smaller number of gestures than normal elderly people: 3 ± 1 vs. 4 ± 1 gestures ($p < 0.000001$). The number of recalled gestures correlated with the MoCA score ($r = 0.6$; $p = 0.001$). The optimal cut-off score was ≤ 4 correctly recalled gestures (sensitivity 82 %; specificity 47 %; area under the receiver operating characteristic curve = 0.72).
Conclusions: The original test to measure short-term, incidental and episodic memory is a brief task with good psychometric properties even in patients with MCI. The novel six-gesture test (TEGEST) is a one- or two-minute and easy-to-use instrument which may signal mild cognitive impairment by four or fewer recalled gestures. It may be easily used in various clinical settings and applied in other countries without the need for translation.
Supported by grants PROGRES Q35, LO1611 and MH CZ DRO 00023752.
Correspondence: *Ales Bartos, Department of Cognitive Disorders, AD Center, National Institute of Mental Health, Klecany, Czech Republic. E-mail: ales.bartos@nudz.cz*
Keywords: test development, mild cognitive impairment, dementia

S. KRUMM, K.I. TAYLOR, R.W. KRESSIG, A.U. MONSCH. Neurocognitive tests of perirhinal cortex functioning differentiate healthy participants from MCI and early AD patients.
Objective: The perirhinal cortex (PRC) is the first structure affected by neurofibrillary pathology in Alzheimer's disease (AD). Measures of PRC functioning might thus be one of the earliest cognitive markers of AD. Here, we test this proof of concept with a novel battery of PRC tests.
Participants and Methods: We administered four PRC measures – odd-one-out (non-verbal computer test; picking the "odd-one" out of six Kanji-like figures as fast as possible), crossmodal integration (non-verbal computer test; visual, acoustic, and combined visual-acoustic subtests, i.e. deciding if a sound belongs to a specific object), picture-naming (verbal computer test; naming objects as fast as possible), and verbal fluency (verbal test; naming as many animals and as many fruits as possible within one minute each) – to 25 normal controls (NCs), 29

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patients with mild cognitive impairment (MCIs; unspecified mild neurocognitive disorder) and 28 patients with very early AD (ADs; mild or major neurocognitive disorder due to AD). While sex and education did not differ, mean age and MMSE scores significantly differed between groups (age in years: NCs: 68.52±10.82; MCIs: 70.59±11.39; ADs: 75.18±6.81; $F(2, 79)=3.210$, $p=.046$; MMSE: NCs: 29.00±1.86; MCIs: 27.72±1.39; ADs: 26.29±1.94; $F(2, 79)=21.278$, $p=4.053E^{-8}$). We used demographically (sex, age, and education) adjusted z-scores to compare group performances and included age as a covariate in each analysis.

Results: Performance on all PRC measures significantly differed between groups with moderate to large effect sizes (η^2_p range .085-.272). A linear regression analysis revealed that only verbal fluency and odd-one-out predicted group membership ($F(3, 78)=16.509$, $p=2.1294E^{-8}$, $R^2=.388$).

Conclusions: Cognitive performance in functional PRC tests significantly differed between NCs, MCIs and early ADs. However, only verbal fluency and odd-one-out predicted group membership. These tests may provide powerful tools for the early diagnosis of AD.

Correspondence: *Sabine Krumm, Basel University Center for Medicine of Aging, Felix Platter Hospital, Memory Clinic, Basel, Switzerland. E-mail: sabine.krumm@fps.ch*

Keywords: Alzheimer's disease, neuropsychological assessment, perirhinal cortex

E. BERTRAND, E. VAN DUINKERKEN, R.L. SANTOS, M.C.N. DOURADO, J. LAKS, J. LANDEIRA-FERNANDEZ, S. COSENTINO, D.C. MOGRABI. Neural correlates of self-awareness in dementia.

Self-awareness is a complex multifaceted construct, including aspects such as metacognition (i.e., the ability to self-monitor and to control one's own thought processes) and anosognosia (i.e., clinical lack of awareness about deficit or condition). Studies showed that impaired self-awareness is a common feature in dementia, particularly in Alzheimer's disease (AD). Poor awareness of the disease and/or the deficits has important implications for the daily functioning and quality of life of patients with AD and their caregivers (e.g., increased engagement in high-risk situations, impaired decision-making capacity, higher caregiver burden). Also, there is variability in the presentation and severity of impaired self-awareness in patients with AD, with lack of awareness ranging from slight minimization to complete denial of the condition. Because of the complexity of this phenomenon and the subjective nature of traditional awareness measures, the neuroanatomical correlates of self-awareness are still little known. In this context, the present work aims to investigate the neural correlates of different aspects of self-awareness, especially metacognition and anosognosia, in cognitively diverse older adults, including people with AD. The results will be discussed in relation to theoretical models of impaired self-awareness, with potential implications for neuropsychological rehabilitation being presented.

Correspondence: *Elodie Bertrand, PUC-Rio / UNIGRANRIO, Rio de Janeiro, Brazil. E-mail: elodie.bertrand1@gmail.com*

H. DUCLOS, A. BEJANIN, F. EUSTACHE, B. DESGRANGES, M. LAISNEY. Role of the context on affective theory of mind in Alzheimer's disease.

Objective: Previous studies have reported deficits for decoding emotions from faces in Alzheimer's disease (AD), but few studies have assessed emotion reasoning in a social context in this pathology. Long-term representations such as social knowledge and episodic memories can help attributing a mental state due to their involvement in contextual information but the relationships between these domains have been poorly explored. This study aimed to assess the decoding and reasoning processes in AD as well as the effect of congruency of the context on emotion attribution.

Participants and Methods: Twenty AD patients (mean age =79.4 ±5.1; mean MMSE score =21.9 ±2.1), 20 healthy old subjects (mean age =77.3 ±5.9), and 20 healthy young subjects (mean age =24.6 ±2.3) performed a neuropsychological battery including ToM testing through three tasks 1) attribute an emotion in a context (without facial expression), 2) recognize an emotion expressed by a face, 3) determine if the emotion expressed by a face is congruent with the emotion inferred in a context (previously shown), and an assessment of social knowledge and episodic memory.

Results: Results showed deficits in AD patients for reasoning on emotions in a social context (Task 1) and for decoding emotions from faces (Task 2). For the emotion attribution in a context (Task 3), analyses revealed similar performances between heathy subjects and AD patients when the emotion was congruent with the context, but deficits in AD patients when the emotion was not congruent. As expected, we observed links between ToM abilities and episodic memory together with social knowledge.

Conclusions: AD patients considered contextual information, so that they help or disturb the decoding of the stimuli in the environment. Overall, our

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findings suggest that AD patients have difficulties to attribute emotional mental states, and that the deficits of long-term representations and incongruency of the information could increase these difficulties

Correspondence: *Harmony DUCLOS, Normandie Univ, UNICAEN, PSL Research University, EPHE, INSERM, U1077, CHU de Caen, Neuropsychologie et Imagerie de la Mémoire Humaine (NIMH), Caen, France. E-mail: harmony.duclos@unicaen.fr*

Keywords: theory of mind, Alzheimer's disease, memory

M. ODAGIRI, K. UEDA, T. IWASAKA, M. YOSHIFUJI, S. YUKIMOTO. The effect of mechanical knowledge of tools on the functional disability of elderly people with dementia.

Objective: The objective of the present study was to elucidate the effect of mechanical knowledge of tools on the functional disability of elderly people with dementia.

Participants: The participants recruited from a day-service center were consisted of twelve people: six elderly peoples with dementia and six age-, sex, and education-matched controls. They were classified into three groups depending on the two test scores of general cognitive function (MMSE) and the mechanical knowledge of tools: healthy control (HC), individuals with comparison cognitive deficits (CCD), and individuals with mechanical knowledge deficits (MKD).

Method: The participants performed instrumental activities of daily living tasks, and the total number of errors and the frequency of each error type were compared between groups (non-parametric tests). Neuropsychological examinations associated with the functional ability such as executive function, semantic memory, praxis and so on, were also implemented and analyzed between groups.

Result: The results showed that the total number of errors performed by the MKD was significantly higher than that by the HC. Additionally, the number of semantic errors was significantly higher in the MKD than in the HC and CCD. Although there was no significant difference between the MKD and CCD in the score of mechanical knowledge as well as semantic memory, the score of dementia participants (CCD and MKD) showed a negative correlation with the number of semantic errors.

Conclusion: Among various functional disabilities, semantic errors may be especially caused by the deterioration in the mechanical knowledge of tools.

Correspondence: *Masashi Odagiri, health science, Kyoto Tachibana University, Kyoto, Japan. E-mail: odagiri@tachibana-u.ac.jp*

Keywords: mechanical knowledge of tools, dementia, IADL

Z.L. GOLDBERG, J.R. HODGES, O. PIGUET, M. IRISH. "Lost for words" – Divergent Communication Profiles across Neurodegenerative Diseases.

Objective: Neurodegenerative disorders of the brain are associated with a wide range of clinical and cognitive impairments. While marked decline in communication is commonly observed, a unique way of assessing the nature and severity of communicative dysfunction in dementia is through the perception of the carer. Further, this enables exploration of whether distinct aspects of communicative function are disproportionately affected contingent on dementia subtype.

Participants and Methods: Carer ratings of perceived communication impairments were obtained for 18 Alzheimer's disease (AD), 26 behavioural variant frontotemporal dementia (bvFTD), 12 logopoenic progressive aphasia (LPA), and 11 semantic dementia (SD) patients, compared to self-ratings of 31 healthy older Controls. Carers completed the La Trobe Communication Questionnaire (LCQ) to explore changes in tone, conversational effectiveness, conversational engagement, conversational flow, partner sensitivity, and conversational attention.

Results: Relative to Controls, impaired communication was evident across all patient groups, with distinct profiles emerging in each dementia subtype (p <.0001). Interestingly, bvFTD patients exhibited the most pronounced impairments across all aspects of communicative function. AD patients displayed a similar profile but in the context of preserved conversational tone. LPA and SD patients displayed alterations in conversational flow, conversational engagement and conversational attention, with SD patients further displaying reduced partner sensitivity.

Conclusion: Our findings reveal pervasive disruption to carer-perceived communicative function in dementia, including those subtypes not characterised by a primary language impairment. Patients with bvFTD displayed the most striking impairments in communication, which likely emerge in parallel with social cognitive dysfunction characteristic of this syndrome.

Correspondence: *Zoë-lee Goldberg, The University of Sydney, School of Psychology, The University of Sydney, Brain and Mind Centre, Sydney, Australia. E-mail: zoe.goldberg@sydney.edu.au*

Keywords: Dementia, Communication

J.A. FIELDS, B. BOEVE, H. ROSEN, A. BOXER, LEFFTDS CONSORTIUM. Cognitive Changes in Phenoconverters from Asymptomatic

to Symptomatic FTLD: Preliminary Data in the LEFFTDS Cohort.

Objective: The Longitudinal Evaluation of Familial Frontotemporal Dementia Subjects (LEFFTDS) Consortium is investigating subjects with microtubule associated protein tau (*MAPT*), progranulin (*GRN*), and chromosome 9 open reading frame 72 (*C9orf72*) mutations in presymptomatic and symptomatic phases annually to model rates of decline.

Participants and Methods: Asymptomatic mutation carriers who completed baseline (n=320; 103 *MAPT*, 91 *GRN*, 114 *C9orf72,* 2 with *GRN+C9orf72,* 10 yet to be characterized) and follow-up were assessed for clinical phenoconversion (modified Clinical Dementia Rating (CDR) score change from 0 to >0). Neuropsychological measures sensitive to frontotemporal dysfunction were examined in those who became symptomatic.

Results: Eleven (3%) participants phenoconverted to CDR>0: Five to CDR=0.5 (1 *GRN*, 4 *MAPT*) at first annual visit and 6 more (2 *MAPT* to CDR=0.5, 2 *MAPT* and 1 *GRN* to CDR=1, 1 *GRN+C9orf72*) by second annual visit. Five of the 11 had MCI with behavioral change or behavioral variant FTD, 4 of whom showed widespread cognitive impairment and decline. Five had various other phenotypes and showed minimal cognitive impairment, with stable performance at follow-up. One had the double mutation, clinically characterized as agrammatic/nonfluent PPA, and showed the greatest level of impairment and decline.

Conclusions: Phenoconversion to symptomatic FTD has occurred in 3% of asymptomatic LEFFTDS participants to date, primarily among *MAPT* mutation carriers. In this small sample of converters, impairments were most frequent when the clinical phenotype at conversion was MCI accompanied by behavioral changes or behavioral variant FTD. Future longitudinal evaluations and biomarker analyses will help identify predictors of outcome in asymptomatic mutation carriers.

Correspondence: *Julie A. Fields, Psychiatry & Psychology, Mayo Clinic, Rochester, USA. E-mail: fields.julie@mayo.edu*

Keywords: frontotemporal dementia, neuropsychology, genetic mutations

H.T. LIEN, T.F. CHEN, C.H. TAI. A Case with Rapid Progression of Cognitive Functions Revealed Heterogeneity in Posterior Cortical Atrophy.

Objective: Recent study has suggested remarkable heterogeneity in the syndrome presentation and pathological changes in posterior cortical atrophy (PCA). Visual and other posterior cognitive dysfunctions are characteristic syndrome in PCA. We presented a case with rapid progression of visual and the posterior cognitive functions to demonstrate the heterogeneity in PCA.

Participant and Methods: The patient was a 63-year-old, right-handed male. Rapidly aggravated disorientation to place had been noticed. Neuropsychological assessment was performed 6 and 10 months after the onset of symptoms. In addition, cerebrospinal fluid (CSF), neuroimaging, and electroencephalogram (EEG) studies were taken 10 months after the onset.

Results: The first neuropsychological assessment mainly focused on spatial-perceptual and visual memory functions, which showed defective performances. The second comprehensive assessment showed remarkable deteriorated spatial-perceptual functions, and deficits in attention, memory, language, and executive functions. Brain magnetic resonance imaging revealed cortical ribbon sign with bilateral temporo-parieto-occipital lobes involvement. Single-photon emission computed tomography revealed diffuse hypoperfusion which was more prominent in the bilateral occipital areas. EEG revealed moderate diffuse cortical dysfunction. The cognitive profile and disease course resembled rapidly progressed prion disease (e.g., Creutzfeldt-Jakob disease). However, the CSF examination revealed negative findings in terms of prion-related protein.

Conclusions: The preliminary case study revealed the heterogeneity of pathological changes might be present in patients with rapidly progressed PCA. In addition, neuropsychological assessment focusing on visual and other posterior cognitive functions may be used as a tool to detect the common and unique cognitive deficits across phenotypes of PCA.

Correspondence: *Hsing-Tien Lien, Department of Neurology, National Taiwan University Hospital, Taipei, Taiwan. E-mail: htlien517@gmail.com*

Keywords: dementia, other cortical, visuospatial, visuoconstruction

Z. SHEBANI, K. PATTERSON, P.J. NESTOR, L.Z. DIAZ-DE-GRENU, K. DAWSON, F. PULVERMULLER. Semantic word category deficits in semantic dementia and posterior cortical atrophy.

Objective: It has long been recognized that perisylvian language cortex and some neighbouring extrasylvian regions play a major role in lexical and semantic processing. However, the involvement of additional cortical areas in the processing of different semantic word categories remains controversial. We investigated word processing in two groups of

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patients whose neurodegenerative diseases affect specific parts of the brain while leaving 'core' language areas intact. The aim was to determine whether brain regions affected in each patient group make a necessary contribution to the processing of different semantic word categories.
Participants: Cohorts with (i) Semantic Dementia (SD), who have anterior temporal-lobe atrophy (N = 11), and (ii) Posterior Cortical Atrophy (PCA), who have parieto-occipital atrophy (N =10) took part in the study. Age-matched neurologically healthy participants served as controls (N = 12).
Methods: Participants performed tests of immediate and delayed serial recall (ISR, DSR), on words from five different semantic categories: colour (e.g., *yellow*), form (*oval*), number (*seven*), spatial prepositions (*under*) and function words (*also*). Word-frequency was matched between the two visual word categories (colour and form) and across the three other categories (number, prepositions, function words).
Results: In both ISR and DSR, SD patients were reliably impaired relative to controls on words from the colour and form categories. ISR performance in the PCA cases did not show a clear category specific pattern, but in DSR, a clear category difference emerged with significantly poorer performance on spatial prepositions.
Conclusion: The patterns of performance on the serial recall tasks as a function of semantic category demonstrates that specific extrasylvian regions of the brain are differentially involved in the processing of different semantic categories of words.
Correspondence: *Zubaida Shebani, MRC Cognition and Brain Sciences Unit, Cambridge University, Cambridge, UK. E-mail: zubaida.shebani@uaeu.ac.ae*
Keywords: Semantic Dementia, Posterior Cortical Atrophy, Category specificity

A. HAYASHI, K. SAKAI, K. MATSUYAMA, Y. YAMAMOTO. A Japanese case of primary progressive aphasia (PPA) with repetition and naming disorders and semantic memory impairments: A 5-year follow-up study.
Objective: We report a patient with PPA who initially showed sentence repetition and mild naming disorders, gradually developed semantic memory impairment and presented severe naming disorders.
Participants and Methods: A 72-year old, right-handed woman with 12 years of education complained of speech difficulties five years ago. She showed word-finding difficulty and slight phonological anomia without anarthria and agrammatism. On brain MRIs, left anterior temporal lobe atrophy had noted for five years. Regional cerebral blood flow measurement with single photon emission computed tomography showed hypoperfusion in the left temporal cortex. Two years after onset, the area of hypoperfusion spread to the left temporal, parietal, and occipital cortices. Amyloid-PET showed an extensive global amyloid load. Following neuropsychological tests were repeated at the interval of one year.
Results: MMSE; 29 or 30 for five years, Alzheimer's Disease Assessment Scale (X: onset, X+1: one year later~X+5: 5 years later); 3, 2.7, 6.3, 6.7, 14.3, 22, Western Aphasia Battery (X+1~5) AQ; 83.4, 84.2, 81.6, 69.8, 69, repetition; 7.4, 7.6, 7.6, 5.8, 5.7, Naming; 8.7, 8.6, 7.7, 5.2, 3.2, Writing; 9.1, 8.7, 8.3, 6.6, 6.4, Wechsler Memory Scale-Revised (X+2~5); Verbal Memory; 80, 71, 65, 57, Visual Memory; 108, 121, 105, 94, Attention/Concentration; 103, 90, 97, 86, Token Test(X+2~5); 148, 142, 91, 129/167.
Conclusions: Diagnoses of LPA (logopenic progressive aphasia) and SD (semantic dementia) could be made according to the radiological findings. From the result of Amyloid PET imaging, the possibility of AD (Alzheimer's disease) was also considered. The sentence repetition and naming disorders were characterized by LPA. With disease progression, mild semantic memory deficits and severe naming deterioration should have been shown as an atypical type of SD. It was suggested that language impairments such as SD may have merged with those characterized by LPA.
Correspondence: *Atsuko Hayashi, Department of Rehabilitation Science, Kobe University Graduate School of Health Sciences, Kobe, Japan. E-mail: a-hayashi@pearl.kobe-u.ac.jp*
Keywords: primary progressive aphasia, logopenic progressive aphasia, Alzheimer's disease

I. CAMERINO, N. MEYER, A. TULADHAR, A. REID, R. KESSELS, F.-E. DE LEEUW, V. PIAI. Role of White Matter Hyperintensity at Specific Locations in Cerebral Small Vessel Disease: A Voxel-Based Lesion Symptom Mapping Study.
Objective: White matter hyperintensities (WMH) are a neuroimaging hallmark of cerebral small vessel disease (CSVD). The effect of WMH on cognition in people with CSVD is not yet clearly understood. Results from previous studies suggested that WMH at strategic locations, might play an important role in cognition and could explain cognitive symptoms better than WMH volume. Previous results on the role of WMH locations on cognition were problematic in that they were either based on patients with mixed dementia diagnosis, on genetic variant of CSVD, or had small sample sizes. This study

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investigates the relation between WMH locations and executive functioning and language production.
Participants and Methods: In a cohort of 500 CSVD patients without dementia, voxel-based lesion symptom mapping was performed to study the relationship between WMH at specific locations and cognition. Stroop (color naming, word reading and color-word naming) and verbal fluency tests were used as measures of different degrees of executive function and language function demands.
Results: We showed for the first time that lower scores on Stroop color-word naming (inhibition) were significantly associated with WMH in bilateral corticospinal tracts. Lower scores in Stroop color naming appeared to be significantly associated with WMH in the right corticospinal tract and superior and inferior longitudinal fasciculus. The word reading part of the Stroop test was associated with WMH in the right corticospinal tract and left superior longitudinal fasciculus. Lower scores of verbal fluency (language function) were associated with WMH in the bilateral anterior thalamic radiation. However, for these two tests, the results were not significant after correcting for lesion size.
Conclusions: The results of this study are consistent with previous literature and show that lesion location is an important factor in explaining clinical features of CSVD.
Correspondence: *Ileana Camerino, Centre for Cognition, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, the Netherlands. E-mail: I.camerino@donders.ru.nl*

C.H. CHI, Y.S. CHIU, Y.L. CHANG. Reduced Limbic White Matter Integrity Mediated Age-Related Decline in the "When" Memory Component.
Objective: The networks of limbic white matter tracts are presumed to have a critical role in episodic memory. This study aimed to examine age-related differences in the four memory components (i.e., *who*, *when*, *where*, and *what*) of verbal episodic memory, and to the degree to which the difference is mediated by limbic white matter tract integrity.
Participants and Methods: The study consists of 30 cognitively intact older adults (OA) and 29 young adults (YA). All participants completed standardized neuropsychological tests, including the Logical Memory test of the Wechsler Memory Scale-III (WMS-3) with a revised scoring method. Tract-specific analysis derived from diffusion spectrum imaging was performed to investigate the integrity of three white matter tracts—the cingulum hippocampal, the fornix, and the uncinate fasciculus.
Results: The results revealed significant age-related differences in the all four memory components during the immediate recall phase. Moreover, an increase in age-related susceptibility to retention of the *when* component over time relative to other memory components was observed. Furthermore, the immediate recall of *when* component was mediated by the integrity of the left fornix and the uncinate fasciculus, while the retention of *when* component was marginally mediated by the tract connecting left posterior cingulum and hippocampus.
Conclusions: These findings suggest that age-related changes of left limbic white matter integrity mediated the relationship between age and verbal episodic memory.
Correspondence: *Yu-Ling Chang, Department of Psychology, College of Science, National Taiwan University, TAIPEI, Taiwan. E-mail: ychang@ntu.edu.tw*
Keywords: Aging, Episodic memory, White Matter

D.H. LUO, Y.S. CHIU, Y.L. CHANG. Alterations in white matter microstructure mediate the deleterious effect of hypertension on cognitive performances in cognitively normal older adults.
Objective: Hypertension has been demonstrated as a prominent vascular risk factor associated with cognitive declines in later life. Cognitive domains shown to be specifically affected involve processing speed and executive function, and to a lesser extent, learning and memory. However, the underlying pathophysiological mechanism of hypertension to cognitive declines remains uncertain and needs to be further clarified. This study thus aimed to examine the role of white matter fibers integrity in hypertension-related cognitive detriments.
Participants and Methods: A total of 66 cognitively normal older adults, comprising 41 hypertensive patients and 25 age-, education-, and gender-matched normotensive controls, were recruited into the study. All participants underwent a comprehensive battery of neuropsychological tests. Tract-based automatic analysis derived from diffusion spectrum imaging was performed to investigate the integrity of white matter tracts. The mediating effects of the white matter integrity between hypertension and cognitive performances were assessed using structural equation modeling analyses.
Results: The results revealed that alterations in white matter integrity, particularly in those tracts connecting frontal regions with posterior cerebral regions, underlay effects of hypertension on performances in multiple cognitive domains, including processing speed, executive function, memory encoding, and memory retrieval.

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Conclusions: Overall, these findings suggest that hypertension might exert deleterious effects on multiple cognitive domains through undermining the white matter microstructure even in cognitively healthy older adults, thus supporting calls for monitoring vascular health to prevent cognitive declines.

Correspondence: *Yu-Ling Chang, Department of Psychology, College of Science, National Taiwan University, Taipei, Taiwan. E-mail: ychang@ntu.edu.tw*

Keywords: hypertension, diffusion spectrum MRI, neurocognition

C.D. MAYO, E.L. MAZEROLLE, L.J. RITCHIE, J.D. FISK, J.R. GAWRYLUK. Is White Matter Microstructure in Alzheimer's Disease Associated with Cognitive Function?

Objective: Memory loss is often the primary cognitive concern in Alzheimer's Disease (AD), but other cognitive domains, such as executive function, are known to be affected. Using diffusion tensor imaging (DTI), we previously found significant alterations in white matter microstructure in AD compared to healthy controls (HC; Mayo et al., 2017). The goal of the current study was to further investigate the relationship between white matter microstructure in AD and cognitive function, including memory and executive function.

Participants and Methods: DTI and neuropsychological data were downloaded from the Alzheimer's Disease Neuroimaging Initiative database for 49 individuals with AD (mean age = 74.41 ± 8.51) and 48 matched HCs (mean age = 72.92 ± 5.92). DTI analyses were performed using FMRIB Software Library Tools. The relationship between whole-brain fractional anisotropy (FA) and mean diffusivity (MD) and composite scores of memory and executive function were examined using Tract-Based Spatial Statistics and voxelwise statistical analyses using Randomise (corrected, $p<.05$).

Results: Individuals with AD performed significantly worse than HC on tests of memory and executive function ($p <0.001$). Overall, there was a significant positive relationship between FA and memory and executive function scores, and a negative relationship between MD and memory and executive function scores. However, there were no significant relationships when the groups were examined separately.

Conclusions: DTI is sensitive to microstructural alterations in white matter integrity in AD over and above that of healthy aging. However, the degree of white matter disruption was not related to cognitive function in either AD or HC. Future research should further explore these relationships to determine whether DTI holds potential to measure progression of AD and treatment efficacy.

Correspondence: *Jodie R. Gawryluk, Psychology, University of Victoria, Victoria, Canada. E-mail: gawryluk@uvic.ca*

Keywords: dementia, Alzheimer's Disease, neuroimaging, structural, cognitive functioning

A. PARKER, V. SCARAPICCHIA, C. SMART, J. GAWRYLUK. Identification of earlier biomarkers for Alzheimer's disease: A neuroimaging study of individuals with subjective cognitive decline.

Objective: Alzheimer's disease (AD) is a degenerative neurocognitive disorder that currently has no cure. Individuals with subjective cognitive decline (SCD), who self-report changes in cognition, but are within the normal range on neuropsychological testing, are thought to be the earliest along the cognitive continuum between healthy aging and AD. The current study used a neuroimaging approach to examine differences in resting state brain function between individuals with SCD and healthy controls (HC).

Participants and Methods: 3T resting state functional magnetic resonance imaging (rsfMRI) data were retrieved from 21 individuals with SCD (F=12, mean age=71.6 years, SD=4.7) and 20 HC (F= 11, mean age = 75.0 years, SD = 6.8) from the screening time point of the Alzheimer's Disease Neuroimaging Initiative database. All data was processed using FSL. A seed of the posterior cingulate was used to examine the default mode network (DMN). Group level comparisons of activity in the DMN between SCD and HC were carried out at the cluster level (min $Z > 2.3$; cluster significance: $p < 0.05$, corrected).

Results: Results revealed significantly greater activity in the DMN including the bilateral precuneus cortex, bilateral thalamus, and right hippocampal regions in individuals with SCD relative to controls. Conversely, healthy controls showed significantly greater activation in the left frontal pole and left paracingulate gyrus compared to individuals with SCD. Follow up results demonstrate how these findings relate to indices of memory and executive functions.

Conclusions: This study represents a crucial step in characterizing individuals with SCD, an increasingly recognized group risk factor for AD. It is imperative to identify biomarkers prior to significant decline on clinical assessment, so that disease-delaying interventions may be delivered at the earliest possible time point.

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Correspondence: *Jodie Gawryluk, Clinical Psychology, University of Victoria, Victoria, BC, Canada. E-mail: gawryluk@uvic.ca*
Keywords: dementia, Alzheimer's disease, neuroimaging, functional connectivity, aging disorders

S.Y. TAY, L.Y.R. TAN, S. HAMEED, S. TING. The role of cognition and functional status in self and caregiver's perceived driving abilities in elderly with cognitive impairment (ECI).

Driving promotes well-being and maintains independence, but decline in cognitive abilities in the elderly can increase risk of accidents and compromise traffic safety. While self-perception of driving abilities predicts fitness to drive and minimizes unsafe driving, studies on caregiver's perception are less conclusive. No local studies had explored ECI or their caregiver's perception of ECI's driving ability, or its relationship with the extent of cognitive impairments and functional status, which could increase awareness and promote safe driving.

We aim to compare and contrast patient and caregiver's reports on perceived driving abilities in relationship to the patient's cognitive and functional status. 22 ECIs (MCI or early AD, Clinical Dementia Rating=0.5/1.0) and their caregivers completed a survey assessing perception of patients' current driving abilities (DriveAware), as well as their memory and functional difficulties. ECIs also underwent cognitive assessment to determine their cognitive status.

ECIs perceived themselves as better able in their overall functioning ($t=-4.70, p<.001$), driving abilities ($t=-3.87, p=.001$) and instrumental ADL functioning ($t=-4.21$, $p<.001$). There is poor agreement between ECIs and caregivers on items measuring driving concerns ($Kappa=.12, p=.27$) and driving performance ($Kappa=-.12, p=.53$) in the higher cognitive functioning group in contrast to lower functioning group ($Kappa=.50$, $p=.71$). While extent of cognitive impairments predicts self-perception of driving abilities ($R^2=.66, F(1,16)=31.3$, $p<.001$), caregivers scores were predicted by their ratings of ECI's functioning ($R^2=.63, F(1,14)=23.9$, $p<.001$).

ECIs self-perceived better driving and functional abilities. Self-perception and caregiver's perception of ECI's driving abilities are determined by different factors and the contrast in opinions is influenced by cognitive functioning. These results and its implications will be discussed in the context of our local settings.

Correspondence: *Sze Yan Tay, Neurology, Singapore General Hospital, Singapore, Singapore. E-mail: tay.sze.yan@sgh.com.sg*
Keywords: driving, cognitive functioning, everyday functioning

K. DOSHI, S. HENDERSON. Is it really overprotection? Evaluating cognitive profiles of elderly diagnosed with mild cognitive impairment with "overprotective" caregivers.

Objective: To investigate the cognitive and functional profiles of elderly diagnosed with mild cognitive impairment who receive "overprotective" caregiver assistance on functional tasks despite being capable of performing them independently, which may contribute to further deterioration of the elderly's cognitive and functional ability.

Participants and Methods: 39 elderly participants diagnosed with mild cognitive impairment were administered the mini-mental state examination (MMSE) and Alzheimer's Disease Cooperative Study- Activities of Daily Living Scale (ADCS-ADLs); family caregivers were interviewed regarding their care recipients' ability to perform functional tasks independently and their provision of assistance. "Overprotective" family caregivers were those who provided assistance despite stating that their elderly care recipient was able to perform the tasks independently. For each of the seven instrumental tasks assessed, participants were assigned into four categories defined by the impact of cognitive difficulties on their functional ability, and whether they received caregiver assistance. Participants who required assistance due to physical reasons were not included for the purposes of this study. ANOVAs were performed to analyze between group differences of MMSE scores.

Results: Of the seven instrumental tasks, the MMSE scores between the four groups significantly differed for (i) the ability to make purchases ($p=0.027$), (ii) managing finances ($p=0.016$), (iii) traveling independently ($p=0.32$), and (iv)using familiar technology ($p=0.001$). "Overprotected" participants had lower scores on the MMSE when compared to those who did not require assistance.

Conclusion: Either lower MMSE scores may explain for caregivers "overprotective" assistance, or caregiver's "overprotection" may explain for the poor cognitive performance on the MMSE. Longitudinal, prospective studies are warranted to elucidate this phenomenon.

Correspondence: *Stacey Henderson, Neurology, Singapore General Hospital, Singapore, Singapore. E-mail: stacey.lee.henderson@sgh.com.sg*
Keywords: Caregiver assistance, Everyday functioning, Cognitive ability

S. HENDERSON, K. DOSHI, N.A.B. MAULOD. Family caregivers of older adults diagnosed with

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mild cognitive impairment: a qualitative study highlighting the multi-dimensional of their caregiving practices.

Objective: To explore functional caregiving assistance provided to the older adult population in Singapore with mild cognitive impairment to inform the development of resources and interventions for caregivers in order to promote care recipients' functional independence.

Participants and Methods: 39 Caregivers of older adults with mild cognitive impairment were interviewed using a semi-structured inventory, the Singapore Activities of Daily Living Inventory (SADLI), developed to explore caregiving practices across 12 instrumental tasks on functional ability. Participants were first asked if they had noticed either a physical or cognitive change in the ability of their care recipient which impacts their performance on each functional task. Subsequently participants described the assistance, if any, they provide as well as what prompted their assistance. Qualitative content analysis was performed using NVivo Pro 11 software. Rigor of the study was ensured by encoding participants' responses by two independent study team members.

Results: Types of caregiving practices differed with varying reasons that were identified by three main themes: (y) the frequency of assistance, (x) the level of involvement of the caregiver and (z) the degree of volition to provide assistance. These three themes create a model that may be utilised to better understand caregiving experiences. Three main reasons explaining for caregiving behaviours and providing assistance were categorised by those taken from the caregiver's perspective, the care recipient's perspective as well as those shared between both participants.

Conclusion: The three themes represent different levels of caregiving on a multi- dimensional model that can elucidate to the burden of caregiving. Together with an understanding of the reasons for providing care, this model can help identify areas and types of inventions that may benefit caregivers and their care recipients.

Correspondence: *Stacey Henderson, Neurology, Singapore General Hospital, Singapore, Singapore. E-mail: stacey.lee.henderson@sgh.com.sg*

Keywords: caregiving practices, functional independence, everyday functioning

M. QUINTANA, J. FRÖGREN, P. ANDERBERG, J. BERGLUND, M. GAROLERA. SMART4MD application: a tool for people living with dementia and their careers. Results of the feasibility study.

Objective: The SMART4MD project aims to develop and test a Health application specifically tailored to people with mild dementia. The aim is to evaluate the feasibility of the SMART4MD study and the usability of the SMART4MD application before the start of the full pilot.

Participants and Methods: This feasibility study was conducted by two clinical partners: Blekinge Institute of Technology, BTH (Sweden) and Consorci Sanitari de Terrassa, CST (Spain). Recruitment and screening of participants were done in April and May 2017 at the two sites until 10 dyads at each site had been found. These 20 dyads completed the baseline questions during the same screening visit and were then scheduled for introduction and usability testing of the SMART4MD app a few weeks later.

Results: The usability testing - in which the aim was to assess the usability and feasibility of the SMART4MD application - was conducted in two phases. Phase I consisted of a one-time introduction and exercises with the application. Phase II consisted of usage of the application in the participant's home environment during a period of four weeks followed by a user evaluation. According to the SOP, the feasibility study was to be considered successfully completed when; at least 15 of the 20 dyads were satisfied with using the application, based on a structured interview with the dyads after four weeks' usage of the app. The feasibility was from this point of view considered successfully completed.

Conclusions: The results indicates that less exposure to similar technology affects both ability and self-esteem when confronted with the model app, and that evaluating usability with the target group using standard forms within usability testing requires pre-cautions.

Correspondence: *Maite Garolera, Brain, Cognition and Behavior: Clinical Research, Consorci Sanitari De Terrassa, Terrassa, Spain. E-mail: mgarolera@cst.cat*

M. QUINTANA, E. ROVIRA, J. CATENA, C. PARDO, M. MARTÍNEZ, L. SORT, J. RUIZ, X. GIRONES. The CAREGIVERSPRO-MMD platform: Preliminary results of satisfaction data on the use of the platform in Spain.

Objective: Population aging and longevity, as major risk factors for the development of chronic neurodegenerative diseases such as dementia and Alzheimer's disease, are reaching their highest values in developed countries, assuming in Europe one of the main health problems. Currently, the care and assistance of older citizens represent an increasing socio-health and economic cost for the societies of those countries subject to processes of

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population aging. That is why its strategic health policies are focused on improving the health of the elderly and preventing dependence by increasing the efficiency of their social and health care. In this line, the European project of development and application of the on-line platform CAREGIVERSPRO-MMD (PIC: 690211), based on social support services of mutual support and dedicated to the assistance, follow-up and empowerment of the dyads (caregivers and people living with dementia), aims to channel all the information generated by the social and health ecosystem around the dyad and encourage the search for solutions to specific problems and needs, to improve the quality of care, control and monitoring of the disease for a better diagnosis and improvement in the subjective quality of life as well as the reduction of the burden of caregivers.

Participants and methods: CAREGIVERSPRO-MMD, evaluated by a prospective, randomized, multicenter, controlled, parallel and longitudinal clinical trial, already has the first satisfaction data of its use by 102 monitored dyads in Manresa (Universitat de Bages Foundation and Fundació Hospital of Sant Andreu).

Results: The results reveal a high level of acceptance and satisfaction among caregivers, people living with dementia, health professionals and social workers, thanks to the successful development of adapted interventions, clinical strategies and gamification applied to the platform.

Conclusions: CAREGIVERSPRO-MMD Platform is a suitable tool for both the dyad and the professional.

Correspondence: *Maria Quintana, Facultat de Salut de Manresa de la Universitat de Vic - Universitat Central de Catalunya, Manresa, Spain. E-mail: mquintana@umanresa.cat*

Symposium 11. Moving Ahead to improve psychosocial outcomes after traumatic brain injury

Sponsored by the Australian Society for the Study of Brain Impairment (ASSBI)

Chair: Skye McDonald

8:45–10:15

S. MCDONALD. Moving Ahead to improve psychosocial outcomes after traumatic brain injury.

Symposium Summary: Moving Ahead is a Centre of Research Excellence in Australia, one of the research arms of the Australasian Society for the Study of Brain Impairment (ASSBI). In this symposium we report on several research approaches designed to better understand and improve psychosocial functioning after brain injury.

First, Skye McDonald overviews the benefits of an integrated research approach to this complex issue. By way of example, she will describe a project conducted by Moving Ahead to identify a common set of outcome instruments that can be used across studies to measure psychosocial function after brain injury. 57 measures were recommended and identified for use in early recovery, outcome, and intervention studies. The use of common outcome measures amplifies research efforts and allows consolidation across studies.

Following this, Vicki Anderson describes a prospective, longitudinal study of social participation and relationships in children two years post injury. In this, a complex dynamic of pre-injury and injury related variables were found to contribute outcomes. On a similar vein, Jennie Ponsford examines predictors of participation in a large sample of adults with TBI, 4.6 years post injury. Her study revealed that the personal attribute of resilience, plays an important role in higher participation post injury, along with demographic and injury related variables. Using a divergent, mixed methods approach, Jacinta Douglas examined the nature and role of friends for a small group of people with severe TBI. Her results paint a picture of diminishing friendships in the years post injury with correlations between number of friends and quality of life, depression and strong-tie support. Finally, Robyn Tate describes an intervention, aimed at improving meaningful occupation after TBI. Her study, using single case experimental design provides evidence that such an intervention can increase meaningful life activity with attendant changes in mood and quality of life.

Correspondence: *Skye U. McDonald, University of New South Wales, Sydney, Australia. E-mail: s.mcdonald@unsw.edu.au*

V. ANDERSON, M.H. BEAUCHAMP, L. CROSSLEY, S.J.C. HEARPS, C. CATROPPA. Social competence at 2 years following child traumatic brain injury.

Objectives: Children with traumatic brain injury (TBI) are at risk of social impairment, but research is yet to document the nature of these skills post-injury and factors that may predict social problems. The study investigated social outcomes post injury and explored factors contributing to these outcomes at 2 years post-injury.

Methods: *Design*. Prospective, longitudinal, observational study. *Participants.* The sample

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included 113 children, 74 with TBI and 39 typically developing (TD) controls. *Measures.* Acutely, parents rated pre-injury function and all children underwent MRI scan. Participants were followed up at 2 years post-injury. Outcomes were social adjustment, social participation, and social relationships. Predictors of social outcomes examined included brain lesion characteristics, environmental factors, and child cognition and behavior.

Results. Reduced social adjustment (p=.011) and social participation (p<.001) were evident in children with TBI compared to TD controls. Poor social adjustment was predicted by externalizing behavior problems and younger age at injury. Reduced social participation was linked to internalizing behavior problems. Within the TBI group, 23% of children exhibited social impairment, with younger age at injury, greater pre-injury and current behavior problems and family dysfunction, and poorer IQ, processing speed, and empathy linked to impairment.

Conclusions: Children with TBI are at risk for persisting social impairments even at 2 years post-injury, although these social problems are not global. Social adjustment and social participation appear most vulnerable and, surprisingly, the dose response relationship present in cognitive and behavioral domains post-injury, is not so well defined for social competence.

Correspondence: *Vicki Anderson, Murdoch Children's Research Institute, Melbourne, Australia. E-mail: Vicki.Anderson@rch.org.au*

J.L. PONSFORD, C. WARDLAW, A. HICKS, M. SHERER. Psychological Resilience is Associated with Participation Outcomes following Mild to Severe Traumatic Brain Injury.

Traumatic brain injury (TBI) causes physical and cognitive-behavioural impairments that reduce participation in employment, leisure and social relationships. Demographic and injury-related factors account for a small proportion of variance in participation post-injury. Personal factors such as resilience may also impact outcomes. This study aimed to examine the association of resilience alongside demographic, injury-related, cognitive, emotional and family factors with participation following TBI. It was hypothesized that resilience would make an independent contribution to participation outcomes after TBI.

Method: Participants included 245 individuals with mild-severe TBI (M_{age}=44.41, SD_{age}=16.09; PTA M 24.95 days, SD 45.99; who completed the Participation Assessment with Recombined Tools-Objective (PART-O-17), Traumatic Brain Injury Quality of Life Resilience scale), Family Assessment Device General Functioning Scale, Rey Auditory Verbal Learning Test, National Adult Reading Test, and Hospital Anxiety and Depression Scale an average 4.63 years post-injury (SD 3.02, R 0.5-13). Multiple regression analyses were used to examine predictors of PART-O scores as the participation measure.

Results: Variables in the model accounted for a significant 38% of the variability in participation outcomes, F (13, 211) = 9.93, p < .05, R^2 =.38, adjusted R^2 =.34. Resilience was a significant predictor of higher participation, along with shorter PTA duration, more years since injury, higher education and IQ, and younger age. Mediation analyses revealed HADs depression mediated the relationship between resilience and participation.

Conclusions: As greater resilience may protect against depression and enhance participation this may be a focus of intervention.

Correspondence: *Jennie L. Ponsford, Monash University, Melbourne, Australia. E-mail: jennie.ponsford@monash.edu*

J.M. DOUGLAS. Understanding friendship following TBI: A mixed method study.

Objective: Close relationships make important contributions to health, emotional wellbeing and the maintenance of self-worth. For those who sustain traumatic brain injury (TBI), life is frequently characterised by declining interpersonal relationships. The aim of this study was to understand the postinjury experience of friendship from the perspective of adults with severe TBI.

Participants and methods: Twenty-three adults who had sustained severe TBI participated in this project. On average 10 years had elapsed since the injury and the majority of participants were between 25 and 45 years old. They all lived in the community with family or paid support. The experience of friendship was explored using mixed methods (quantitative measures and in-depth interviews). Qualitative analysis of interview transcripts moved through a process of data-driven open and focussed coding to reveal emergent themes and categories.

Results: Participants nominated on average 3.35 (SD 2.19) friends. When paid carers and family members were not included, the mean dropped to 1.52 (SD 1.38). Exploratory correlations between number of friends and quality of life, depression and strong-tie support revealed significant associations of moderate to large effects. The postinjury experience of friendship was broadly conceptualized as "going downhill" with four overlapping phases: *losing contact, being misunderstood, wanting to share* and *hanging on*.

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Conclusions: Participants' stories illustrated how rehabilitation can focus on friendship by supporting established relationships and facilitating access to activities that afford interpersonal encounters and opportunities to share experiences.

Correspondence: *Jacinta M. Douglas, LaTrobe University, Melbourne, Australia. E-mail: J.Douglas@latrobe.edu.au*

R.L. TATE, D. WAKIM, L. SIGMUNDSDOTTIR, W. LONGLEY. Increasing meaningful activity for people with apathy after severe traumatic brain injury: evaluating a novel intervention.

Objectives: Vocational and non-vocational outcomes after severe traumatic brain injury (sTBI) are often poor, with less than 50% returning to work and only the minority resuming leisure and social activity. Interventions addressing non-vocational activity are well placed to make a difference for many people with sTBI, yet systematic reviews have identified few primary studies. We aimed to develop a new intervention (Programme for Engagement, Participation and Activity, PEPA) and evaluate its effect.

Method: Study design comprised seven single-case experiments, using multiple-baseline designs across behaviours. The 5-week baseline served as the control condition. Participants (n=7; aged 27-59 years; 6 males) were not able to return to work, had limited leisure and social activities, and experienced neurobehavioural impairment including apathy. Primary outcome measures were three individually-developed target behaviours (leisure, social and lifestyle activities), measured weekly throughout baseline and intervention. Generalisation measures evaluated other aspects of life (e.g., mood, quality of life). Intervention: PEPA comprises 15 weekly, individual sessions and two booster sessions. The programme trains goal-directed behaviours in non-vocational activities. Data analysis used visual analysis, supplemented by statistical analysis, including weighted Tau-U evaluating non-overlap across tiers and effect size.

Results: The intervention was successful for six of the seven participants (weighted Tau-U range $z=2.38$-4.61; $p \leq 0.001$ for five participants), with effect sizes ranging from moderate (ES=.55) to large in five participants (ES: .640-.768). Generalisation effects extended to other domains of life.

Conclusions: The PEPA shows promise as an effective intervention to increase non-vocational activity in people with apathy and substantial disability after sTBI.

Correspondence: *Robyn L. Tate, John Walsh Centre for Rehabilitation Research, University of Sydney, Sydney, Australia. E-mail: rtate@med.usyd.edu.au*

Paper Session 15. Differential neurocognitive and neuroimaging profiles of AD, DLB, and FTD variants

Moderator: Eva Bolcekova

8:45–10:15

S. RAMANAN, L. MARSTALLER, J.R. HODGES, O. PIGUET, M. IRISH. Profiles of episodic memory impairment in typical and atypical Alzheimer's disease variants.

Objective: The logopenic variant of Primary Progressive Aphasia (lvPPA) is an atypical variant of Alzheimer's disease (AD), presenting with language impairments due to early temporo-parietal atrophy. This contrasts with typical AD, where amnesia due to medial temporal and parietal atrophy is the hallmark clinical feature. The status of episodic memory in lvPPA remains unknown, though one might predict verbal memory deficits, given its clinical presentation. The current study aimed to delineate the status and associated neural correlates of episodic memory performance in lvPPA.

Participants and Methods: 19 lvPPA and 23 disease-matched typical AD patients underwent tests of verbal and nonverbal episodic recall and were contrasted with 31 healthy Controls. Participants further underwent structural MRI brain scans to explore associations between grey and white matter damage and episodic memory performance.

Results: Relative to Controls, lvPPA patients were impaired across episodic memory measures, further scoring intermediate to AD and Control groups on verbal recall. Interestingly, comparable profiles emerged on nonverbal recall performance between lvPPA and AD groups. Voxel-based morphometry analyses implicated the left inferior parietal cortex as a common neural correlate driving verbal memory dysfunction across patient groups. Probabilistic white matter fibre tracking analyses revealed that disrupted white matter structural connectivity between the left inferior parietal cortex and the hippocampus further contributed to verbal episodic memory impairments across participant groups.

Conclusions: Our findings reveal significant episodic memory impairments in lvPPA attributable to compromised grey and white matter integrity of the left inferior parietal cortex. From a clinical perspective, our results carry important implications

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for the differential diagnosis of typical from atypical AD presentations based solely on the presence of episodic memory deficits.

Correspondence: *Muireann Irish, School of Psychology, The University of Sydney, Brain and Mind Centre, 100 Mallett Street, Camperdown, Sydney, Australia. E-mail: muireann.irish@sydney.edu.au*

Keywords: dementia, Alzheimer's disease, memory disorders, neuroimaging, structural

E. CANU, F. AGOSTA, F. IMPERIALE, P.M. FERRARO, G. MAGNANI, G. COMI, S.F. CAPPA, M. FILIPPI. A brief version of the sentence anagram test and syntactic-processing brain network in primary progressive aphasia.

Objectives: To test the ability of the Sentence Anagram Test (SAT) in distinguishing non-fluent (nfv) and logopenic variants (lv) of primary progressive aphasia (PPA); to determine the relationship between SAT variables and brain cortical and white matter integrity in patients; to propose a brief version of SAT.

Participants and Methods: 13 nfvPPA and 9 lvPPA underwent 44-item-version of SAT and a MRI scan. Performance accuracy and reaction time were recorded and compared between nfvPPA and lvPPA patients. A ROC curve analysis determined the ability of SAT in distinguishing each clinical syndrome. In all patients, the correlation between anatomical changes and the SAT variables with highest discriminatory accuracy were performed. A 22-item-version of SAT was randomly selected and tested for classification ability.

Results: Compared to lvPPA, nfvPPA patients showed worse scores in both canonical and non-canonical sentences. SAT total and non-canonical sentence scores were able to separate nfvPPA and lvPPA patients with the highest diagnostic accuracies (AUC:0.91 and 0.93, respectively). These variables were positively correlated with the grey matter volume of the left inferior frontal gyrus (pars triangularis), rolandic operculum, supplementary motor area, precentral gyrus, and middle frontal gyrus, and with the integrity of the body of the corpus callosum. The SAT 22-item-version total and non-canonical sentences scores reached diagnostic accuracies similar to the original version (AUC:0.94 and 0.92, respectively).

Conclusions: The SAT, in particular the investigation of the non-canonical syntax, provides an in vivo instrument to distinguish nfvPPA and lvPPA clinically and patient performances were associated with crucial brain regions implicated in syntactic-processing. The 22-item-brief version of SAT is powerful and can be immediately used in the clinical practice.

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Correspondence: *Elisa Canu, Neuroimaging Research Unit, Institute of Experimental Neurology, Division of Neuroscience, San Raffaele Scientific Institute, Vita-Salute San Raffaele University, Milan, Italy, Milan, Italy. E-mail: canu.elisa@hsr.it*

Keywords: Primary Progressive Aphasia, Sentence Anagram Test, Syntactic-processing brain network

H. DUCLOS, R. LAILLIER, M. CAILLAUD, F. DOIDY, S. SEGOBIN, C. MERCK, S. BELLIARD, O. MARTINAUD, V. DE LA SAYETTE, F. EUSTACHE, B. DESGRANGES, M. LAISNEY. Impairment of different mechanisms of social knowledge in semantic dementia.

Objective: Few studies focused on social norms knowledge (SNK) in Semantic dementia (SD), although these patients have a general impairment regarding semantic memory. However, the anatomical and cognitive mechanisms driving SNK are unclear in these patients. This study aimed to assess SNK performances in SD and to characterize its neuropsychological and neuroanatomical correlates. We were particularly interested in whether there are differences in two mechanisms required for SNK: semantic store and social reasoning.

Participants and Methods: Seventeen patients suffering from SD, and 19 matched healthy controls (HC) were administered a task assessing SNK where participants had to detect situations with a social fault, a neuropsychological battery (with an assessment of semantic memory and executive functions), and a structural MRI. A detection score based on the situation with a social fault correctly identified and reflecting the semantic store and a rejection score based on the situations without fault correctly identified reflecting the social reasoning were computed

Results: Both the detection and the rejection scores were significantly lower for SD patients than for HC, with more deficits for the detection score. The detection score correlated with semantic knowledge and the rejection score with inhibition. On MRI analysis, the detection score significantly correlated with lower volume of temporal lobes bilaterally, while the rejection score correlated with lower volume of the frontal areas, (uncorrected, $p<.001$, $k>200$ mm^3).

Conclusions: The stock of social knowledge was linked to semantic memory and temporal pole integrity bilaterally, whereas social reasoning mainly

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depended on inhibition processes linked to the integrity of frontal regions. We have been able to report disorders for SNK in patients with SD, which could reflect a dysfunction of different mechanisms, a deficit for the stock of social knowledge and moderate difficulties for social reasoning.

Correspondence: *Harmony Duclos, Normandie Univ, UNICAEN, PSL Research University, EPHE, INSERM, U1077, CHU de Caen, Neuropsychologie et Imagerie de la Mémoire Humaine (NIMH), Caen, France. E-mail: harmony.duclos@unicaen.fr*

Keywords: social cognition, semantic dementia, memory

D. BRUNO, C. BUSSE', A. CAGNIN. Effective discrimination between Alzheimer's disease and dementia with Lewy bodies with the recency ratio.

Objective: Despite neuropsychological differences between individuals with Alzheimer's disease (AD) and dementia with Lewy bodies (DLB), overlap in performance has been observed, including analogous scores in memory tests (Rey Auditory Verbal Learning, AVLT). However, a recent report by Busse' et al. (2017) has shown that several cognitive scores, including some derived from the AVLT, discriminate between AD and DLB. Recency performance (i.e., memory for items at the end of the list) at trial 1 of the AVLT was found to be better in individuals with AD, compared to DLB, which is consistent with a vast literature on serial position effects in AD, including our own work with the recency ratio (Rr) score. The principle of Rr is that since immediate recency tends to be high in AD, only for delayed recency to be usually low, a ratio between these two measures will be higher in individuals with AD than controls. We re-analysed the data from Busse' et al. (2017) to determine whether Rr is effective at discriminating between AD and DLB.

Participants: Data from individuals with AD (n=32, age=72.2 ± 8.3) and DLB (n=29, age=74.7 ± 7.5), collected as part of a study at the University of Padua, were analysed.

Methods: Rr was calculated using this formula: (trial 1 recency + 1) / (delayed trial recency + 1). A t-test was carried out to establish whether Rr differed between AD and DLB. Effect sizes were then calculated for significant simple effects in the original paper, and for Rr. ROC curves were then derived to compare memory scores.

Results: Results show that Rr is significantly higher in AD than in DLB, and yields the largest effect size (Cohen's $d = 1.060$) compared to all other previously reported measures. Similarly, the area under the ROC curve was higher for Rr (0.774) than for trial 1 recency (0.670).

Conclusions: These findings support the use of Rr as a cognitive measure for the discrimination between AD and DLB.

Correspondence: *Davide Bruno, Liverpool John Moores University, Liverpool, UK. E-mail: d.bruno@ljmu.ac.uk*

Keywords: dementia, Alzheimer's disease, dementia with Lewy bodies, memory disorders

J. CIAFONE, P. GALLAGHER, A.J. THOMAS. Neuropsychological impairment in Mild Cognitive Impairment due to dementia with Lewy bodies and Alzheimer's disease.

Objective: Efforts are being made to identify dementia with Lewy bodies (DLB), the second commonest cause of neurodegenerative dementia after Alzheimer's disease (AD), in the Mild Cognitive Impairment phase (MCI-LB), during which intervention on the disease processes would likely be most successful. Few studies have targeted this group and the cognitive profile of prodromal DLB is therefore unclear. The present study aims to elucidate the neuropsychology of DLB in the MCI phase (MCI-LB) relative to MCI due to AD (MCI-AD) and healthy controls.

Participants and Methods: In addition to age-matched controls ($n = 32$), recruited patients were diagnosed within the study as MCI-LB ($n = 39$) or MCI-AD ($n = 12$) following clinical examination and imaging. Patients meeting NIA-AA criteria for MCI and one or more consensus criteria for the diagnostic features and biomarkers of DLB (McKeith *et al.*, 2017) are considered "possible" or "probable" MCI-LB. Remaining participants with demonstrable cognitive impairment but no clinical symptoms or biomarkers for DLB are considered MCI-AD.

Results: While both groups are impaired relative to controls, results suggest that MCI-LB is more impaired than MCI-AD in the domains of executive (Stroop Test, $p = .008$) and visuospatial function (pareidolia task, $p = .038$). MCI-AD performed significantly worse in verbal learning and memory than MCI-LB (Rey Auditory Verbal Learning Test short [$p = .020$] and long [$p = .032$] delay free recall).

Conclusions: The executive and visuospatial dysfunction typical of advanced DLB is observable in earlier, MCI phases and may therefore be useful in distinguishing it from MCI-AD and normal aging. MCI-AD, in contrast, shows verbal learning and memory impairment. Such early knowledge of dementia subtype would help identify candidates for potential novel drug trials and prevent the use of possibly dangerous therapeutics, for example antipsychotics in DLB.

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Correspondence: *Joanna Ciafone, Institute of Neuroscience, Newcastle University, Newcastle upon Tyne, UK. E-mail: j.m.ciafone1@newcastle.ac.uk*
Keywords: neuropsychological assessment, dementia with Lewy bodies, dementia, Alzheimer's disease

Invited Symposium 12. Addressing Global Neuropsychological Disability

Chair: Tedd Judd

8:45–10:15

T. JUDD. Addressing Global Neuropsychological Disability.

Symposium Summary: About 14% of the world's population lives in North America, Europe, Australia, and New Zealand where global neuropsychological resources are concentrated. Given that these areas generally also have higher levels of nutrition, health care, safety regulations, and peace than the rest of the world, it is likely that their proportion of the world's neuropsychological disability is less than 14%. If neuropsychology as a discipline is to address global neuropsychological disability meaningfully, this will require redeploying of resources. It will also require expanding and rethinking capacities to serve underserved languages, cultures, and diseases in low resource countries. This symposium will address major challenges facing neuropsychology in addressing global neuropsychological disability from the perspectives of cultural competence, areas of need, and service models. In keeping with a theme of the conference, *The practice of neuropsychology in an increasingly globalized and diverse world*, we will look at how neuropsychology is diversifying its perspective through increasingly global communications. Case examples of needs and potential solutions will be drawn from neuropsychology as practiced in Latin America, Africa, and Asia. From these examples, we will draw recommendations for additional paradigms of skills, knowledge, and service models in neuropsychology appropriate to a diverse and under-resourced world. We will consider the future of international communications and collaborations to better serve the neuropsychologically disabled in all of their diversity and in all parts of the globe.

Correspondence: *Tedd Judd, Private practice, Bellingham, Washington, USA & Universidad del Valle de Guatemala, Guatemala. E-mail: teddjudd@gmail.com*

T. JUDD. The Practice of Neuropsychology in an Increasingly Globalized and Diverse World.

Neuropsychology has had its greatest development in Europe and North America, where it has been largely regional in nature, focusing on the diseases, languages, and cognitive processes of the dominant local populations. Because of this emphasis, as neuropsychology has developed in other regions it has had to work with North Atlantic paradigms and, additionally, address local diseases, languages, and cognitive processes. In recent years immigration and increasing communication technologies have necessitated and facilitated greater awareness throughout the field of neuropsychology of the need for increased multicultural competence. North Atlantic neuropsychologists recognize a need to be able to serve immigrant populations. African, Asian, and Latin American neuropsychologists need to be able to serve their own populations. All neuropsychologists need to be able to serve multicultural, bilingual, and transitional populations. And all neuropsychologists need to better understand the full range of contexts in which brains develop. Among themes that are in need of greater neuropsychological attention are:

- the diversity of writing systems and literacy disorders
- illiteracy
- bilingualism and multilingualism
- acculturation
- malnutrition
- cerebral malaria
- stigma and attitudes towards neuropsychological disabilities
- neuropsychological perspectives in education, community-based rehabilitation, and other non-professional or non-medical interventions

This symposium will take a brief overview of the development of neuropsychology in Asia, Africa, and Latin America to identify distinctive and pertinent issues in each region. We will examine examples of locally-appropriate approaches to such issues. We will conclude by looking at promising directions for future international communications, collaborations, and technology transfer to better serve the neuropsychologically disabled in all of their diversity and in all parts of the globe.

Correspondence: *Tedd Judd, Psicología, Private practice, Bellingham, Washington, USA & Universidad del Valle de Guatemala, Guatemala. E-mail: teddjudd@gmail.com*

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Keywords: cross-cultural issues, language: second/foreign, acculturation

J.C. ARANGO LASPRILLA. Families and Traumatic Brain Injury Rehabilitation In Developing Countries.

Traumatic brain injury (TBI) is a worldwide public health problem and a leading cause of injury-related death and complex disability cognitive, somatic, affective behavioral, and motor impairments. Given these short- and long-term consequences, the individual sustaining a TBI is often unable to lead an independent life. This lack of autonomy requires a certain level of caregiving, a responsibility typically assumed by family members. The caregiving role involves aiding the individual with TBI in daily functioning. As family members become caregivers, they become frustrated due to decreased personal time and difficulties associated with daily management of behavioral issues, physical disabilities, and cognitive deficits in the individual with TBI. Moreover, family members are often unprepared and/or inexperienced in this type of caregiving role.

Family roles and expectations and values of personal independence versus interdependence vary widely across cultures and countries, with North American values being outliers in extraordinary valuing of personal independence. Overprotection can be a major issue in certain societies.

This presentation offers an overview of international comparative studies of psychosocial consequences of caregiving for individuals with TBI. I will present the results of a cross-cultural brain injury family intervention program that we created to improve individual and family functioning. There is initial evidence that this program can improve levels of depression, anxiety, burden, and problem-solving appraisals in terms of confidence, approach-avoidance, and personal control. It is one of the first family interventions that includes family members living in the home in addition to the caregiver. It is adapted to family conditions common in developing countries with strong family commitments but limited professional resources.

Correspondence: *Juan Carlos Arango Lasprilla, BioCruces Health Research Institute, IKERBASQUE, Basque Foundation for Science, Bilbao, Spain. E-mail: jcalasprilla@gmail.com*

Keywords: cross-cultural issues, traumatic brain injury, neurorehabilitation

B.J. PILLAY. Neuropsychology in the South Africa. Can the existing state continue?

South Africa faces a quadruple burden of disease: the HIV/AIDS epidemic alongside a high burden of TB; high maternal and child mortality; high levels of violence and injuries; and a growing burden of non-communicable diseases (NCDs: cardiovascular diseases, diabetes, chronic respiratory conditions and cancer). All of these have neuropsychological consequences: HIV dementia and HIV-Associated Neurocognitive Disorder (HAND) impact disease burden and treatment adherence; child mortality reflects more widespread inadequate perinatal care that results in high levels of developmental disabilities; high injuries include many traumatic brain injuries; and NCDs include cerebrovascular disease, cerebral hypoxia, and brain tumors. Further the huge wealth gap between the rich and the poor is mirrored in the dual public-private health system in which the 20% rich has access to over 80% of the health resources. Over 82% of the SA population—45 million people—depend on the seriously-stretched and under-resourced public health system. About half of the population is rural with only primary care available. The mental health sector is already underfunded, under-resourced and neglected and faces significant cuts in posts, resources and facilities in the current health crisis. Within this context, traditional neuropsychology services are considered a luxury and given very little priority. In this challenging, diverse public health context, approaches to neuropsychological needs include:

- 'Task shift' neuropsychology acts that were previously out of their scope of practice to other categories of psychologists
- Create new psychological 'midlevel workers' in primary health care.
- Create mid-level health workers and other paraprofessionals in education
- Promote community or homebased neuropsychology rehabilitation. Similar approaches have been successful with HIV/AIDS care in SA.
- Develop policy and promote public education to reduce the burden of neuropsychology disabilities.

Correspondence: *Basil J. Pillay, Department Behavioural Medicine, Nelson R Mandela School of Medicine, School of Nursing and Public Health, College of Health Sciences, University of KwaZulu-Natal, Durban, South Africa. E-mail: pillayb@ukzn.ac.za*

Keywords: cross-cultural issues, public health, neurorehabilitation

A. DUTT, R. NANDI, F. MULLA, N. KAPUR, J.J. EVANS. Addressing Neuropsychological Disability: An Indian Perspective.

India is facing a 'hidden epidemic' of neuropsychological disability resulting from

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dementia, traumatic brain injury, and stroke. However, dementia and brain injury in India is often managed purely medically without holistic and goal-directed neuropsychological treatment. Neuropsychology referrals are mostly for assessment for dementia and rarely for neuropsychological rehabilitation. Neuropsychological services and resources are scarce, particularly in the government sector. Patients and their families are often unaware of the importance or availability of neuropsychology services. Western tests and norms are often used but cultural and linguistic diversity is often not considered in their interpretation. Illiteracy rates remain high and variable, which limits use of a common neuropsychological assessment protocol. Neuropsychological rehabilitation often focuses on restoration of functions using repetitive computer-based cognitive retraining or grain sorting, rather than working on meaningful goals and compensatory strategies. This is shifting towards home based, family-oriented holistic neuropsychological rehabilitation. This is particularly evident after three neuropsychological rehabilitation training workshops conducted by international experts, supported by international societies. Attempts to provide good neuropsychological services include regular clinical supervision by international experts and international research collaborations in cross cultural neuropsychology. National funding agencies have started supporting research towards common harmonization standards across India despite demographic heterogeneity. To further address neuropsychological disability, there is a need to: increase awareness of neuropsychology's role amongst medical professionals; develop and sharpen neuropsychology skills even through informal training; increase helmet use for road safety; and harness mobile technologies, telemedicine and psychoeducation to serve rural populations.

Correspondence: *Aparna Dutt, Neuropsychology & Clinical Psychology Unit, Duttanagar Mental Health Centre, Kolkata, India. E-mail: aparnadutt6@gmail.com*

Keywords: cross-cultural issues, bilingualism, neurorehabilitation

Paper Session 16. Learning and attentional disorders in children and adults

Moderator: Alberto L. Fernandez

8:45–10:15

A. GRANDJEAN, I. SUAREZ, D. DAFONSECA, L. CASINI. What can we learn about interference control in children with ADHD when dissociating impulsivity and inhibition?

Objective: The deficit in "interference control" commonly reported in children with Attention Deficit Hyperactivity Disorder (ADHD) and usually interpreted as an inhibition deficit could be due to at least two distinct processes which are not disentangled in most studies: a deficit in suppressing automatic responses and a larger susceptibility to triggering automatic responses. Here, we separately investigated these two components by using dynamic analyses of performance which provided us two distinct indices respectively measuring 1/the susceptibility to automatic activation and 2/ the strength of the activation suppression.

Participants and Methods: In Experiment 1, we compared interference control between 25 children with ADHD without medication, 20 children with ADHD under methylphenidate (MPH), and 20 control children performing a Simon reaction time task to investigate the effect of 1/ ADHD and 2/ MPH, on interference control. In Experiment 2, we compared the performance of 13 children with ADHD without medication before and after a 3-months intervention program to investigate the effect of this program on both indices.

Results: The main findings were that 1/ children with ADHD presented both a higher susceptibility to trigger automatic responses and an inhibition deficit, 2/ MPH improved the selective inhibition of automatic responses without modifying the strength of automatic responses, and 3/ the intervention program improved both the ability to resist automatic actions and to inhibit them.

Conclusions: Our results allow, for the first time, to dissociate the effects of 1/ ADHD, 2/ MPH, and 3/ a behavioral intervention program on two different components of the interference control.

Correspondence: *Laurence Casini, Aix-Marseille Université, Marseille, France. E-mail: laurence.casini@univ-amu.fr*

Keywords: attention deficit and hyperactivity disorder, inhibitory control, cognitive control

A.D. VOULGARI. Developmental reading difficulties in Greek: A dual-route model approach.

Objective: The present study examined whether subtypes of developmental reading disorders could be found in Greek, a language which is "shallow" in reading, but "deep" in writing, according to dual-route models. Similar subtypes have been found in other languages.

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Participants and Methods: Two age groups of possibly reading disabled children and the corresponding control groups comprised the sample of the present study. The materials that were used for the investigation of children's reading ability (investigation of the sub-lexical and lexical route) consisted of nonwords and irregular or exception words from a specially constructed evaluation protocol, as well as a homophone selection task. Additionally, reading fluency tasks (of words and nonwords) and three sub-scales of a test of reading performance (Torp-5, Torp-6, Torp-13) were administered. The reading mistakes for all of the above tasks were recorded and statistically analyzed.
Results: The results document the existence in Greek of the same reading disorders that have been found in other languages. Namely, there were subjects that could read words but could not read nonwords, subjects that could read nonwords but found it difficult to read exception words and others with a poor reading in both tasks. It was shown that the specially constructed tasks can distinguish the two subsystems, of the lexical and the sub-lexical route.
Conclusion: This finding confirms the hypotheses that the two subsystems, of the lexical and the sub-lexical route, can be dissociated and that the specially constructed tasks (word reading, nonword reading, homophone selection) can distinguish the disordered lexical route from the disordered sub-lexical route. The identification of the existence of at least two discernible reading "routes" and of the reading difficulties that associate with them, support the notion that dual-route models can be used for the categorization of poor readers for the facilitation of intervention.
Correspondence: *Aikaterini D. Voulgari, Department of Primary Education, University of Thessaly, Volos, Greece. E-mail: kvoulgari@uth.gr*
Keywords: Dyslexia, Assessment

P. FREITAS, V.G. HAASE, G. WOOD. The neural correlates in interference effects of Numerical Stroop Task: An ALE meta-analysis.
Objective: The study of functional magnetic resonance imaging (fMRI) activation in numerical Stroop interference puts in evidence neural correlates of number, automatic, and controlled processes. Meta-analyses of numerical Stroop interference tasks are important to summarize results from fMRI studies that may contribute to current theories. During the processing of numerical Stroop interference tasks (and distance effect, which activates a sub-network of the size congruity effect) specific areas in a network are selectively activated. The goal of this work is to summarize the activations of those areas of a network by a quantitative, function-location meta-analysis. The size-congruity-effect was investigated by Counting Stroop and the physical-numerical interference paradigms with meta-analyses and comparisons regarding similarities in activations. The goal of the present meta-analyses is to identify brain regions that are commonly activated by functional magnetic resonance imaging (fMRI) investigating number stroop processing in healthy adults. Meta-analyses used an activation likelihood estimation (ALE) logarithm.
Participants and Methods: The study includes 15 fMRI papers (total number of subjects n = 155 to 302, total number of foci = 81 to 233) published from 2012 to 2017.
Results: Both paradigms reveal activations in posterior parietal regions. For the attentional control verified through the number stroop effect the activated areas were: dorsolateral prefrontal cortex, the anterior cingulate gyrus, and the intraparietal sulcus. Consistent activation over both paradigms was found in five clusters, two in frontal and three in the parietal lobe.
Conclusions: Both paradigms activate parietal areas but differ in the activation of areas correlated to attentional control.
Correspondence: *Patricia Freitas, Federal University of Bahia, Brazil, Vitória da Conquista, Brazil. E-mail: pmfrei@gmail.com*
Keywords: ALE meta analysis, Size congruity effect, Counting Stroop

Morning Coffee Break

10:15–10:30

Symposium 13. New Approaches to Neurorehabilitation

Sponsored by the INS Student Liaison Committee

Chair: John Deluca

10:30–12:00

J. DELUCA. New Approaches to Neurorehabilitation.
Symposium Summary: A variety of neurological disorders lead to brain damage or dysfunction and often results in cognitive impairments. Such impairments can have a significant impact on

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everyday life functional activity and overall quality of life. The present symposium will present the current status of efforts to rehabilitation cognitive dysfunction resulting from damage to the brain. Dr. John DeLuca's presentation is entitled "Cognitive Rehabilitation in Multiple Sclerosis and Traumatic Brain Injury". This talk will focus on the latest randomized clinical trials to improve cognitive impairment, with particular emphasis on the use of neuroimaging relating outcome to neuroplasticity. Dr. Flavia Mattioli will talk on "The use of Transcranial Direct-Current Stimulation (tDCS) in Multiple Sclerosis and post stroke aphasia", discussing how tDCS can be used for treatment. The final presentation will be by Dr. Stephanie Clarke entitled "Auditory complaints of brain-damaged patients: mechanisms and interventions".

Correspondence: *John B. DeLuca, Kessler Foundation, West orange, USA. E-mail: jdeluca@kesslerfoundation.org*

J. DELUCA. Cognitive Rehabilitation in Multiple Sclerosis.

It is now well established that up to 70% of persons with multiple sclerosis (MS) suffer from cognitive impairment (Chiaravalloti & DeLuca, 2008). Such impairments can have a significant impact on everyday functional activity in persons with MS. Given the frequency and degree of cognitive involvement in persons with MS, and how it affects so many aspects of a person's life (e.g., vocational, familial, social, emotional, cultural) the need for cognitive rehabilitation therapies and programs is clear. The main objective of this presentation will describe the research data on the effectiveness of cognitive rehabilitation in persons with MS.

There is increasing evidence that cognitive rehabilitation is effective in treating cognitive impairment in persons with MS (Goverover et al, 2018), including the most recent Cochrane review on the subject (das Nair et al, 2016). Evidence exist primarily for treatment of learning and memory where Class I evidence has shown that targeted interventions designed to improve the strength of the acquisition of information can significantly improve performance. Recent studies have also found that such treatment can also improve attention and executive functions in person with MS. Interventions include working in the clinic, and working remotely (e.g., home) using the internet. Several studies have shown that cognitive rehabilitation not only improves neuropsychological functioning, but also results in increased functional brain activity on fMRI and functional connectivity in the brain, as well as improved everyday life activity and quality of life (e.g., Chiaravalloti et al, 2012, 2013). The behavioral and neuroimaging studies of cognitive rehabilitation in MS will be reviewed. Overall, the latest research shows that cognitive rehabilitation can be effective and is ready for clinical application for persons with MS.

Correspondence: *John DeLuca, research, Kessler Foundation, West orange, USA. E-mail: jdeluca@kesslerfoundation.org*

Keywords: Cognitive rehabilitation, multiple sclerosis, neuroimaging

F. MATTIOLI. The use of Transcranial Direct-Current Stimulation (tDCS) in Multiple Sclerosis and post stroke aphasia.

Focal lesions located in the left hemisphere often produce aphasia or ideomotor limb apraxia. On the other hand, multifocal brain lesions, such as Multiple Sclerosis (MS), can affect different neuropsychological abilities in the same patient. In particular, attention, information processing speed and executive function impairments are frequently observed, along with memory disorders. The neuropsychological rehabilitation of either aphasia, apraxia in post stroke patients or the multiple cognitive deficits in MS patients has great importance, as they all deeply impact on patients' quality of life. Evidences of the efficacy of language therapy are known in chronic aphasics and their functional correlates are supposed to consist in an increased activation of perilesional left hemisphere language areas. Besides traditional language and neuropsychological rehabilitation approaches, the combination of a function specific cognitive training with neuromodulation techniques, such as transcranial Direct Current Stimulation (tDCS) has been reported to be effective in inducing improvement in naming and other linguistic modalities in aphasics. Furthermore, tDCS delivered to the left posterior parietal cortex reduced the time required to perform and plan skilled movements in patients with apraxia. In MS, randomized clinical trials showed attention and information processing speed, as well as memory and executive function improvement, with functional correlates consisting in an increased activation of function specific brain areas and networks, as revealed by fMRI. On this basis, neuromodulation techniques applied in conjunction with specific cognitive trainings on appropriate brain regions, are considered to be helpful in ameliorating cognitive abilities also in MS patients. In this presentation the clinical evidences of the effects of tDCS in acquired language disorders, ideomotor apraxia and in attention and information processing deficits of MS will be discussed.

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Correspondence: *Flavia Mattioli, Neuropsychology Unit Spedali Civili Brescia Italy, Brescia, Italy. E-mail: flaviacaterina.mattioli@gmail.com*

S. CLARKE. Auditory complaints of brain-damaged patients: mechanisms and interventions.

Patients who sustained traumatic brain injury or stroke often complain of auditory problems: not hearing well in one or both ears, not being able to stay in noisy surroundings, perceiving distorted sounds. These complaints occur even when the ear, the auditory nerve, the auditory centers and pathways in the brain stem, the acoustic radiation as well as Heschl's gyrus are intact and standard audiogram within normal limits. We will discuss three putative mechanisms and the resulting options for intervention. First Heschl's gyrus comprises two tonotopic maps, which are normally modulated by attention (Da Costa et al. 2013) but can be distorted in anatomically intact HG of lesioned brains (Da Costa et al. 2018 in prep). Second, disorders of sound localization occur relatively frequently in cases of brain damage, but can (double) dissociate with sound recognition deficits (Clarke and At 2014). Patients who recognize environmental sounds well but have auditory spatial deficits, often complain of not hearing well, either on one or on both sides. Third, auditory spatial cues contribute implicitly in sound recognition, in addition to the explicit capacity to localize sounds; this ability is very likely supported by a position-linked representation of sound objects (Bourquin et al. 2013; Clarke and Geiser 201 5; Da Costa et al. 2018 in revision). Deficits in explicit and implicit use of spatial cues can be dissociated in brain-damaged patients and can lead to surprising clinical situations (Bellmann and Clarke 2003; Duffour-Nikolov et al. 2007; Tissieres et al. 2018 in prep). Depending on the severity of the disturbance and the overall objectives for rehabilitation different interventions can be proposed.

Correspondence: *Stephanie Clarke, CHUV, Lausanne, Switzerland. E-mail: Stephanie.Clarke@chuv.ch*

Symposium 14. Neuropsychology of Developmental Language Disorder: A gateway to tailored assessment and treatment?

Chair: Constance T.W.M. Vissers

10:30–12:00

C.T.W.M. VISSERS. Neuropsychology of Developmental Language Disorder: a gateway to tailored assessment and treatment?

Symposium Summary: Although children with Developmental Language Disorder (DLD) are quite common (around 5% of the population), the nature and mechanisms of this disorder remain unclear. One of the main reasons for this is the traditional 'diagnosis-by-exclusion'. DLD is defined by what it is not rather than by what it is. Children are diagnosed with DLD when exhibiting significant language disabilities which cannot be explained by other factors (e.g. a sensory deficit, intellectual impairment). This symposium proposes an alternative approach to DLD, claiming that it is these children's multiple deficits in cognitive development, particularly in the domains of executive functioning (EF) and Theory of Mind (ToM), which impede language acquisition. Given this wider range of cognitive deficits, assessment and treatment of children with DLD is requires a focus on multiple cognitive domains.

Although EF deficits are often reported in schoolchildren with DLD, only little is known about EF in preschoolers with DLD. *Vissers* presents empirical evidence for EF deficits in preschoolers with DLD. It is proposed that broad neuropsychological assessment in which both language and EF are taken into account can contribute to early detection of DLD. *Scheper* zooms in on the interplay between narrative ability and EF in children with DLD and the implications for intervention. Here it is concluded that children with DLD can benefit from treatment that taps into both language and EF. ToM deficits in DLD are often related to social emotional deficits. *Smit* focusses on ToM deficits and social emotional disorders in adolescents with DLD and presents promising data on the effectivity of a ToM group treatment. *Krüger* presents an n=1 intervention study in which emotion recognition (affective ToM) is stimulated in an adolescent with DLD by reinforcing eye movements to and fixations at the diagnostic regions of a face. The clinical use of eye movement training is promising for the field of ToM training in DLD.

Correspondence: *Constance Vissers, Kentalis Academy/ Behavioural Science Institute, Royal Dutch Kentalis/ Radboud University Nijmegen, Nijmegen, the Netherlands. E-mail: c.vissers@kentalis.nl*

C.T.W.M. VISSERS. Executive functioning in preschoolers with developmental language impairment.

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Ample empirical evidence exists for executive deficits in schoolchildren with developmental language disorder (DLD). Little is known though about EF in preschoolers with DLD. Since early childhood is the primary period for both language and EF to develop, the early development of language and EF plausibly interact in an empowering or inhibitive way (see Vissers et al., 2015). Therefore, to come to insight into the aetiology of DLD, research on early EF and language development is necessary.

Participants and methods: 82 preschoolers with DLD and 43 typically developing (TD) children (age 2-5 years) took part. All the children with DLD visited the Kentalis special daycare groups at the time of testing. To investigate EF in these children both performance based measures (working memory, inhibition and selective attention) and behavioral ratings (Behaviour Rating Inventory of Executive Function for Preschoolers) were acquired.

Results: Preschoolers with DLD had lower visuospatial working memory [$t(107.296) = -2.561$, $p = .012$] and lower inhibition [Chi^2 $(1)= 19.309$, $p < .001$] compared to TD children. Performance on a visual selective attention task was similar to the performance of TD children. Parents of preschoolers with DLD report their child to have more problems with inhibition [$p < .001$], emotion regulation [$p = .011$], working memory [$p < .001$] and planning and organization [$p = .003$] compared to parents of TD children.

Conclusions: Both performance based measures and behavioral ratings indicate that preschoolers with DLD show executive difficulties at least in the domain of working memory and inhibition. Broad neuropsychological assessment in which both language and EF are taken into account contribute to early detection and tailored treatment of DLD. Causal models for the interplay between language and EF in DLD are discussed.

Correspondence: *Constance Vissers, Kentalis Academy/ Behavioural Science Institute, Royal Dutch Kentalis/ Radboud University Nijmegen, Nijmegen, the Netherlands. E-mail: c.vissers@kentalis.nl*

Keywords: Developmental Language Disorder, Executive Functions, Preschoolers

A. SCHEPER, J. CUPERUS, L. VERHOEVEN. The effectivity of narrative intervention in Developmental Language Disorder: interaction between narrative ability and executive functioning.

Objective: It is well-known that children with developmental language disorder (DLD) have impaired narrative abilities. There is growing evidence that the problems associated with SLI are not limited to language. Executive functions (EFs) are also to be involved in these problems (e.g. Henry et al. 2012, Scheper, Boelhouwer, Cuperus & Verhoeven, under revision). To date, there is still need for interventions for children with DLD to enhance their narrative ability. The present study explores the narrative and executive function skills in DLD compared to TD and the efficacy of an intervention in which language ability and EF skills are trained.

Participants and methods: 61 DLD children and 49 TD children between the ages of 9 and 12 took part in the study. The DLD group received eight weeks of multidisciplinary treatment. Narrative ability and EF skills were tested beforehand (T1) and approximately six months after treatment (T2). ANCOVA and Mann Whitney *U*-tests were conducted to determine a statistically significant difference between DLD and TD at T1 on narrative and EF variables. Next, correlation coefficients were computed to prove a positive predictor for narrative ability in DLD. A hierarchical regression analysis was conducted to conclude whether narrative and EF variables were effective in explaining unique variance in narrative complexity in DLD.

Results: Children with DLD are outperformed by their TD peers on almost all narrative and EF variables at T1. At six-month follow-up (T2), DLD children performed significantly better on narrative measures. Moreover, children showed improved visual short-term memory and cognitive flexibility. Scores for verbal short-term memory and (complex) sustained attention did not differ between T1 and T2.

Conclusions: This study shows that children with DLD can benefit from multidisciplinary treatment that taps into their language ability as well as their EF skills.

Correspondence: *Annette Scheper, Royal Dutch Kentalis, St Michielsgestel, the Netherlands. E-mail: a.scheper@kentalis.nl*

Keywords: Executive Functions, Narrative intervention, Developmental Language Disorder

L. SMIT, C.T.W.M. VISSERS, I. RABELING-KEUS, L. VERHOEVEN, H KNOORS. The effectivity of Theory of Mind treatment in adolescents with Developmental Language Disorder.

Objective: Young adults with a developmental language disorder (DLD) suffer from social difficulties much more often than their peers. Theory of Mind deficits may be the fundamental neuropsychological cause for these social symptoms. We investigate the effects of a specialized ToM group treatment for adolescents with DLD: 'ToM, a

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matter of being aware' (Vissers & Honée, 2018). In the 14 session treatment consciousness of one's own inner world and others' inner worlds is strengthened through group conversations and exercises. Participants are stimulated to gradually develop the missing fundamental ToM awareness.
Participants: In this study 18 adolescents (*M* = 19.33, *SD* = 4.09) participated in the newly developed ToM-treatment. These adolescents were recruited through Royal Dutch Kentalis (a Dutch organization providing services to people with hearing- and/or communication problems).
Methods: To shed light on the level of social emotional functioning before the treatment, personal treatment goals are set and defined according to Goal Attainment Scaling (GAS) procedures. A post training measurement is performed after the last training session, using the same GAS interview to see if participants experienced progression after the treatment.
Results: GAS was measured using Wilcoxson's signed-rank test. Results for GAS were significant, (Z = -3.10, p = .002).
Conclusions & Implications: GAS indicate positive effects of the ToM treatment. This means that participants improved on their personal ToM-related goals after the treatment compared to before the treatment. After the treatment participants have made progress in their personal socio-emotional goals drafted prior to the treatment.
Correspondence: *Lidy Smit, Behavioural Science Institute, Radboud University Nijmegen, Nijmegen, the Netherlands. E-mail: l.smit@pwo.ru.nl*
Keywords: Theory of Mind, Developmental Language Disorder, Social emotional functioning

H. KRÜGER, C.T.W.M. VISSERS. Towards a Clinical Use of Eye Movements for Improving Facial Emotion Recognition. An Investigative Approach.
Objective: Specific regions of the face play a key role in facial emotion recognition. For example, the eyes, the mouth and the nose are by far the most common targets of eye movements when we look at faces to decode their emotional state. A number of clinical groups, such as people with developmental language disorder (DLD) or autism spectrum disorder have known impairments in facial emotion recognition (an aspect of affective ToM). These groups also often show deviations from the common visual scanpath when attempting to decode an emotion from a face. Here we were interested to see whether reinforcing eye movements to and fixations at the diagnostic regions of a face can improve performance on recognising facial emotions.
Participant and Method: Subject SB (13 yrs.), diagnosed with DLD and impaired emotion recognition, entered a 10 day training program where he was presented with emotional faces and received immediate auditory feedback whenever his eyes fixated a diagnostic region.
Results: Performance was at 68,3 % correct recognition in the first three days and at 78,3 % in the last three days. There was a marginally significant difference when comparing the performance of the pre-phase and the end-phase per emotion ($t(6) = 1.45$; $p < 0.099$, one-tailed), whereby performance showed a trend towards improvement at the end of the training. Reinforcements of eye movements raised from 2,71 fixations in the diagnostic regions in the pre-training phase and 3,33 fixations in the diagnostic regions in the last three days of the testing phase, this increase was true for all emotions tested ($t(6) = 3.92$; $p < 0.005$, one-tailed). There was a positive Pearson correlation between normalized fixation count and normalized recognition performance ($r(265) = 0.141$, $p < 0.023$).
Conclusion: The results of this n=1 investigation offer a promising perspective on the development of a new clinical tool designed to improve facial emotion recognition in DLD.
Correspondence: *Hannah Krüger, Radboud University Nijmegen, Nijmegen, the Netherlands. E-mail: hannah.krueger@gmail.com*
Keywords: Emotion recognition, Eye movement reinforcement, Developmental Language Disorder

Symposium 15. Showcasing Latino American Neuropsychological Research with Global Impact

Sponsored by the Asociación Latinoamericana de Neuropsicología (ALAN)

Chair: Mauricio A. Garcia-Barrera

10:30–12:00

M.A. GARCIA-BARRERA. ALAN Symposium: Showcasing Latino American Neuropsychological Research with Global Impact.
Symposium Summary: The Asociación Latinoamericana de Neuropsicología (ALAN) was formally created in 1999 in Cartagena (Colombia) during their first Biannual International Congress Cerebro y Mente: La Integración. Its fundamental objective is the development and strengthening of

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Neuropsychology in Latin America. The ALAN was founded as a federation of neuropsychological societies, which means that all existing neuropsychological societies in Latin America can in principle be considered part of the ALAN. More than a society, it is an association of societies.

The aim of this symposium, is to showcase some examples of the research that has originated in countries such as Colombia and Mexico, in topics as varied and intriguing as the examination of biomarkers for empathy and social emotional processing in former excombatants from the Colombian armed conflict, the study of executive functioning in private industry executives, the investigation of the relationships between intelligence and creativity in Colombian administrative level employees, and the study of ocular inhibition and anticipatory errors in unaffected parents of children with ADHD as a possible avenue for ADHD endophenotypes identification.

Together, these studies are an outstanding demonstration of high quality Latino American research that has a global impact.

Correspondence: *Mauricio Garcia-Barrera, Psychology, University of Victoria, Victoria, Canada. E-mail: mgarcia@uvic.ca*

S. TRUJILLO, N. TRUJILLO, M. PARRA, J.D. LOPEZ, J.E. UGARRIZA, M.A. GARCIA-BARRERA. Using social-based neurocognitive markers as a tool for understanding the effects of the Colombian armed conflict.

Armed conflicts involve violent confrontations that promote atypical behavioural, cognitive and social functioning among their actors. Particularly, the Colombian conflict is a long-standing armed confrontation characterized by the violation of human rights, massive displacement, violent homicides and forced disappearances. After more than five-decades, the Colombian government has signed peace agreements with armed organizations (paramilitary groups, guerrillas) aiming to promote a reintegration process by offering psychosocial support to ex-combatants. Such process has focused on improving ex-combatants' educational/occupational competencies as well as their psychological attitudes towards recipient communities. Despite the success of this strategy, around 40% of the ex-combatants described a limited response to it, which have motivated the inclusion of complementary approaches. On this sense, neurocognitive markers of social cognition have been recently considered as robust tools to guide the implementation and follow up of reintegration interventions, and therefore, we incorporated in our ex-combatants research protocols in order (1) to enlighten social-neurocognitive mechanisms reorganized after their long-term exposure to conflict, and (2) to inform the utility of the inclusion of an individual-based socio-cognitive training as part of their reintegration process. Overall, ex-combatants demonstrate an atypical emotional processing characterized by increased neural activation during face recognition while neural activation elicited by a task using emotionally charged words (positive, negative, neutral) shows undifferentiated patterns. They also obtained lower scores across cognitive and emotional empathy dimensions. Furthermore, implementing socio-cognitive training was effective as a strategy in the reintegration process. The integration of neurocognitive information is crucial for understanding and moderating the impact of armed conflict in ex-combatants.

Correspondence: *Natalia Trujillo, Psychology, Universidad de Granada, Granada, Spain. E-mail: natalia.trujillo@udea.edu.co*

Keywords: empathy, event related potentials, social cognition

V. ALBRECHT, E.C. DUGGAN, C.C. LOAIZA, I. IRURITA, M.A. GARCIA-BARRERA. The Association Between Measures of Intelligence and Creativity– A Threefold Approach.

Objective: Researchers and clinicians have been challenged to disentangle the relation between intelligence and creativity. Research demonstrated they share a small positive correlation (r=0.17; Kim, 2005); yet a more complex association may occur for individuals with high intelligence (i.e., the threshold hypothesis, Jauk et al., 2013). The current study aimed to further examine the relationship between intelligence and creativity using (1)correlation, (2)regression, and (3)confirmatory factor analysis(CFA).

Participants and Methods: A sample of 122 professionals from Cali, Colombia ($Mean_{age}$=33.8, $Mean_{FSIQ}$=122.9) completed the Chilean version of the Wechsler Adult Intelligence Scale (WAIS-IV; Wechsler, 2013), and the Abbreviated Torrance Test for Adults (ATTA; Goff & Torrance, 2002). Using correlations, segmented regression, and CFA, we investigated (1)the association between WAIS and ATTA composite and index scores, (2)evidence for the threshold hypothesis (i.e.,a change in slope of creativity level at FSIQ=120), and (3)the factor structure of a series of uni- and multi-dimensional intelligence-creativity models.

Results: (1)There was small, but non-significant correlation between FSIQ and creativity level, r=0.14, p=0.13. (2)Creativity level slope did not

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change at FSIQ=120, R^2=0.34, F(2, 119)=2.08, p=0.13. (3)A two-factor model separating intelligence and creativity yielded better model fit than all other models, CFI=1.00, RMSEA=0.00.
Conclusion: In our sample, although non-significant, the magnitude of the intelligence-creativity correlation was replicated, while the threshold hypothesis using FSIQ=120 did not replicate. Further, CFA provided evidence that the WAIS and the ATTA tap into different abilities. This study suggests a complex relationship between intelligence and creativity that should be studied further using factor analyses, psychometrically supported instruments, and in cross-cultural samples like ours that use psychometrically supported instruments
Correspondence: *Vivien Albrecht, Maastricht University, Maastricht, the Netherlands. E-mail: v.albrecht@student.maastrichtuniversity.nl*
Keywords: Intelligence, Creativity, Confirmatory factor analysis

Y. CHAMORRO, M.D.E. LOURDES RAMÍREZ-DUEÑAS, E. MATUTE. Inhibitory oculomotor control in unaffected parents of ADHD children.
Introduction: The inhibitory control has been proposed as a core characteristic of ADHD and a potential endophenotype of this disorder. If this was the case, one will expect to find this characteristic among first degree relatives of individuals with ADHD.
Objective: The aim of the present study was to determine if the oculomotor inhibitory control of unaffected parents with ADHD children suggests a failure in their inhibitory control.
Participants and Methods: By using prosaccadic and antisaccadic tasks, in gap and overlap conditions, we assessed the oculomotor control in unaffected parents of children identified with ADHD symptoms (n=19) and parents of children with typical development (n=18). We analyzed the direction errors, anticipatory errors and saccadic reaction time of correct responses. For all participants we determined the presence of ADHD symptoms (in adulthood and childhood).
Results: We observed that the group of parents with ADHD children made more anticipatory errors in the prosaccadic-gap task in comparison to the groups of parents with control children (H=278.5, p=0.001, η^2=.28). There were no differences between groups in the directions errors or the saccadic reaction time. The ADHD symptoms showed no associations with the saccadic measures.
Conclusions: A greater number of anticipations in the parents of ADHD children, suggest in them a failure in the ability to withhold the initiation of responses in the absence of external control references (no fixation point in the gap condition) and in tasks with low cognitive load (prosaccadic). Anticipatory errors could be considered for the study of ADHD endophenotypes.
Correspondence: *Yaira Chamorro, Instituto de Neurociencias, Universidad de Guadalajara, Guadalajara, Mexico. E-mail: yaira.chd@gmail.com*
Keywords: ADHD-relatives, inhibitory control, endophenotypes

M.A. GARCIA-BARRERA, J.E. KARR, C.C. LOAIZA. Latent Variable Examination of Executive Functions in Industry Executives from Colombia.
Objectives: The effective coordination of processes and resources in order to achieve a goal define both the aim of our executive function and the crux of the job of executives in any type of organization. Interestingly, only a handful of studies have looked at executive functioning in industry employees. The purpose of this study was to examine three executive functions, namely updating, shifting and inhibiting using a latent variable approach via confirmatory factor analysis (CFA), in healthy adults in high responsibility job positions.
Participants and Methods: A sample of 183 administrative-level employees within a corporation from Colombia (Age: M=32.20, Range: 20.97-54.87; 54.6% Female) consented to participate in this study. Tasks administered included: Go/No-Go and Tower (inhibition); N-back, letter memory, and Corsi's blocks (updating working memory); and the local-global task and two additional switching tasks (shifting). An age-controlled CFA was conducted and model fit evaluated. Non-parametric bootstrapping was used to determine the rate of solution propriety among 5000 bootstrapped samples.
Results: The three-factor first-order measurement model with age-controlled fit the data well (CFI=0.973; RMSEA=0.034). The bootstrapping analysis showed convergence at a frequency of 95.54%. A bifactor model fit best, with inhibiting loading at 1.0 onto the higher-order factor and with age controlled (CFI=1.0; RMSEA=0.000).
Conclusions: Our latent-variable approach to the examination of executive functions evidenced a balance of unity and diversity within the test battery. Consistent with recent research, inhibition was fully attributable to the general factor. Age had a significant effect on the latent factors, in which the higher the age the lower the latent mean. This study serves as the foundation to future studies examining

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the role of executive functioning in leadership, decision-making, and strategic problem solving in executives from a private industry.
Correspondence: *Mauricio A. Garcia-Barrera, Psychology, University of Victoria, Victoria, Canada. E-mail: mgarcia@uvic.ca*
Keywords: executive abilities, normal, Healthy adults, latent variable analysis

Symposium 16. Current issues in the neuropsychology of HIV/AIDS

Chair: Emilia Łojek

10:30–12:00

E. ŁOJEK. Current issues in the neuropsychology of HIV/AIDS.
Symposium Summary: The implementation of combination anti-retroviral therapy (cART) resulted in the transformation of HIV infection into a chronic condition. Nowadays, the mean life span of HIV-seropositive (HIV+) individuals is comparable to that of the general population. cART suppresses and maintains viral load below detectable levels in the majority of optimally treated HIV+ patients. Furthermore, cART led to a decreased incidence of HIV Associated Neurocognitive Disorders (HAND) particularly in its severe forms (HIV-associated dementia). Despite these important developments, milder forms of HAND (not severe enough to qualify as dementia) are still prevalent in HIV+ aviremic individuals (30%). The underlying causes of mild HAND remains to be elucidated and because of this, some of the putative pathogenic factors (i.e. ageing, potential cART neurotoxicity) are under increased investigation. The aim of this symposium is to provide an update on the most recent advances in the field of neuroHIV research and provide a forum for discussing the abovementioned issues. We are proposing four presentations, which will highlight some of the most pressing issues in our field of research. R. Kessels as Discussant will open a broader discussion.
Correspondence: *Emilia Łojek, Department of Neuropsychology, Warsaw University, Warsaw, Poland. E-mail: emilia@psych.uw.edu.pl*

A.R. EGBERT, B. BISWAL, E. ŁOJEK. The effects of age in HIV infection on the relationship between neurocognition and brain functional connectivity.
Background: The current study assessed the impact of HIV on neurocognitive domains and intrinsic functional connectivity (FC) of the brain in cART+ patient cohort. The main objective was to evaluate the moderating effects of age on the relationship between cognitive and brain functional status in HIV infection.
Methods: Neurocognitive domains were evaluated with a comprehensive battery of standardized neuropsychological tests. Brain FC was examined with the Independent Component Analysis (ICA) and Regional Homogeneity (ReHo). The independent and interaction effects of age-HIV were tested in 108 participants (age M=42), including 54 HIV+/cART+ patients and 54 healthy age-matched control participants. Frascati criteria for diagnosing HAND were not met by the majority of HIV-infected participants, i.e., 9% showed asymptomatic HAND, and less than 6% mild to moderate forms of the disorder.
Results: Primary deterioration due to HIV was revealed in Attention Factor scores and FC within the Occipital Network. Synergistic effects of age and HIV were not shown on cognitive scores, however, were observed in FC of the Motor Network. Age did not moderate the relationship between neurocognition and brain FC in HIV-infected individuals. Meanwhile, aging weakened those relationships in healthy control group.
Conclusions: This study provides further support that HIV infection remains to have deteriorating effects on cognitive status even in the cART era. Unlike in healthy aging, age of the HIV-infected individuals does not seem to alter the extent to which spontaneous activity of the brain influences the condition of cognitive functions. The current results open a discussion on the distinctive brain functional bases of cognitive degradation in aging of HIV-infected population.
Correspondence: *Anna R. Egbert, Djavad Mowafaghian Center for Brain Health, University of British Columbia, Vancouver, Canada. E-mail: anna.rita.egbert@gmail.com*
Keywords: HIV/AIDS, cognitive neuroscience, neuroimaging, functional connectivity

N. GAWRON, A. PLUTA, M. SOBAŃSKA. Independent effects of age, HIV, and HIV-associated clinical factors on neuropsychological functioning and brain volume in aviremic HIV+ patients.
Objective: The impact of HIV infection on older patients' cognitive functions and brain volume is not yet fully understood. In this study, we examined the influence of HIV, age, and HIV-related immunological characteristics on neuropsychological performance and brain structure in HIV-seropositive Polish MSM receiving cART.

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Methods: Ninety one aviremic HIV+ patients and demographically similar 95 HIV- controls (age range 23-75, 11-26 years of education, 81% employed) underwent neuropsychological assessment. Out of these groups 54 HIV+ and 62 HIV- participants also took part in brain imaging session. Brain volumes in cortical and subcortical regions were measured using voxel-based morphometry. A series of linear regression models were performed to estimate the independent and/or interactive effects of HIV status and age on test outcomes and brain volume. In HIV+ group effects of current CD4 cell counts, CD4 nadir, highest plasma HIV RNA level or duration of the infection and age on cognition and brain volume were estimated.
Results: HIV and ageing showed independent effects on attention, working memory, verbal learning, figural fluency, and visuomotor dexterity. Older HIV+ participants showed larger declines in verbal recall with advancing age than matched controls. HIV infection was related to cortical white matter volume decrease while older age was associated with cortical white matter volume increase. Lower CD4 nadir was related to poorer memory. Brain regional volume was not related to HIV clinical factors.
Conclusion: Our findings indicate that in HIV+ patients on effective cART the infection and age act independently, leading to neuropsychological deficits and having different effect on the cortical white matter volume. Low CD4 nadir predisposes for memory decline.
Correspondence: *Natalia Gawron, The Faculty of Psychology, University of Warsaw, Stawki 5/7 st, 00-183 Warsaw, Poland, Warszawa, Poland. E-mail: natalia.gawron@psych.uw.edu.pl*
Keywords: HIV/AIDS, neuropsychological outcome, brain structure

C.S. HAKKERS, M.J.E. VAN ZANDVOORT. Subjective and Objective Improvement on Cognition after Discontinuing Efavirenz in Asymptomatic HIV patients.
Background: cART toxicity has an effect on cognition, with Efavirenz as the most notable example. Little is known about its long-term effects in patients who don't report overt cognitive complaints. The aim of this study was to assess the effect of switching Efavirenz (EFV) to Rilpivirine (RPV) in cognitive asymptomatic patients.
Methods: 54 virologically suppressed, cognitive asymptomatic male HIV-infected patients on TDF/FTC/EFV (Atripla) were included and randomized (2:1) to switch to TDF/FTC/RPV (Eviplera) (switch group) or continue on Atripla (control group) for 12 weeks. At baseline and week 12, all patients underwent a standardized extensive neuropsychological assessment (NPA), and filled in questionnaires on quality of life, participation and mood. Effects of the switch were analyzed per group using a linear mixed model. Moreover, Normative Comparison (NC) was used to assess improvement at individual level as compared to the control group.
Results: 14 control and 34 switch subjects completed the study. There were no differences at baseline for age, education or NPA-score. Group-analysis demonstrated a greater improvement for the switch group on the domains attention (estimated Z-score difference= 0.37, p=0.041) and speed of information processing (estimated Z-score difference= 0.37, p=0.014). NC-analyses showed that 15% of the 34 patients who switched improved on NPA-score as compared to the control group. There were no improvements in questionnaire-score. Interestingly, subjective improvement in everyday life after discontinuing Efavirenz made 74% of the switch group chose for a regime without Efavirenz after study completion.
Conclusion: switching from Atripla to Eviplera resulted in objective cognitive improvement in cognitive asymptomatic patients. There is a discrepancy in objective and subjective cognitive complaints in this asymptomatic group which makes it challenging to identify patients that would benefit from discontinuing Efavirenz at beforehand.
Correspondence: *Charlotte Hakkers, UMC Utrecht, Utrecht, the Netherlands. E-mail: c.s.hakkers@umcutrecht.nl*

L.A. CYSIQUE, S. ROURKE. Establishing an international task force to address potential revisions of HAND frascati criteria: Rationale, proposal/goals, areas to review/update, logistics, timeline and progress to date.
Rationale: HIV-associated neurocognitive disorders (hand) persists despite cart. significant advances in characterizing and defining diagnostic criteria for milder forms of HAND (ANI/MND) occurred with the 2007 Frascati criteria, but there remains a debate about the validity and neuropathogenesis of ANI, impact that early cART will have on reducing prevalence of HAND, and degree to which comorbidities, legacy effects, and pathological aging can complicate HAND. There are also inconsistencies in methods used to screen for and diagnose/monitor HAND. These issues significantly limit our ability to offer prognostic information to patients about their neurological health, and the potential strategies to prevent, mitigate and manage HAND.
Proposal/Goal: Since 10/2016, we have worked towards the establishment of a taskforce that will aim

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at addressing these issues, and conclude with consensus document on specific actions and recommendations.
Review/Update: 1) Harmonization of diagnostic methods, criteria and validity for defining neurocognitive impairment/decline & functional status; 2) Improved screenings for mild HAND; 3) Aging-related / HIV-associated & psychiatric comorbidities differential diagnosis; 5) Identify systemic, genetic, neuropathological and neuroimaging biomarkers to predict HAND & risk for progression; 6) Clinical guidelines recommendations for assessment, diagnostic monitoring & interventions.
Logistics/Timeline: 1) ~3-year project including development of terms of reference with clear objectives and timelines; 2.) Secure support from key funding bodies & relevant scientific/professional associations.
progress to date: 1) The taskforce is currently composed of 90 members. 2) A survey has been launched in February 2018 to determine the taskforce breath of expertise, geographical locations and priority goals. 3) A satellite CROI 2018 meeting will present the survey results, & the neurocognition, biomarkers, clinical practice working groups' co-chairs.
Correspondence: *Lucette A. Cysique, Neuroscience Research Australia, The University of New South Wales, Sydney, Australia. E-mail: lcysique@unsw.edu.au*
Keywords: HIV-associated neurocognitive disorders, Diagnostic criteria, Revisions

Poster Session 5. Assessment methods and psychometrics in an increasingly globalized world

10:35–12:25

A.E. THOMANN, N. GOETTEL, J.B. HESSLER, M. BERRES, T. JAHN, A.U. MONSCH. Differences in normative samples of the Montreal Cognitive Assessment: Call for guidelines.
Objective: Normative values for the Montreal Cognitive Assessment (MoCA) exist for several languages with substantial differences regarding the recommended (empirically derived) cut-off scores. Cultural differences may not fully explain these discrepancies. Thus, we investigated the comparability between MoCA normative studies using two German-speaking samples.
Participants: Subjects were included from a normative study for the MoCA in Basel, Switzerland, (N = 283, 155 women, mean (SD) age = 73.8 (5.2) years; education = 13.6 (2.9) years) and from a normative study on the Cognitive Functions Dementia (CFD) in Munich, Germany, and Vienna, Austria (N = 244, 150 women, mean (SD) age = 74.3 (6.1) years).
Methods: Comparability between studies was achieved by paralleling inclusion and exclusion criteria wherever possible. Potential study center-related effects were explored using regression analysis. The dependent variable was the MoCA total score; covariates were age, education, gender, study center, and possible interactions.
Results: The mean (SD) MoCA total score was 26.1 (2.5) points in Basel and 24.8 (3.0) points in Munich/Vienna. A lower MoCA total score was associated with older age ($p = 0.005$), male gender ($p = 0.18$), lower education ($p = 0.003$), and study center Munich/Vienna ($p = 0.003$). No interactions between the demographic variables and study center were detected.
Conclusion: MoCA performance differed between two German-speaking samples, even after adjusting for demographic effects. As these countries are culturally very similar, inconsistent inclusion and exclusion criteria may explain the observed differences. A comparison of other MoCA normative studies revealed great heterogeneity regarding the selection process of volunteers and the methods used to establish normative data. International guidelines to conduct normative studies are needed as these may enhance comparability of norms in the future.
Correspondence: *Alessandra Elena Thomann, Memory Clinic and Department of Anesthesia, Felix Platter Hospital and University Hospital Basel, Basel, Switzerland. E-mail: alessandra.thomann@fps.ch*
Keywords: normative data, Montreal cognitive assessment, elderly individuals

E. BOLCEKOVA, O. BEZDICEK, A. FENDRYCH MAZANCOVA, R. RUSINA, R. JECH, E. RUZICKA. Equipercentile Ranks of MMSE and DRS-2 Scores.
Objective: The Mini-Mental State Examination (MMSE) and Mattis' Dementia Rating Scale 2 (DRS-2) are both widely used screening tests of cognitive abilities. Many professionals are more familiar with the MMSE; but in some contexts, the use of DRS-2 is preferred. The aim of this study was to analyze relationships of scores of these two tests, and to present equipercentile values that allow mutual transformations.

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Participants and Methods: The study includes 259 subjects (150 men and 109 women), aged 21 – 91 years (M = 62.8, SD = 11.0), with 7 – 25 years of education (M = 13.9, SD = 3.1). The subjects' cognitive performance ranged from normal to severe deficits, and their diagnoses included Alzheimer's disease, Parkinson's disease and other neurodegenerative conditions. All were tested with a neuropsychological battery including MMSE and DRS-2.
Results: MMSE scores ranged from 6 to 30 points (M = 25.7, SD = 4.6), and DRS-2 scores ranged from 35 to 144 (M = 132.4, SD = 15.4). Correlation of the scores is strong and statistically significant (r = 0.89, p < .0001). In a linear regression model, the scores explain 79.8% variance of one another. We present corresponding scores, as they were observed in our sample (e.g., MMSE 24 corresponds to DRS-2 126-128).
Conclusions: MMSE and DRS-2 differ in many aspects, but their results are strongly correlated. We believe that understanding the relationship of these scores will help communication among neuropsychologists, physicians and other healthcare professionals.
This study was supported by Progres Q27/LF1.
Correspondence: *Eva Bolcekova, Department of Neurology and Center of Clinical Neuroscience, Charles University, First Faculty of Medicine and General University Hospital, Prague, Czech Republic. E-mail: eva.bolcekova@lf1.cuni.cz*
Keywords: cognitive screening, MMSE, DRS-2

A. BARTOS, M. HOLLA. Alternate form reliability of Written picture naming and immediate recall test (PICNIC) for mild cognitive impairment and Alzheimer's disease.
Objective: Alternate test forms are necessary in repeated cognitive assessments. The reliability of alternate forms of new Written picture naming and immediate recall test (PICNIC) test was verified.
Participants and Methods: The PICNIC test evaluates long-term semantic memory, language and short-term episodic visual memory. First, the participants write down and simultaneously remember the names of 20 line drawings (*long-term semantic memory, language*). Then they immediately recall and write down as many picture names as possible (*immediate short-term episodic memory*). Evaluation is based on naming errors (number of pictures wrongly named or left unnamed) and free recall (number of correctly recalled pictures without confabulations or repetitions). The test is available in two alternate forms (A and B). The reliability of these alternate forms was verified. Both forms were administered to 50 healthy elderly people (age 67,1 ± 6,6, MoCA 26,2 ± 2,8 points) in one month test-retest interval.
Results: Average number of naming errors was 0,3 ± 0,6 in both A and B version. Average number of recalled pictures was 9,4 ± 2,4 in both A and B version. There was no significant difference found between the results of both forms of the test in naming errors (p=0,782, paired Wilcoxon test) and number of recalled pictures (p=0,714, paired Wilcoxon test). Bland–Altman plot showed a reasonably good agreement (the 95% limits of agreement ranged from −2,2 to 2,2 for number of recalled pictures and from −0,8 to 0,8 for naming errors).
Conclusions: The alternate form reliability of the PICNIC test is excellent. Both forms of the test show no significant differences and can be used interchangeably in repeated cognitive assessments of mild cognitive impairment and Alzheimer's disease.
Supported by grant PROGRES Q35, LO1611 and NIMH-CZ, 00023752.
Correspondence: *Marie Holla, Department of Cognitive Disorders, AD center, National Institute of Mental Health, Prague, Czech Republic. E-mail: marie.holla@centrum.cz*
Keywords: alternate form reliability, Alzheimer´s disease, mild cognitive impairment

L.B. DEHN, M. BELLWON-BURDINSKI, S. HUNOLD, D. FAST, M. DRIESSEN, T. BEBLO. Assessment of everyday memory performance of patients with depression: First results from two ecologically valid paradigms.
Objective: Patients with major depressive disorder (MDD) frequently complain about their everyday memory, which might exceed neuropsychological test outcomes. Because the ecological validity of common test procedures is still a matter of debate, we aimed to assess everyday memory performance in MDD using two ecologically valid memory paradigms.
Methods: Ten inpatients with MDD (age: M=46) and ten matched healthy controls (HC) completed two everyday-memory paradigms (EMP) and answered the Questionnaire for cognitive complaints (FLei). EMP-1: To bridge the waiting time before a planned neuropsychological assessment, subjects were shown 2 videos on the waiting room TV, in which a spokeswoman presented 2 stories based on the established "Logical Memory"-test. After 30 minutes, subjects had to perform an unexpected free recall and recognition of the video content during the intended test session. EMP-2: A week later, unannounced phone calls were conducted to ask about the recollection of everyday-related details form the assessment situation.

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Results: Patients stated more cognitive complaints in their daily life than HC (p<.001). While no difference was found in EMP-1 performance, MDD patients showed impairments in EMP-2 (p=.005). EMP-2 performance was tendentially associated with subjective complaints in patients (r=-.56, p=.095), but not in HC (r=.10, p=.781). In both groups, no significant association was found between EMP-1 performance and subjective complaints (p>.360).
Conclusions: MDD patients showed impairments in the long-term (1 week) compared to the short-term (30 minutes) everyday-memory paradigm. Moreover, subjective cognitive complaints seem to be more related to the long-term recall of everyday-related information. Although the two paradigms are not directly comparable, the results nevertheless indicate that different time conditions need to be considered in everyday-memory assessment.
Correspondence: *Lorenz B. Dehn, Research Division, Ev. Hospital Bethel (EvKB), Clinic of Psychiatry and Psychotherapy, Bielefeld, Germany. E-mail: lorenz.dehn@evkb.de*
Keywords: memory complaints, ecological validity, depression

R. RAUDEBERG, G.L. IVERSON, Å. HAMMAR. The Importance of Clinical Reference Values for Conceptualizing Neuropsychological Deficits in People with Schizophrenia Spectrum Disorders.
Objective: To illustrate the importance and usefulness of clinical normative data for people with severe and persistent mental illness.
Participants and Methods: A convenience sample of 302 patients from a psychiatric inpatient hospital in Bergen, Norway was included. A subgroup of 127 (42.1%) had severe co-morbid substance abuse. The total sample ranged between 18-38 years, with a mean age of 24.6 years (SD=4.9). Years of education ranged from 9-20 years, with a mean of 12.3 years (SD=1.8). All completed the Norwegian version of the Repeatable Battery for the Assessment of Neuropsychological Status [(RBANS; 162 (53.64%) completed version A and 140 (46.37%) version B].
Results: The average scores (i.e., at the 50th percentile) for inpatients with schizophrenia spectrum disorders were as follows: Immediate Memory Index=80, Visuospatial/Constructional Index=88, Language Index=78, Attention Index=72, Delayed Memory Index=81, and Total Score=71, approximately one to two SD below the mean for healthy adults. The prevalence of low scores was calculated by simultaneously examining all five RBANS index scores. Base rates of low domain scores were calculated by using four cutoff scores that might be routinely used in clinical practice, including: (a) more than one standard deviation (SD) below the mean (i.e., <85), (b) below the 10th percentile (i.e., <81), (c) at or below the 5th percentile (i.e., ≤76), and (d) more than two SDs below the mean (i.e., <70). The prevalence of having two or more low index scores was: <85=78.8%, <81 (10th percentile)=73.2% ≤76 (5th percentile)=62.3%, and <70=33.1%.
Conclusions: The average RBANS scores in the sample were one to two SD below the mean for healthy adults. The prevalence of two or more low index scores was high. Using clinical normative data to describe a patient's cognitive performance in terms of expectation for their peer group can be useful for multidisciplinary treatment planning.
Correspondence: *Rune Raudeberg, Division of Psychiatry, Haukeland University Hospital, Bergen, Norway. E-mail: rune.raudeberg@uib.no*
Keywords: normative data, schizophrenia

R.J. ROBOTHAM, R. STARRFELT. Assessing visual perception: towards a systematic approach.
Objective: Visual perceptual deficits are common in neurological disorders. Around 30 % of patients with acquired brain injury suffer from such visual deficits and it has become apparent that many patients with neurodegenerative disorders also have such impairments. Visual perceptual impairments can affect performance on all neuropsychological tests that involve visual stimuli. They are known to have an impact on activities of daily living and quality of life, and can have a negative impact on the rehabilitation of other cognitive functions. Despite this, visual perception often receives little attention in neuropsychological assessments. A contributing factor to this is that the literature does not offer systematic approaches to the neuropsychological assessment of visual perception. Here, we aim to provide a framework that enables such an approach.
Methods: We identified tests of visual perception designed for neurological patients. The tests were categorised according to the visual subprocesses that the tests assess. On this basis, we developed a simple framework and provide an overview of the different visual perceptual tests and associated processes.
Results: Based on this framework, we provide recommendations that should enable a systematic approach to the assessment of visual perceptual disorders.
Conclusions: We present a conceptual framework developed to support a systematic approach to the neuropsychological assessment of visual perceptual functions. This will hopefully contribute to visual

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perception being assessed more systematically in clinical and research settings.
Correspondence: *Ro J. Robotham, Department of Psychology, University of Copenhagen, Copenhagen, Denmark. E-mail: jer@psy.ku.dk*
Keywords: Visual perception, Assessment

A.L. JOSEPH, K. GARCIA, T. MBURU, N.A. DEFILIPPIS, R. IVINS, J. DSURNEY. Discriminative Validity of New Subscales for the Halstead Category Test.

The Halstead Category Test has been shown to be the most sensitive test in the Halstead-Reitan battery. There are several forms of the Category Test (CT) that are highly correlated and considered equivalent. A critique of the CT is that it yields a single error score. A recent attempt to develop subscales was undertaken by Jorge Costa. A concurrent validity study of these subscales was performed by McNally, et. al. 2015 and found many of the subscales are highly correlated with other tests of cognitive function in a TBI population. In this study we hypothesize that there will be significant differences between patients who suffered a mild TBI (mTBI) and high functioning individuals.

Patients (N=90) of at least 18 years of age were administered either the computerized CT (head injured) or the booklet CT (controls, BCT). The present study included a TBI group and a control group. The TBI group (n=79) sustained an mTBI and the control group (n=11) had no history of head injury or other neurological condition. The CT was scored for total errors and the 13 subscales developed by Costa. Univariate ANCOVAs between the TBI and control groups were performed on each of the 13 subscales and the total error score, controlling for education level.

TBI patients performed significantly worse on total CT error score as well as the learning, spatial positional, and proportional reasoning subscales. When correcting for total errors, TBI patients performed worse on the memory subscale compared to controls.

Our results in part support our hypothesis as several subscales were found to discriminate between groups. Our results support previous research that spatial positional and proportional reasoning can discriminate between TBI and healthy patients, and are highly correlated to total errors. Based on these findings it is clear that CT subscale scores can differentiate cognitive functions but further investigation into the calculation and correction factors of these scores is needed.

Correspondence: *John Dsurney, Wake Forest University, Winston-Salem, USA. E-mail: jdsurney@verizon.net*
Keywords: Assessment, Executive abilities-Abnormal, mild traumatic brain injury

A. MUSHLITZ, G. ANDREWS, A. COLUNGA. FAS BeST: Behavioral Profile Screener for At-Risk Individuals.

Objectives: Our objective was to determine the accuracy of the FAS BeST screener for identifying a unique behavioral profile caused by prenatal exposure to alcohol.

Participants & Methods: Children to young adults (n= 135, m=99, f=44, 2-21yrs) in a large metropolitan developmental clinic who were determined to be "at-risk" for prenatal exposure to alcohol were screened using the FAS BeST. The case managers included the FAS BeST in the packet completed by the child's legal guardian. Protocols were de-identified and coded by the center's director and delivered to the principle investigator. Children whose scores were at or above the cutoff (total= 75) were provided a full diagnostic evaluation for a Fetal Alcohol Spectrum Disorder (FASD) diagnosis. The diagnosis was delivered to the investigator once it was confirmed.

Results: The mean of the sample with confirmed diagnoses of FASD is above the established cutoff for this measure. All, but two of those diagnosed with one of the FASD diagnoses were captured accurately. Using a MANOVA the data were analyzed using both the full at-risk sample and the confirmed diagnosis sample. No gender differences, or age group differences were found for the total score, the score for externalizing behaviors, or the score for cognitive problem-solving behaviors. Using One Way ANOVA, three items were found to have significant differences between genders ($p<.05$). The female participants were rated higher on two elements (unable to take responsibility, looks innocent even though looking guilty) while male participants were higher on one element (appearing to be undisciplined).

Conclusions: Children with a FASD diagnosis have a unique behavioral profile that is captured by the FAS BeST. The current study provides supporting information that female and male participants prenatally exposed to alcohol do not have significant differences in their behavioral presentation.

Correspondence: *Allison Mushlitz, Graduate School of Clinical Psychology, George Fox University, Newberg, USA. E-mail: amushlitz15@georgefox.edu*
Keywords: FASD, Screener, Prenatal Exposure

M.C. GUERRETTE, M. MCKERRAL, G. LAGARDE, P. VINCENT, S. WINTER, R. MINICHIELLO. Tracking rehabilitation

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outcomes within a traumatic brain injury (TBI) continuum of care using the Mayo-Portland Adaptability Inventory (MPAI-4).

Objectives: This study describes a knowledge transfer approach within a trauma services continuum, meshing together clinical, administrative and research contributions, which laid the foundation for systematic measurement of functional evolution and social participation outcomes in post-TBI rehabilitation. Our objective was to assess the functional evolution of adults with TBI depending on the course of rehabilitation (post-acute inpatient and/or outpatient).

Participants and Method: The MPAI-4 and its three subscales, Abilities, Adjustment, and Participation, give rise to specific indexes and a total score reflecting the general level of adaptation/social participation of persons with acquired brain injury. The French-Canadian (Québec) version of the MPAI-4 (Malec & Lezak, 2003; McKerral et al., 2014) was implemented in five inpatient and outpatient rehabilitation centres in the greater Montreal region. A computer interface was created to integrate in real time, in a local database in each of the sites, the MPAI-4 measurements collected. Data is obtained for all adults with TBI at the start and end of rehabilitation.

Results: Over 600 MPAI-4 measures have been completed and results show significant improvement in scores between beginning and end of rehabilitation. Age and TBI severity predict MPAI-4 total scores at the end of rehabilitation for users who completed rehabilitation following an outpatient path, but not for users who followed an inpatient-outpatient path. Initial subscale scores also predict the total scores at the end of rehabilitation, regardless of the rehabilitation path followed.

Conclusions: We identified indicators that predict the general level of social participation at the end of rehabilitation. Such a systematic intake of outcome measures across rehabilitation sites using the MPAI-4 allows to better assess functional evolution and factors related to social participation outcomes of adults with TBI, and to support clinical decision-making.

Correspondence: *Marie-Claude Guerrette, Centre for Interdisciplinary Research in Rehabilitation of Greater Montreal (CRIR), IURDPM, Montréal, Québec, Canada. E-mail: marie-claude.guerrette@umontreal.ca*

Keywords: Traumatic brain injury, Outcome, Social participation

A.E. DATOC, J.C. BURGESS, R. BENNETT, L. LASHLEY, C.J. GOLDEN. The Role of Native Language on ImPACT Baseline Scores of High School and Collegiate Athletes.

Objective: To determine if native language plays a role in Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) baseline scores in high school and collegiate athletes; explore if gender and age influence results.

Participants and Methods: Data was derived from a de-identified ImPACT database in South Florida consisting of 15,951 high school and collegiate athletes (M_{age}=15.55; 59.3% male). Athletes were included if they were native-language English speakers, native-language Spanish speakers who also spoke English, had no history of concussion, and if they completed a baseline ImPACT in English. English-speaking athletes (n=15,239), M_{age}=15.53; 59% male; Spanish-speaking athletes (n=712), M_{age}=15.91; 65% male.

Results: ANOVA revealed significant differences on Visual Motor Speed [F(1, 15,949)=51.470, p<.001] and Impulse Control [F(1, 15,949)=7.095, p=.008] composites between native-language English and native-language Spanish speaking athletes. Main effects of gender and age were significant at baseline on all composite scores (p<.05).

Conclusions: Results suggest native language plays a role in an individual's Visual Motor Speed and Impulse Control scores. Further, this study highlights the need to consider gender and age when interpreting baseline scores. This study supports prior findings by Ott and colleagues (2014) which revealed differences between English-speaking and bilingual Spanish-speaking athletes on ImPACT, but conflicts with a previous study by Tsushima, Tsushima, Oshiro, and Maruta (2017) that found no differences in ImPACT baseline scores of a large ethnically diverse sample. There is a clear need for future research in this area to determine how native language influences baseline scores. The limited number of native-language Spanish speakers may have also affected this study's results. Future investigators should consider including a more representative sample of Spanish-speaking athletes to better understand this relationship.

Correspondence: *Alison E. Datoc, Clinical Psychology, Nova Southeastern University, Fort Lauderdale, USA. E-mail: ad1995@mynsu.nova.edu*

Keywords: Concussion, Language, Neurocognition

L.J. RAPPORT, R.A. HANKS, S.R. MILLIS, C. PEARSON. Psychometric properties of the Concussion Symptom Checklist.

Objective: To examine psychometric properties of the Concussion Symptom Checklist (CSC; Miller & Mittenberg, 1998), a tool designed to assess

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symptoms associated with mild traumatic brain injury (mTBI) and monitor recovery over time.
Participants and Methods: 199 adults, ages 18 – 82, presented at the Emergency Department (ED) with mTBI and were discharged home from the ED. Patients completed the CSC via telephone follow-up at 1 week, 3 months, and 6 months post injury. On the CSC, respondents indicate whether they have experienced 12 symptoms of mTBI in the past week. For each item, respondents also indicate the number of days they experienced each symptom and assign a severity rating (1 – 10) for any symptom they experienced.
Results: CSC scores were unrelated to age, education and gender (all $r < .15$). At each follow up point, the three CSC indexes were highly intercorrelated (all $r > .90$). Reliability for the presence/absence scoring metric yielded coefficient alphas exceeding .80 (good) at all three time points. Retest reliability assessed via intraclass correlation (ICC) for the interval 3 to 6 months post injury was .77 (excellent). CSC item *severity* rating (0 – 10) yielded coefficient alphas > .90 (excellent) and retest ICC = .82 (excellent). Performance of *days-bothered* ratings was intermediate to the presence and severity indexes. Baseline community integration in the ED showed small inverse relation to CSC at all three time points. CSC at 7 days was moderately related to reports of missed social activities due to the mTBI at each follow-up (eta .31 to .48).
Conclusions: CSC showed good to excellent internal consistency and retest reliability, across all three scoring metrics and time points; however, the scores are highly redundant. Likely because of larger range and finer metric, the severity rating showed highest reliability. Validity of the CSC was supported by associations with psychosocial characteristics at baseline and longitudinal outcome.
Correspondence: *Lisa J. Rapport, Psychology, Wayne State University, Detroit, USA. E-mail: rapport@wayne.edu*
Keywords: assessment, mild traumatic brain injury, psychometric constructs

D.S. TULSKY. Advances in Patient Reported Outcome Measurement to Assess Self-Reported Cognitive, Emotional, Medical, and Physical Functioning.
Objective: The Traumatic Brain Injury - Quality of Life (TBI-QOL) Measurement System that includes scales measuring 22 areas of functioning and has great potential for neuropsychologists when testing individuals with TBI. It has been developed using Computerized Adaptive Testing (CAT) and has direct links to the PROMIS and Neuro-QOL systems. This presentation will focus on how neuropsychologists can assess multifaceted domains of functioning (including Cognitive, Emotional, Social, Physical, and Medical) very rapidly through self-report measures.
Participation: A sample of 675 individuals with TBI were recruited from 5 TBI Model Systems. Each participant had medically documented complicated-mild, moderate, or severe TBI. A second sample of 79 individuals completed TBI-QOL CAT instruments within 6 months of their injury and were retested 6 months later.
Methods: In Study 1, participants completed a large number of items (k=922) in 4 interview sessions (with approximately 230 - 250 items per session). In Study 2, participants completed 20 different TBI-QOL CAT instruments in an interview format with the examiner reading questions and entering data into the computer.
Results: Item Response theory was performed on the items within a sub-domain. IRT results were used as the calibration values for the CATs. Confirmatory Factor Analyses was performed on each of the 22 item domains and demonstrate that the items confirmed to a unidimensional model (all measuring a similar construct). In the second sample, responsiveness to change was detected for each of the TBI-QOL banks.
Conclusions: The TBI-QOL item banks include: Cognition, Executive Functioning, Communication, Headaches, Fatigue, Depression, Anxiety, Resilience, Positive Affect, Self-Esteem, Stigma, Emotional Dyscontrol, Ability to Participate, and Independence. These scales can be administered very rapidly using CAT administration and offering self reported ratings across multiple domains of functioning.
Correspondence: *David S. Tulsky, Center for Health Assessment Research and Translation, University of Delaware, Newark, USA. E-mail: dtulsky@udel.edu*
Keywords: Quality of Life, Traumatic Brain Injury, self-report

S. KUPIETZKY, J. AHONNISKA-ASSA, S. BARAK, J. LANDA, A. BREZNER, T. SILBERG. Parents and teachers reports on a child's emotional and behavioral problems following traumatic brain injury (TBI): A meta-analysis.
Objectives: Assessment of emotional and behavioral outcomes following childhood TBI relies heavily on parents reports. It is of great interest to determine how well parents' reports correspond with reports of other informants. A meta-analysis was conducted to evaluate the relationships between data obtained from parents and teachers on child's behavioral and emotional problems following TBI.

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Methods: An initial literature search with associated key words was conducted focusing on behavioral and emotional outcomes of children following TBI, age 6–18 years. 128 articles published over 17 years in reviewed journals were examined. 26 articles meeting final criteria were included abstracting Child Behaviour Checklist (CBCL) and Teacher Rating Form (TRF) scores and other initial characteristics of participants.
Results: A total of 2033 children following TBI were included in the analysis. Among them, 2008 children had parents' reports and 427 children had teachers and parents' reports. The initial analysis revealed average levels of emotional and behavioral problems, as indicated by the CBCL and TRF questionnaires. The overall effect size for Total, Externalizing and Internalizing summary scales was relatively low suggesting that reports on the child's problems following TBI do not significantly differ between parents and teachers.
Conclusions: This meta-analysis highlights the fact that most studies rely only on parents' reports when evaluating emotional and behavioral problems following childhood TBI. Given that there is no biological marker that definitively indicates the presence of emotional or behavioral problems following head injury, collecting data from multiple sources should be considered a primary method in assessing child's psychological state. This review requires future extended research and examination of potential moderators, to deepen our understanding on the effect of different informants' perspectives on child's emotional and behavioural problems.
Correspondence: *Janna Landa, Psychology, The Academic College of Tel-Aviv- Yaffo, Tel Aviv, Israel. E-mail: janna.landa@sheba.health.gov.il*
Keywords: Outcome, Assessment, Multi-informants

J. WATSON, R. HIRST, C. BROWN. Effects of Age and FSIQ on Performance Validity Tests in Pediatric Baseline Evaluations.
Objective: The vast majority of performance validity test (PVT) literature utilizes adult samples. PVT study findings may not generalize to children given their still-developing cognitive abilities, which could impact PVT performance. Consequently, the current study examines the utility of PVTs among a healthy pediatric athlete population. Specifically, this study seeks to identify which PVTs are appropriate validity indicators for children and adolescents.
Participants and Methods: The sample consisted of 81 youth athletes (74% male; 8-18 years old; mean = 11.65, standard deviation = 2.29) recruited from sports leagues to participate in a longitudinal sport concussion clinical research program. Investigators administered a comprehensive two-hour baseline neuropsychological battery, including the Test of Memory Malingering, Reliable Digit Span, and Rey 15-Item Test and recognition trial, to assess performance validity.
Results: Linear regression analysis revealed a significant positive relationship between participant age and Reliable Digit Span performance ($p < 0.0001$; $\beta = 0.76$), indicating that older participants generally performed better. FSIQ was also positively associated with RDS scores ($p < 0.0001$; $\beta = 0.11$). Similarly, both age and FSIQ significantly predicted Rey-15 recall ($p = 0.007$ and 0.002, respectively) and recognition ($p < 0.000$ and 0.023, respectively). Importantly, age and FSIQ did not predict TOMM Trial 1 or Trial 2 performance (ps > .05, respectively).
Conclusions: These findings suggest that younger children and children with lower estimated FSIQ's may be vulnerable to poorer performance on RDS and Rey 15 Item Test, while TOMM performance is not related to those factors. This suggests that the TOMM may be a more appropriate indicator of performance validity in children, as it is independent of age or intelligence. Consequently, the TOMM may be more appropriate for use when assessing performance validity within a pediatric population.
Correspondence: *Jessica Watson, Clinical Psychology PhD, Palo Alto University, Palo Alto, USA. E-mail: jwatson@paloaltou.edu*
Keywords: Pediatric Neuropsychology, Effort Testing, Performance Validity Test

J.C. CHEN, M.S. HUA. Intelligence Patterns in Patients with Common Brain Diseases and the Clinical Utility of Convention Procedures estimating their Premorbid Intellectual Function.
Background: No studies to date have investigated the intelligence patterns of patients with CNS diseases in Taiwan. Neuropsychologists usually collect patients' demographics and use regression equations estimating their premorbid IQs. However, no research to date has examined the clinical utility of such estimations. The present study was thus to explore these two issues in Taiwanese patients with common brain diseases.
Participants and Methods: We recruited 440 patients including those with single and multiple domains of MCI (MCI-s and MCI-m), and early dementia probably due to AD, CVD and PD. Each patient received a comprehensive neuropsychological test battery including ten WAIS-III subtests for the study.
Results: IQ scores declined as patients with amnestic MCI-s of AD and CVD progressed to MCI-

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m and dementia (they deteriorated the most). Similar intellectual decline patterns, except for a significantly lower PIQ, were also evident in patients with PD MCI-s and MCI-m, and very mild PDD. Using demographic variables (DV) plus the Information or Similarities subtest, and plus the Picture Completion or Matrix Reasoning subtest could estimate well the premorbid VIQ and PIQ respectively for those with amnestic MCI-s due to AD and CVD. For the PD patients, using DV and Verbal subtests properly estimated the premorbid VIQ while DV alone estimated fittingly the premorbid PIQ.

Conclusion: A deterioration of intellectual function (with dementia declined the most) along the disease course was all evident in patients with the three major brain diseases, and their patterns were like, except for PD patients who evidenced a more significant decline of Performance intelligence. Meanwhile, the current methods estimating patients' premorbid IQs appear suitable for the clinical use. Nonetheless, further cross-validated investigation on a large scale is necessary.

Correspondence: *Mau-Sun Hua, Departments of Neurology and Psychology, Kaohsiung Chang Gung Memorial Hospital and National Taiwan University, Kaohsiung and Taipei, Taiwan. E-mail: huams@ntu.edu.tw*

Keywords: intellecutal functioning, premorbid functioning, brain disorder

B. UTTL, B. MCBREEN. Psychometric Analyses of Shipley Institute of Living Scale.

Objectives: The study objective was to examine psychometric properties of Shipley Institute of Living Scale (Shipley, 1940) by examining reliability and validity, and by conducting detailed item analyses of both Verbal and Abstraction scales.

Participants and Methods: Participants were undergraduate students in three large scale studies. They completed SILS as part of 2 to 3 hour long batteries of cognitive and personality tests including other measures of crystallized and fluid intelligence.

Results: The results show that SILS Verbal and Abstraction scales were reliable and valid measures of crystallized and fluid intelligence, respectively. The item analyses indicate that neither Verbal nor Abstraction scales were in need of any substantive revisions. Reliabilities and validities of both Verbal and Abstractions scales were at least as good as reliabilities and validities of the newer version of the SILS published in the SILS-2 manual.

Conclusions: SILS continues to be a useful, brief measure of verbal and fluid intelligence, with psychometric properties comparable to the new version of SILS, SILS-2. However, in contrast to SILS, SILS-2 provides more extensive normative data.

Correspondence: *Bob Uttl, Psychology, Mount Royal University, Calgary, Canada. E-mail: uttlbob@gmail.com*

Keywords: Shipley Institute of Living Scale, reliability, validity

O. ELKANA. The WAIS Information Subtest as an Indicator of Crystallized Intelligence and Brain Reserve among Highly Educated Older Adults: A 3 years Longitudinal Study.

Objective: The WAIS-III Information Subtest (IS) is known as a neuropsychological "Hold" test that is relatively resistant to decline with aging and brain injury. The present study examined performance on the IS among a group of highly educated healthy elders during three-year period.

Participants and Methods: 27 participants (12 men and 15 women) ages 68-83 (Mean = 75.07, SD=4.62), education level (Mean= 17.14 years, SD= 3.21) undergo cognitive assessment once a year (T0, T1, T2 and T3) for three consecutive years.

The Cognitive assessments include: Montreal Cognitive Assessment test (MoCA); Rey Auditory Verbal Learning Test (RAVLT); Rey Osterrieth Complex Figure test (ROCF); IS; WAIS-III Digit Span Forward and Backward Subtest; Trail Making Test (TMT), Parts A and B; Verbal Fluency Test: Phonetic Fluency (PF) and Semantic Fluency (SF) and Beck Depression Inventory questionnaire (BDI). MRI anatomic scan was perform only at T0.

Results: Highly stable performances on the IS across the time was found (Mean Z score T0 =1.39; T1=1.37, T2=1.50, T3=1.48) and were significantly higher than zero (for all years $p<0.0001$). In contrast, other neuropsychological tests showed differences in performance across time; some performances significantly declined (ROCF copy, RAVLT - proactive interference, and MoCA) whereas others were improved (ROCF- delayed, RAVLT - delayed, and TMT- A). Moreover, a significant positive correlation was found between whole brain grey matter volumes and IS ($r=0.46$, $p=0.01$), even when controlling Age variable (partial correlation $r=0.43$, $p=0.02$), whereas on other tests no significant correlations were found.

Conclusion: Our findings stressing and strengthening the robust nature of semantic knowledge as Indicator of crystallized intelligence. The IS appears to be an adequate neuropsychological measurement of premorbid ability in highly educated older adults and may be considered as a proxy measure of brain reserve.

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Correspondence: *Odelia Elkana, Academic College of Tel Aviv-Yaffo, Tel Aviv, Israel. E-mail: odelia.elkana@gmail.com*
Keywords: WAIS Information Subtest, Brain Reserve, Neuropsychological Assessment

K. ANNI, M. ENNOK, K. BURK. Estonian adaptation of WAIS-III: evidence of reliability and validity.

Objective: Wechsler Adult Intelligence Scale – Third edition (WAIS-III) verbal scale have been adapted to Estonian language and culture, using classical test theory and item response analysis. The aim of this study is to provide the psychometric properties for all WAIS-III subtests in Estonian standardization sample.
Participants and Methods: The standardization sample included 759 adults (age 16-89). The sample composition was adapted according to the 2014 Estonian census data. Participants were administered all subtests of WAIS-III. Reliability analyses are based on Cronbach alpha coefficients in 11 age groups for all the subtests and composite scores. Internal structure validity is evaluated with subtest intercorrelations and confirmatory factor analysis (CFA). With CFA we tested five structural models, with different number of factors and subtest compositions.
Results: The mean reliability coefficients for subtests ranged from 0.56-0.87. The mean reliability coefficients were lower than 0.7 in Picture Arrangement and Object Assembly subtests. As expected the coefficients for index and IQ scores were higher, ranging from 0.88-0.96. Subtest intercorrelations were in accordance of the assumptions of the original test. CFA confirmed that the four-factor model fits best (total sample goodness-of fit statistics: $\chi^2 = 268.267$, df = 59, CFI = 0.967, RMSEA = 0.069), although five-factor model was roughly equivalent or even slightly better for the total sample ($\chi^2 = 158.499$, df = 56, CFI = 0.984, RMSEA = 0.049). The fit for the one-, two-, and three-factor models was inadequate.
Discussion: This study confirms that the Estonian adaption of WAIS-III have mostly acceptable to excellent reliability statistics, which are comparable with the original version results. Probable reasons for lower reliability coefficients are discussed. CFA confirmed four-factor model, which have been proposed by test developers and also replicated previously with other WAIS-III adaptations.
Correspondence: *Kätlin Anni, University of Tartu, Tartu, Estonia. E-mail: katlinanni@gmail.com*
Keywords: assessment, intelligence

J.M. SIEBERT, K.G.F. THOMAS. A Linguistically Fair IQ Screening Tool for South Africa's Multilingual Reality.

Objective: We describe the first steps toward creating a linguistically fair, inherently multilingual IQ screening tool. Hence, we offer potential solutions to two pressing issues in cross-cultural neuropsychological assessment: the lack of standardized tests normed on linguistically heterogeneous populations and the question of which language(s) to use when assessing multilinguals.
Methods: The Multilingual Vocabulary Test (MVT) asks test-takers to provide definitions for a series of increasingly difficult words, with each word presented in three languages (English/Afrikaans/isiXhosa). A pen-and-paper MVT is administered and scored identically to Wechsler Vocabulary subtests and a digital multiple-choice version is administered online. Study 1 assessed criterion validity and internal consistency. Undergraduates completed the MVT (pen-and-paper: $n = 35$; digital: $n = 30$), as well as Raven's Advanced Progressive Matrices (APM) and a South African-adapted WASI Vocabulary subtest. Study 2, using a different sample of undergraduates ($N = 248$), assessed the internal consistency of a modified digital MVT, with changes based on Study 1 results. In both studies, we gathered data on participants' linguistic profiles via the Language Experience and Proficiency Questionnaire.
Results: In Study 1, MVT scores correlated weakly with criterion scores (APM, $r = .21$; SA-WASI, $r = .52$). MVT performance (unlike criterion performance) was unaffected by dominant language, language acquired first, and number of languages spoken. Internal consistency of the digital MVT improved from .24 (Study 1) to .77 (Study 2).
Conclusions: Although psychometric analyses suggest the MVT requires further improvement, its resistance to linguistic history is a promising step toward more linguistically fair IQ screening. Such screening would allow test-takers to draw on multiple languages during vocabulary tests and would thus predict their intelligence more accurately than currently used monolingual tools.
Correspondence: *Julian M Siebert, Psychology, University of Cape Town, Cape Town, South Africa. E-mail: SBRJUL003@myuct.ac.za*
Keywords: cross-cultural issues, test development, intelligence

T. JUDD. Informal Neuropsychological Evaluation of Foreign Language Learning Aptitude in Linguistically, Educationally, and Epidemiologically Diverse Populations.

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Immigration generates many needs for foreign language learning for education, employment, citizenship, and other needs. Many immigrants bring with them unrecognized neuropsychological disabilities that hinder such learning. Neuropsychologists may be asked to evaluate such clients with respect to:

- disability exemptions from mandatory language instruction;
- instructional strategies, compensations, and accommodations;
- strategies, compensations, and accommodations to facilitate optimal communication and learning in the workplace, court, health care, and other settings.

Immigrants often do not have remote medical or educational records documenting historical cognitive difficulties. Many speak languages for which pertinent language ability testing is not available. Furthermore, developmental language learning disorders often have distinctive presentations in different writing systems. When documented history and formal evaluation of native language abilities are not available, informal evaluations become the next best alternative. In keeping with the conference theme of *The practice of neuropsychology in an increasingly globalized and diverse world*, this presentation will review a suite of techniques that can facilitate this process, including:

- Researching the linguistics and writing system of the native language
- Questions regarding personal history that can give indications of developmental disabilities, even in the uneducated
- Techniques for testing and interpreting native language literacy
- Techniques for evaluating target language knowledge and capacity
- Techniques for evaluating target language phonemic aptitude
- Techniques for evaluating target language phonemic learning aptitude
- Techniques for evaluating potential for using translation technologies

The presentation will also outline compensations and accommodations for learning and communication that neuropsychologists can recommend for such populations.

Correspondence: *Tedd Judd, Private practice, Bellingham, Washington, USA & Universidad del Valle de Guatemala, Guatemala. E-mail: teddjudd@gmail.com*

Keywords: language: second/foreign, cross-cultural issues, test development

A.L. FERNANDEZ, G.E. JÁUREGUI ARRIONDO, M. FOLMER, V. SEITA, G. CIARÍMBOLI. Development of the multicultural neuropsychological scale: A new tool for neuropsychological assessment of culturally diverse populations.

Objectives: Most of the current neuropsychological tests are inappropriate to assess migrants who have been raised and educated in a culture different to where most of these tests have been developed, especially non-Western cultures. The purpose of this study is to describe the development of the Multi-cultural Neuropsychological Scale (MNS), a scale designed as a cross-cultural neuropsychological test.
Methods: The MNS is a short scale devised with universal stimuli which are easy to translate into different languages. It is aimed at adult population and consists of 7 subtests evaluating five cognitive domains: attention, memory, executive functioning, constructional praxias and language. The MNS was applied to 79 adults of both sexes and an educational range between 0 and 20 years of education. For some of the subtests different versions of the same task were designed for individuals with low and high educational level.
Results: the total score showed significant correlations with education (.44) and age (-.30). However, the correlation with age was no longer significant when a partial correlation was computed controlling for education. When the entire group was analyzed age showed a correlation only with memory subtests (range= -.27 to -.36); and education was correlated with visual memory (range= .29 to .44), constructional praxias (.30), language (.56) and executive functioning (.32). There were not significant differences between both sexes on the total score. Overall, subjects understood the instructions and were able to perform the tasks, even those with very low education. Only illiterate subjects were not amenable to testing.
Conclusions: The MNS appears as a short, portable, and user-friendly tool to assess neuropsychological functioning in adults with low and high education. Future studies with populations from a different culture remain to be conducted in order to demonstrate its cross-cultural validity. Validity and reliability studies are in progress.

Correspondence: *Alberto L. Fernandez, Neuropsychology, Universidad Catolica de Córdoba, Córdoba, Argentina. E-mail: albertolfernan@gmail.com*

I. PLATTNER, L. MBAKILE-MAHLANZA, S. MAROBELA, T. KGOLO, M. MONYANE-PHEKO, V. PATEL, A. FEINSTEIN. Assessing

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cognition in Botswana using a brief computerized neuropsychological battery.

Objective: To determine the feasibility of using a brief computerized battery for assessing cognition in citizens of Botswana.

Participants: The sample consisted on 134 healthy subjects and this included 71 (53%) females. The mean age of the sample was 31.16 years (SD: 10.63; minimum: 18 years; maximum: 60 years).

Method: Participants were administered a brief computerized battery of tests (Stroop, Symbol-Digit Modalities Test (SDMT), and 2 and 4 second visual versions of the Paced Auditory Serial Addition Test (PVSAT). Half the subjects were tested in English and the other half in Setswana.

Results: All subjects completed the 20 minute battery. There were no demographic differences between the English and Setswana groups. There were no statistically significant cognitive differences between the two groups. Education predicted performance on all tests in both groups. Age and gender predicted performance on the Stroop and SDMT respectively, but only in the group administered the tests in English.

Conclusions: Botswana has an absolute dearth of neuropsychological expertise. Computerized testing is one way to offset, in small part, this health care challenge. The current data show that computerized testing is feasible with similar results obtained across both language groups. Cultural influences in performance are however present and need to be taken into account when interpreting findings.

Correspondence: *Lingani Mbakile-Mahlanza, Psychology Department, University of Botswana, Gaborone, Botswana. E-mail: lingani.mbakile-mahlanza@mopipi.ub.bw*

Keywords: Cognition, culture, normative data

R. RAUDEBERG, G.L. IVERSON, Å. HAMMAR. Norms Matter: US Normative Data Under-Estimates Cognitive Deficits in Norwegians with Schizophrenia Spectrum Disorders.

Objective: To illustrate and quantify how using different normative systems influences the accuracy of identifying cognitive impairment in people with schizophrenia spectrum disorders.

Participants and Methods: A convenience sample of 302 patients from a psychiatric inpatient hospital in Bergen, Norway was included. A subgroup of 127 (42.1%) had severe co-morbid substance abuse. The total sample ranged between 18-38 years, with a mean age of 24.6 years (SD=4.9). Years of education ranged from 9-20 years, with a mean of 12.3 years (SD=1.8). All completed the Norwegian version of the Repeatable Battery for the Assessment of Neuropsychological Status [(RBANS; 162 (53.64%) completed version A and 140 (46.37%) version B].

Results: There were statistically significant differences between the Immediate Memory, Visuospatial/Constructional, Language, Delayed Memory and Total Scale Index scores when comparing the American normative scores to the Scandinavian normative scores. The effect sizes were medium to large. The patient samples scored higher when using the American normative data, suggesting less cognitive impairment. We defined cognitive impairment has having 2 or more (out of 5) index scores ≤ 5th percentile. Using the American normative data, 32.6% of the group with no co-morbid substance abuse met criteria for impairment compared to 59.4% using the Scandinavian normative data [

Correspondence: *Rune Raudeberg, Division of Psychiatry, Haukeland University Hospital, Bergen, Norway. E-mail: rune.raudeberg@uib.no*

Keywords: normative data, schizophrenia

M. SAKAMOTO, T. GIOVANNETTI, E. TSUTSUMI, D.J. LIBON. Development of the Japanese version of Verbal Learning Test and norms for the elderly.

Objective: There is an urgent need in Japan to develop neuropsychological (NP) tests for dementia detection, especially to assess episodic memory. Simply translating English NP tests into Japanese is problematic without considering language and cultural differences. This study presents data related to the development of a Japanese version of Philadelphia (repeatable) Verbal Learning Test (PrVLT-J).

Participants and Methods: The P(r)VLT-J was constructed using items obtained from pilot tasks with 57 healthy, Japanese adults who were asked to generate exemplars from semantic categories. The P(r)VLT-J format is the same as California Verbal Learning Test I and original 9-word P(r)VLT, such that it includes 9 words drawn from 3 categories (vegetables, snacks, stationaries). Delay Recognition contained 36 words including semantic and non-related distractors. The P(r)VLT-J was administered to 192 healthy elderly volunteers (48 men, 144 women; M age= 73±8.3; M education= 12.6±2.6).

Results: On average, participants recalled 35.7±5.2 words on list A immediate free recall, 7.5±2.9 words on short delay recall, and 7.4±1.6 words on long delay recall. On recognition, participants were 97% accurate in differentiating targets from foils. Sex was significantly associated with immediate free recall (R^2= 0.06, p= .002) and long delay recall (R^2= 0.05, p=. 008). Age was significantly associated only with recognition (R^2= 0.12, p< .0001), whereas education

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was significantly associated with immediate free recall (R^2= 0.04, p= .003), long delay recall (R^2= 0.02, p=. 045), and recognition (R^2= 0.10, p< .0001). **Conclusions:** Results of this study are consistent with those of the original 9-word P(r)VLT. Additional normative data are needed to develop adjustments for sex, age and education. The present study suggests that the P(r)VLT-J may be useful for the evaluation of mild cognitive impairment and dementia syndromes in Japanese elders.

Correspondence: *Maiko Sakamoto, Department of Medicine, Saga University, Saga, Japan. E-mail: masaka@cc.saga-u.ac.jp*

Keywords: test development, aging, normal

Y. OKAMURA, H. FUTATSUKA. Validation in Japanese of the Jansari assessment of Executive Functions (JEF©).

Objective: We verified the effectiveness of Japanese version of the Jansari assessment of Executive Functions (JEF©: Jansari et al., 2014) again. We had found some reasons for the significant differences in JEF© scores between the original sample and a Japanese sample before (Okamura et al., 2016), including the age-related change. In this study, we compared the data under age control.

Participants and Methods: 26 participants (13M, 13F) aged 22–55 years (M=31.42, SD=10.48) participated in the study. There were no significant differences between the Japanese sample and Normative sample (Jansari et al., 2014) in terms of age (Japanese sample mean 31.4 (SD10.5), Normative sample mean 33.3 (SD 10.2); Welch's t test t (83.29) =0.68, p>.05). The Japanese translation of JEF© was run on a standard laptop and resembles playing a computer-game.

Results: Welch's t tests revealed that there were no significant differences in Planning, Prioritisation, Selective-Thinking, Adaptive-thinking. Action-Based Prospective Memory, Event-Based Prospective Memory, and Time-Based Prospective Memory. However There were significant differences in Creative-Thinking (t=6.56, p<.001) and overall Average JEF© score (t=2.80, p<.001) in spite of controlling age-related change.

Conclusions: We found the Japanese sample performed similarly to the original normative sample on most of the measures under age control. This suggest that we should be careful for using executive assessment in handling age related change of executive function.

We found significant differences in Creative-Thinking. There could be some reasons for the difference, including cultural pressures. It would be necessary to change the instructions about Creative-Thinking, and to be adapted it culturally.

Correspondence: *Yoko Okamura, Department of Psychology, School of Human Science, Senshu University, Kawasaki, Japan. E-mail: okamura@psy.senshu-u.ac.jp*

Keywords: executive abilities, normal, assessment

J.C.L.M. DUIJKERS, C.T.W.M. VISSERS, M. RINCK, J.I.M. EGGER. Dutch translation and adaptation of the Barkley Deficits in Executive Functioning Scale (BDEFS).

Objective: The ability to self-regulate one's daily life depends on several self-directed, executive actions. Russell Barkley defined both cognitive and emotional executive functions like self-management of time, self-organization, self-restraint (inhibition), self-motivation and self-regulation of emotion. Based on his model of self-regulation and executive functions (1997), Barkley developed the Barkley Deficits in Executive Functioning Scale (BDEFS). Whereas executive functions have shown to be compromised in several mental disorders, its tailor-made measurement is highly relevant. The aim of this study was to develop a Dutch translation and adaptation of the BDEFS conform official guidelines.

Participants and Methods: After forward and backward translations, cognitive debriefing and reconciliations, the final concept BDEFS version and the original were filled by 25 bilingual Dutch adults, for semantic correspondence measurements and construct validity. Consequently, 60 Dutch adult participants filled the Dutch BDEFS, BIS11 and DEX questionnaires in order to assess concurrent validity.

Results: The original and translated BDEFS indicate sufficient semantic equivalence and Spearman's rho of total scores is high: 0.841. Items mostly show significant and high to moderate correlations, indicating good construct validity. Regression analysis shows no proportional bias. Furthermore, the BDEFS translation has high internal consistency; its reliability (Cronbach's alpha) ranges from 0.890 (data n= 25) to even 0.941 (data n=60). Lastly, the correlation between the BDEFS, BIS11 and DEX supports concurrent validity; correlations between BDEFS, DEX and BIS11 total scores are significant with respectively high (rho= 0.717) to moderate (rho= 0.432) values.

Conclusions: Results point to a successful BDEFS translation and adaptation, facilitating its applicability in the Netherlands. Elaborating on this, for a new study the BDEFS is currently assessed in Dutch clinical practice.

Correspondence: *Judith C.L.M. Duijkers, Centre of Excellence for Korsakoff and alcohol related cognitive disorders, and Addiction care, Vincent van*

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Gogh for Psychiatry, Venray, the Netherlands. E-mail: Judithonderzoek@hotmail.com
Keywords: BDEFS, Executive function, Self regulation

T.R. NIELSEN, K. SEGERS, V. VANDERASPOILDEN, U. BEINHOFF, L. MINTHON, A. PISSIOTA, P. BEKKHUS-WETTERBERG, G.H. BJØRKLØF, M. TSOLAKI, M. GKIOKA, G. WALDEMAR. Validation of a brief Multicultural Cognitive Examination (MCE) for evaluation of dementia.

Objective: The aims of this study were to present the psychometric properties of a newly designed cognitive screening instrument, the Multicultural Cognitive Examination (MCE), compare it with the Rowland Universal Dementia Assessment Scale (RUDAS), and explore its ability to differentiate patients with Alzheimer's disease (AD) from non-AD dementia in a multicultural population.
Participants and Methods: The study was a Western European cross-sectional multi-center study conducted in Germany, Belgium, Denmark, Sweden, Norway and Greece. A total of 66 patients with dementia and 123 cognitively intact participants were included across six memory clinics; 96 had ethnic minority background. The MCE consists of four components evaluating separate cognitive functions and was constructed by adding measures of memory, verbal fluency, and visuospatial function to the RUDAS to create a scale with 0-100 points.
Results: Moderate to large differences were present between patients with dementia and control participants on all MCE components. The MCE significantly improved diagnostic accuracy compared to using the RUDAS alone, with area under the curves of .918, .984 and .991 for the RUDAS, MCE composite and demographically corrected composite scores, respectively. Comparison of performances across subcomponents of the MCE revealed that patients with AD dementia performed significantly poorer on the memory component compared to those with non-AD dementia.
Conclusions: The MCE is a brief cross-cultural cognitive screening instrument that expands evaluation of the cognitive functions covered by the RUDAS, does not require any specialized training, and may be particularly useful for classification of mild dementia or dementia subtypes when neuropsychological support is not readily available.
Correspondence: *T. Rune Nielsen, Neurology, Danish Dementia Research Centre, Copenhagen, Denmark. E-mail: rune.nielsen@regionh.dk*
Keywords: cross-cultural issues, cognitive screening, dementia, Alzheimer's disease

A. BLOCH, D. KAHANA, D. MARGALIT, D. HOOFIEN. The Personality Assessment Inventory in Hebrew-speaking Individuals with Acquired Brain Injury.

Objective: The extent to which personality scales developed for the general population are valid and applicable among individuals with brain damage is a fundamental concern in the provision of accurate neuropsychological assessment and treatment. The current study aimed to shed light on ties between a commonly used self-report measure of personality and various aspects of cognitive functioning, with an emphasis on memory, among Hebrew-speaking adults with acquired brain injuries.
Participants and Methods: A database obtained from the Israeli National Institute for the Rehabilitation of the Brain Injured, comprising 103 participants with acquired brain damage, was examined retrospectively. Participants had undergone comprehensive neuropsychological assessments, including tests of malingering, and completed the Hebrew version of the Personality Assessment Inventory (PAI). Analyses addressed the applicability of the PAI among individuals with brain injuries and explored associations between its clinical and validity scales and various measures of cognitive functioning found in the neuropsychological assessments.
Results: Beyond showing that the Hebrew version of the PAI can be used to assess measures of personality and psychopathology among individuals with brain injuries, the results revealed specific patterns related to both the clinical and validity scales of the PAI, as well as associations between PAI measures and cognitive functions. Relationships between memory performance and various PAI scales, and between the validity scales specifically and additional measures of malingering, were particularly noteworthy.
Conclusions: The findings suggest that brain damage may be associated with characteristic performance profiles on self-report measures of personality, and that cognitive functioning in general and memory specifically should be taken into careful consideration in evaluating the results of such measures among individuals with acquired brain damage.
Correspondence: *Ayala Bloch, The National Institute for the Rehabilitation of the Brain Injured, Tel Aviv, Israel. E-mail: ayalabl@shikumil.org.il*
Keywords: Personality Assessment Inventory, acquired brain injury

P.S. RAO, M. RANGASWAMY, J. EVANS, A. DUTT. Development and initial validation of the

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Indian Prospective Memory Questionnaire: A preliminary comparison of performance of healthy Indian adults and patients with psychosis.
Objective: Individuals suffering from psychotic disorders, including schizophrenia and first episode psychosis (FEP), have deficits in several neuro-cognitive domains, including deficits in Prospective Memory (PM), which is an individual's ability to carry out intentions after a delay. PM is important for everyday living, social and occupational functioning. Although PM deficits have been documented previously in psychosis, relatively few studies have attempted to understand this problem in the South Asian setting, particularly India. Currently, there is no socio-culturally relevant test or questionnaire to assess PM in psychosis specifically for the Indian population.
Participants and Methods: We developed the Indian Prospective Memory Questionnaire – Bengali version (IPMQ-B) based on modifications of existing PM questionnaires (CAPM, PRMQ and PMQ) to suit the Indian socio-cultural & linguistic context. A sample of 47 healthy controls and 15 patients with FEP or established schizophrenia were assessed in Kolkata, a socio-economically diverse, multi-ethnic and multi-cultural city. In addition to the IPMQ-B, the Cambridge Prospective Memory Test (CAMPROMT), a standardised test of PM was administered. A Mann-Whitney U Test was used to test for group differences.
Results: There were no differences between the groups for age (p=.345), gender (p=0.28) and education (p=.145). The patient group reported significantly higher levels of PM difficulties on the IPMQ-B (p<0.001), and performed significantly poorer on the CAMPROMPT (p<0.001) in comparison to controls.
Conclusion: Our preliminary data provide further evidence of PM difficulties for people with FEP/schizophrenia and provide initial validation of the IPMQ-B. However, the sample size of the present study restricts further analysis, accounting for other potential confounders, or examination of subcategories within the patient group. Data collection from a larger patient sample is underway.
Correspondence: *Sulakshana Rao, Department of Psychology, Christ (Deemed to be University), Bangalore, India. E-mail: sulakshana.rao@res.christuniversity.in*
Keywords: Prospective Memory, First Episode Psychosis, Schizophrenia

T. KUFA, J. MICHALEC, L. KALISOVA, T. NIKOLAI, P. HARSA, P. SILHAN, M. HYZA, O. BEZDICEK. Discriminative validity of MATRICS Consensus Cognitive Battery Czech version in schizophrenia.
Objective: The objective of the present study is to evaluate the discriminative validity of MCCB Czech version (MATRICS Consensus Cognitive Battery), i.e., its ability to differentiate patients with schizophrenia and control group based on their cognitive performance. MCCB is international "gold standard" for assessing cognition in schizophrenia.
Participants and Methods: Clinical group (SCH) includes 197 subjects with a diagnosis of schizophrenia; mean age 35.1 ± 9.88; 76% males; length of illness: 35% less than two years (including first episodes of illness), 33% between two and less than ten years, 32% ten and more years. Healthy control group (HC) includes 31 subjects; mean age 33.5 ± 10.2; 58% males. Cognitive performance was evaluated using MCCB (MATRICS Consensus Cognitive Battery) which includes nine tests assessing six cognitive domains (see below). Performance is expressed in normative T-scores using USA norms since Czech normative study is not published yet.
Results: Results of t-test for independent groups: indicated as mean ± SD in T-score for a given group in Speed of Processing SCH = 55.6 ± 8.8 vs HC = 32.1 ± 12.8 and Cohen's d =2.14; Attention/Vigilance SCH = 47.1 ± 8.2 vs HC = 34.3 ± 10.8 and d =1.33; Working Memory SCH = 50.8 ± 6.8 vs HC = 36.2 ± 12.1 and d =1.49; Verbal Learning SCH = 51.5 ± 8.1 vs HC = 36.9 ± 7.8 and d =1.84; Visual Learning SCH = 52.4 ± 9.6 vs HC = 39.6 ± 13.5 and d =1.09; Reasoning and Problem solving SCH = 51.8 ± 10.1 vs HC = 39.6 ± 9.5 and d =1.24. All differences were significant (p < .05).
Conclusions: The present results show that MCCB Czech version is sensitive to cognitive deficit in schizophrenia and is able to differentiate schizophrenia patients from the control group.
Correspondence: *Tomas Kufa, Department of Psychiatry, First Faculty of Medicine and General University Hospital in Prague, Charles University in Prague, Prague, Czech Republic. E-mail: KufaTomas@gmail.com*
Keywords: schizophrenia, cognitive functioning

L. KRAMSKA, J. ZALMANOVA, Z. DVORAKOVA, L. HRESKOVA, Z. VOJTECH. Assessment of patients with Psychogenic Nonepileptic Seizures using Czech version of Neuropsychological Assessment Battery Screening Module.
Objective: Differential diagnosis of Psychogenic Nonepileptic Seizures (PNES) can be sometimes difficult to make and often requires a

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multidisciplinary approach. Neuropsychological assessment is an indispensable part of such diagnosis. However, many neuropsychological tests are not complex to such an extent that offers a full profile of cognitive functioning. Neuropsychological Assessment Battery (NAB) is a relatively new and complex neuropsychological tool that tests all cognitive domains. The aim of the present study is to verify the usefulness of NAB in the differential diagnosis of PNES.

Participants and methods: 15 PNES patients (38.2y, 14w/1m) and 50 healthy controls (15 patients and 15 controls were matched according to the age and gender; 38.2y, 14w/1m) were tested by the NAB Screening module (S-NAB), which assesses five cognitive domains. Demographic and medical information was also collected. PNES diagnosis was based on Video EEG monitoring (one week) with normal EEG findings, habitual seizure capture, suggestive seizure provocation, and patients´ history.

Results: Compared to the control group, patients with PNES obtained significantly lower scores in following domains: Memory, Spatial and Total scale ($p < .001$).

Conclusions: Although the sample size was small, the analysis discovered a statistically significant difference between the clinical group and the control group. The findings suggest that S-NAB can be used in differential diagnosis of PNES as a screening of cognitive performance and effort during testing.

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Correspondence: *Lenka Kramska, Neurocenter, Clinical Psychlogy, Na Homolce Hospital, Prague, Czech Republic. E-mail: kramska.lenka@icloud.com*

Keywords: Neuropsychological Assessment Battery, Psychogenic nonepileptic seizures, Differential diagnosis

H. GOUSE, M. HENRY, J.A. JOSKA, R.N. ROBBINS. Norms for cognitive tests commonly used to assess HIV associated cognitive impairment in isiXhosa speakers in Cape Town, South Africa.

Objective: Suitable normative data for neuropsychological (NP) tests are critical for accurate clinical and scientific interpretation of test performance. First world country norms are inadequate in resource-limited settings with high burdens of neurological disease. South Africa has the world's highest prevalence of HIV (~6 million people) and HIV-associated neurocognitive disorders (HAND) are of high concern. We provide regression-based normative scores for cognitive tests frequently used to identify HAND in isiXhosa-speaking South Africans.

Participants and Methods: 114 healthy isiXhosa speakers stratified by sex, age, and education (50% women; age, M=35.44, SD=11.95; years of education, M=10.54, SD=1.43) were recruited from a primary health care clinic in Cape Town. Regression based norms were calculated for (1) Learning/Memory: Hopkins Verbal Learning-Revised, Brief Visuospatial Memory-Revised; (2) Executive Function: Color Trails 2, Wisconsin Card-Sorting; (3) Attention/concentration: Spatial Span, Digit Span; (4) Processing Speed: Color Trails I, Digit Symbol Coding; (5) Language: semantic fluency: animals, fruits and vegetables; and (6) Motor Functioning: finger tapping, grooved pegboard. Linear regressions were utilised, with age, education and gender entered in the first block, and depression levels, testing language and learning issues in the second.

Results: Age and education significantly predicted executive function, attention, processing speed, and motor function. Education significantly predicted learning/memory, and language domains. Overall, higher age was associated with worse test performance and higher education with better performance.

Conclusions: Gender, testing language and learning difficulties were not consistent predictors of NP test performance. When interpreting assessments of NP performance, clinicians and researchers should correct for the patient's age and education to determine the presence of impaired cognitive functioning.

Correspondence: *Hetta Gouse, Psychiatry and Mental Health, University of Cape Town, Cape Town, South Africa. E-mail: hetta.gouse@gmail.com*

Keywords: Norms, Cross cultural assessment, HIV

J. SALVADOR-CRUZ, C. ARMENGOL DE LA MIYAR, J. BECERRA ARCOS, E.J. MOES. Visuospatial and visuoperceptive processes in Mexican ten-year-olds with three levels of lateralized hand and eye preference: consistent, inconsistent, and mixed.

Forty-four 10-year-old school children attending an elementary school in Ciudad Netzahualcoyotl (State of Mexico) were administered the Rey Osterrieth Complex Figure, along with the Lateralization Indicators from the Neurological Soft Signs Scale-Mexico (SNB-MX), in order to investigate whether degree and side of lateralization are associated with visuoconstructional proficiency, as measured by the ability to draw a complex figure.

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Most children (77%) exhibited a solid hand preference (75 % for the right and 2% for the left); 14% had not yet established a solid R/L preference. The remaining 9% presented with mixed handedness. (Exact Fisher: 6.342, p= .039; Exact Fisher: 23.286, p= .010.). As for eye preference, 50% of the children were consistently lateralized, 23% inconsistently lateralized and 27% were mixed in their use of the right or left eye (Exact Fisher: 8.663, p=.040).

Type and frequency of minor visuomotor errors committed were as follows: (a) poor trace execution: 16%, (b) feature displacement: 11%, (c) incomplete closure: 16%, and (d) unfinished lines: 41%. For major visuomotor errors (suggestive of an underlying neuropathology), type and frequency of errors were: (a) sloppy traces: 18%, (b) feature displacement: 50%, (c) incomplete closure: 63%, (d) unfinished lines: 18%, and (e) inaccurate spatial orientation: 4%.

Qualitatively, inconsistently lateralized children proceeded in a piecemeal, fragmented, unplanned and purely sequential manner. There was no indication of an ability to appreciate the structural, holistic components of the drawing, which would have provided a scaffold to guide the placement of discrete aspects of the figure.

This study underscores the utility of lateralization measures in the early identification of potential delays in cognitive maturation. This allows for remediation and stimulation to be offered as early as possible, thereby potentially limiting the untoward consequences of atypical brain maturation events.

Correspondence: *Judith Salvador-Cruz, Departamento de Posgrado e Investigación, FES Zaragoza UNAM, Ciudad de México, Mexico. E-mail: salvadcj@gmail.com*

Keywords: laterality, visuospatial, child development, normal

I. BENITO SANCHEZ, D. RIVERA, B. BROOKS, M. LONGONI, D. RAMOS-USUGA, J.C. ARANGO-LASPRILLA. Prevalence of Low Scores on Psychomotor Speed and Attention Tests in a Spanish-Speaking Adult Population from 12 Latin American Countries.

Objective: To determine the prevalence of low scores for four neuropsychological tests with six total scores commonly used to evaluate psychomotor speed and attention functions.

Method: N=5402 healthy adults from 12 countries in Latin-America were administered Trail Making Test (TMT), Stroop Color-Word Interference Test, Symbol Digit Modalities Test (SDMT), and Brief Test of Attention (BTA). Inclusion criteria were: age between 18-95 years, born and currently living in the country where the protocol was conducted, spoke Spanish as native language, had completed at least 1 year of formal education, able to read and write, and scored ≥23 on the Mini-Mental State Examination. Two-thirds were women, and the average age was 53.5±20.0 (range 18-95) years. Z scores were calculated for TMT A and B scores, Stroop Color and Word scores, and SDMT and BTA scores adjusting for age, age2, sex, education, and all interaction variables if significant for the given country. Each z score was converted to a percentile for each of the 5 subtest scores. Each participant was categorized based on his/her number of low scoring tests in specific percentile cutoff groups - 25th, 16th, 10th, 5th, and 2nd.

Results: Between 71.1% (Paraguay) and 84.5% (Guatemala) of the sample had at least 1 of the 5 scores below the 25th percentile. Between 31% (Guatemala) and 45.5% (Honduras) scored below the 10th percentile on at least 1 of the 5 subtests. Between 4.8% (Honduras) and 11.5% (Puerto Rico) scored below the 2nd percentile on at least 1 of the 5 scores.

Conclusions: It is common for healthy Spanish-speaking adults to obtain some low scores when administering and interpreting a small battery of psychomotor speed and attention measures. Failing to appreciate these base rates of low scores and not adjusting interpretation of performance accordingly can lead to overly high rates of false-positive diagnoses of cognitive deficits.

Correspondence: *Itziar Benito Sánchez, Grupo de Investigación Psicologia Aplicada a la Salud y Comportamiento Humano (PSYBHE), Universidad de Alicante, Alicante, Spain. E-mail: itziar.benitosanchez@gmail.com*

Keywords: Attention, Psychomotor Speed, psychometric constructs

J.C. ARANGO-LASPRILLA, D. RIVERA, B. BROOKS, D. RAMOS-USUGA, W. RODRIGUEZ-IRIZARRY, M.C. QUIJANO-MARTINEZ, M. ERTL. Prevalence of Low Scores on Learning and Memory test outcomes in a Spanish-Speaking Adult Population from 12 Latin American Countries.

Objective: To determine the prevalence of low scores for two neuropsychological tests with five total scores commonly used to evaluate learning and memory functions.

Method: N=5402 healthy adults from 12 countries in Latin-America were administered Rey–Osterrieth Complex Figure (ROCF) and Hopkins Verbal Learning Test (HVLT-R). Inclusion criteria were: age between 18 to 95 years, born and currently living in the country where the protocol was conducted,

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spoke Spanish as native language, had completed at least one year of formal education, able to read and write, and scored ≥23 on the Mini-Mental State Examination. Two-thirds were women, and the average age was 53.5±20.0 (range 18-95) years. Z scores were calculated for ROCF Copy and Memory scores and HVLT Total recall, Delayed recall, and Recognition scores adjusting for age, age^2, gender, education, and all interaction variables if significant for the given country. Each z score was converted to a percentile for each of the 5 sub-test scores. Each participant was categorized based on his/her number of low scoring tests in specific percentile cutoff groups - 25th, 16th, 10th, 5th, 2nd.
Results: Between 57.3% (El Salvador) and 64.6% (Bolivia) of the sample could be classified as having at least 1 of the 5 scores below the 25th percentile. Between 27.1% (El Salvador) and 33.9% (Puerto Rico) scored below the 10th percentile on at least 1 of the 5 sub-tests. Between 5.9% (Chile, El Salvador, Peru) and 10.3% (Argentina) scored below the 2nd percentile on at least one of the five scores.
Conclusions: The results are consistent with other studies that found that low scores are common when multiple neuropsychological outcomes (tests and/or scores) are evaluated in healthy individuals. Clinicians should take into account the higher probability of low scores in a given individual when evaluating learning and memory using various sets of scores in order to reduce false-positive diagnoses of cognitive deficits in that person.
Correspondence: *Juan Carlos Arango-Lasprilla, IKERBASQUE, Basque Foundation for Science, Bilbao, Spain. E-mail: jcalasprilla@gmail.com*
Keywords: Multivariate Base Rates, Learning and Memory, Spanish-Speaking Adult

J.C. ARANGO-LASPRILLA, D. RIVERA, B. BROOKS, I. BENITO-SANCHEZ, Y. RODRIGUEZ-AGUDELO, A. AGUAYO, Á. ALIAGA. Prevalence of Low Scores on Executive Functions Tests in a Spanish-Speaking Adult Population from 12 Latin American Countries.
Objective: To determine the prevalence of low scores for two neuropsychological tests with five total scores commonly used to evaluate executive functions.
Method: N=5402 healthy adults from 12 countries in Latin-America were administered Stroop Color-Word Interference Test and Modified Wisconsin Card Sorting Test (M-WCST). Inclusion criteria were: a) age between 18 to 95 years, b) born and currently living in the country where the protocol was conducted, c) spoke Spanish as native language, d) had completed at least 1 year of formal education, e) able to read and write, and f) scored ≥23 on the Mini-Mental State Examination. Two-thirds were women, and the average age was 53.5±20.0 (range 18-95) years. Z scores were calculated for Stroop Word-Color and Interference scores and M-WCST Categories, Perseveration errors, and Total errors scores adjusting for age, age^2, sex, education, and all interaction variables if significant for the given country. Each z score was converted to a percentile for each of the 5 sub-test scores. Each participant was categorized based on his/her number of low scoring tests in specific percentile cutoff groups - 25th, 16th, 10th, 5th, and 2nd.
Results: Between 67.4% (Argentina) and 76.3% (Cuba) of the sample had at least 1 of the 5 scores below the 25th percentile. Between 23.7% (Guatemala) and 38.4% (El Salvador) scored below the 10th percentile on at least 1 of the 5 scores. Between 1.1% (Paraguay) and 7.4% (Mexico) scored below the 2nd percentile on at least 1 of the 5 scores.
Conclusions: Consistent with existing research on interpretation of multiple tests, having low scores on measures of executive functioning can be common. Clinicians working with Spanish-speaking adults should take into account the higher probability of low scores on measures of executive functions to reduce false-positive diagnoses of cognitive deficits in an individual.
Correspondence: *Juan Carlos Arango-Lasprilla, BioCruces Health Research Institute. Cruces University Hospital, Barakaldo, Spain. E-mail: jcalasprilla@gmail.com*
Keywords: Multivariate Base Rates, Executive Functions, Spanish-Speaking Adult

D. RIVERA, L. OLABARRIETA-LANDA, W. RODRIGUEZ-IRIZARRY, A. AGUAYO, J. GALARZA-DEL-ANGEL, Y. RODRIGUEZ-AGUDELO, M. LONGONI, C. DE LA CADENA, J.C. ARANGO-LASPRILLA. Normative study of verbal fluency test (Letter M, Fruits, and professions) in a Spanish-speaking adult population from eleven countries in Latin-America.
Objective: To generate demographic-adjusted norms for the Letter M, Fruits, and professions categories.
Method: 3977 healthy adults from eleven countries in Latin-America were evaluated. Individuals were between 18 to 95 years old, were born and currently lived in the country where the protocol was conducted, spoke Spanish as native language, had completed at least one year of formal education, were able to read and write at the time of evaluation, scored ≥23 on the Mini-Mental State Examination. Norms were created using multiple linear regressions and residual values. Age, age^2, gender, education,

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education^2, and interactions were included as predictors in the main model by country.
Results: The final models showed main effects for age on all scores except on Letter M for Honduras, Fruits for Cuba, Honduras and profession for Argentina, Honduras and Paraguay, such that scores increased linearly as a function of age (p's<0.005). Letter M, Fruits, and Professions categories were affected by age^2 in some countries (Argentina, Guatemala and Mexico for Letter M, Fruits for Argentina, Guatemala, Mexico and Paraguay, Professions Guatemala and Mexico). The final models showed main effects for education on all scores except on fruits for Puerto Rico such that scores increased linearly as a function of education (p's<0.005). In addition, Education^2 affected on Letter M for Bolivia, fruits Bolivia, Honduras and Paraguay and professions for Bolivia. Gender affects the scores on letter M for Guatemala, Fruits for El Salvador, Guatemala, Mexico, and Peru, with women obtained higher scores than men (p's<0.005). Letter M, Fruits, and Professions were affected by interaction age and education in Guatemala, Paraguay, and Bolivia.
Conclusions: This multi-national Spanish speaking normative study will help neuropsychologist on these countries to better use this tests on the evaluation and diagnosis of their patients.
Correspondence: *Diego Rivera, BioCruces Health Research Institute, Barakaldo, Spain. E-mail: diegoriveraps@gmail.com*
Keywords: Normative data, Verbal fluency test, Latin-America

L. OLABARRIETA-LANDA, D. RIVERA, R. FERRER-CASCALES, E. VERGARA-MORAGUES, J. IBAÑEZ-ALONSO, A. CARACUEL, I. FERNÁNDEZ, J.C. ARANGO-LASPRILLA. Normative study of the letters P, M, and R in a pediatric population from Spain.
Objective: To generate demographic-adjusted norms for the phonological verbal fluency test (letters P, M, and R) for pediatric population from Spain.
Participants and Methods: 1003 healthy children from Spain were evaluated. Inclusion criteria were: between 6-17 years old, an IQ≥80 on the Test of Non-Verbal Intelligence, and score of<19 on the Children Depression Inventory. Fifty-one percent were girls, the average age was 11.3±3.3, and the mean parent education (MPE) was 14.1±4.0. Phonological verbal fluency test (P, M, and R letters) scores were normed using multiple linear regressions and standard deviation of residual values. Age, age^2, sex, MPE, and its interactions were included as predictors in the analyses. A four step analyses were used to generate norms 1) the predictive value was obtained using b-values of each model, 2) the residual value was obtained, 3) the residual value was standardized, and 4) tables of percentiles were calculated.
Results: The final models showed main effects for age and MPE on the letters P, M, and R, so that scores increased linearly as a function of age (p's<0.003) and MPE (p's<0.001). An interaction between age and education was found for the letter R, so that older children with higher MPE achieved higher scores (p's<0.001). Finally, a main effect of sex on the letter P was found, so that girls produced more words than boys (p's<0.001).
Conclusions: This is the largest national phonological verbal fluency normative study ever conducted in Spain. The results will allow neuropsychologists from Spain to have a more accurate way to interpret the phonological verbal fluency test scores when used to assess language and executive functions in a pediatric-population.
Correspondence: *Laiene Olabarrieta-Landa, University of Deusto, Bilbao, Spain. E-mail: laieneolabarrieta@gmail.com*
Keywords: Phonological verbal fluency, Normative data, Pediatric population

L. OLABARRIETA-LANDA, D. RAMOS-USUGA, D. RIVERA, N. ALBALADEJO-BLÁZQUEZ, I. GONZÁLEZ, I. ROMERO, I.D. DELGADO-MEJIA, E. VERGARA-MORAGUES, M. SARACOSTTI, M. SOTO-AÑARI, J.C. ARANGO-LASPRILLA. Phonological verbal fluency task performance depends on phonemes used: Results from children in 11 Spanish-speaking countries.
Objective: To determine in which of the selected phonemes (F, A, S, M, R, P) of phonological verbal fluency task (PVFT) a group of children from 11 Spanish-speaking countries achieve higher scores.
Participants and Methods: 6,030 clinically healthy children from 10 Latin American countries (Chile, Colombia, Cuba, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Peru, and Puerto Rico) and Spain participated in the study. Inclusion criteria were: a) between 6 and 17 years old, b) Spanish as primary language, c) an IQ of≥80 according to the Test of Non-Verbal Intelligence, d) a score of <19 on the Children's Depression Inventory, and e) enrolled in school (private or public). Fifty-one percent of the sample were girls, the mean age was 11.44 years, and the mean for of parents' education was 13.23 years. All participants completed the PVFT.
Results: One-way analysis of variance for phoneme on number of words produced revealed significant differences between phonemes (p<.001). Bonferroni

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post-hoc analysis revealed that participants produced significantly more words in P (p<.001), and M (p's<.01) phonemes, and significantly lower words in phoneme F (p<.001). No significant differences were found in the number of words produced by participants among the R and S, and A and S.

Conclusions: The use of FAS phonemes in the evaluation of phonological verbal fluency in Spanish speaking individuals have been controversial. The results of this study showed that Spanish speaking children have significantly better performance on P and M phonemes as compared to those more traditional phonemes (FAS), and suggested that the phonemes P and M will be more appropriate when evaluating Spanish speaking clients. The results of this study showed that neuropsychologists should be aware that PVFT performance may depends on phonemes used.

Correspondence: *Laiene Olabarrieta-Landa, University of Deusto, Bilbao, Spain. E-mail: laieneolabarrieta@gmail.com*

Keywords: Phonological verbal fluency, Pediatric population

D. RIVERA, D. RAMOS-USUGA, I. BENITO-SÁNCHEZ, M.R. ACOSTA BARRETO, L. OLABARRIETA-LANDA, J.C. ARANGO-LASPRILLA. The useful of Phonological verbal fluency test on the diagnosis and classification of intellectual disability in Spanish speaking pediatric population.

Objective: To determine if the phonological fluency test is a good measure to differentiate between children with intellectual disability (ID) and healthy controls in a pediatric population from Colombia South America.

Participants and Method: 205 healthy participants and 142 participants with ID from Bogotá, Colombia participated in the study. Fifty-seven percent of the healthy sample were women, the mean age was 11.6, and the mean years of education of parents (MLPE) was 11.3. Among clinical sample, 60% were men, the mean age was 10.1, and the MLPE was 8.3. Receiver Operating Characteristic (ROC) curve was used to discriminate if the letter PMR, and the Area Under the Curve (AUC) as a measure of accuracy. Three Binary logistic regressions adjusted by age, age^2, MLPE and the total score of each letter were used to determine the probability of the phonological fluency test to accurately classified children with ID and Healthy controls.

Results: The AUC for the P letter was .909, for M letter .912, and for R letter .914, suggesting high accuracy regarding the instrument's ability to distinguish between individuals with and without ID. First logistic regression showed that MLPE [Exp(B)=.030] and P [Exp(B)=.505] letter classify children with and without ID (Cox & Snell R square=.526). Second logistic regression showed that MLPE [Exp(B)=.052] and M [Exp(B)=.476] letter classify children with and without ID (Cox & Snell R square=.515). Third logistic regression showed that MLPE [Exp(B)=.031] and R [Exp(B)=.394] letter classify children with and without ID (Cox & Snell R square=.539). Using binary response estimation cut-off points for each score were calculated: ≤14 for P letter, ≤13 for M letter, and ≤11 for R letter. Age and age^2 were not significant.

Conclusions: PMR letters are sensible to classify between children with and without ID. Binary response model estimation allows clinician to determine the probability of phonological fluency deficits associated with ID.

Correspondence: *Diego Rivera, BioCruces Health Research Institute. Cruces University Hospital, Barakaldo, Spain. E-mail: diegoriveraps@gmail.com*

Keywords: Verbal fluency test, Intellectual disability, Spanish speaking pediatric

D. RIVERA, L. OLABARRIETA-LANDA, J.A. CALDERON CHALA, S.L. OLIVERA PLAZA, J. GALARZA-DEL-ANGEL, A. AGUAYO, A. RODRÍGUEZ-LORENZANA, C.J. DE LOS REYES ARAGÓN, J.C. ARANGO-LASPRILLA. The impact of literacy and education on cognitive performance in a group of Spanish-speaking individuals from Latin America.

Objective: To analyze the effect of literacy and education on different cognitive measures in a group of healthy adults from 7 Latin American countries.

Participants and Method: 850 adults from Bolivia, Colombia, El Salvador, Guatemala, Honduras, Mexico, and Puerto Rico participated in the study. They completed the Rey-Osterrieth Complex Figure test (ROCF), Modified Wisconsin card sorting test (M-WCST), Brief test of attention (BTA), Semantic verbal fluency test (animals, fruits, and professions), Symbol digit modalities test (SDMT), and Hopkins verbal learning test-Revised (HVLT-R). 61% of the sample were women, with a mean age of 58.3. The sample was divided in 5 groups: absolute illiterate (don´t read or write), functional illiterate (they know how to read and write), 1-6, 7-12, and >12 years of education.

Results: Analysis of variance showed significant differences between groups in age (F=3.52; p<0,01), so that illiterate groups were older than literate groups. After controlling for age, ANCOVAs revealed significant differences between groups in

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ROCF copy (F=89.08; p<0,001), and memory (F=49.87; p<0,001); M-WCST category (F=56.46; p<0,001), perseverative errors (F=19.70; p <0,001), and total errors (F=35.62; p<0,001); BTA (F=99.27; p<0,001), animals (F=62.65; p<0,001), fruits (F=50.54; p<0,001), and professions (F=124.68; p<0,001); SDMT (F=152.16; p<0,001), and HVLT-R learning (F=65.51; p<0,001), recall (F=196.45; p<0,001), and recognition (F=7.84; p<0,001). Absolute illiterate obtained the lowest scores, followed by functional illiterate, participants with 1-6, 7-12 and >12 years of education.

Conclusions: It is well known that education is associated with cognitive performance. However, neuropsychologists should not assume that all individuals with not education (illiterates) have a homogenous cognitive performance. The differences on neuropsychological performance in illiterates' individuals could be explained by their reading and writing skills.

Correspondence: *Diego Rivera, BioCruces Health Research Institute. Cruces University Hospital, Barakaldo, Spain. E-mail: diegoriveraps@gmail.com*

Keywords: Illiterate population, cognitive performance, Latin-America

F. GARCIA-VAZ, V. MECA-LALLANA, B. DEL RIO, C. AGUIRRE, J.A. VIVANCOS, R.G. GONZALEZ-CUENCA, A. MELDAÑA-RIVERA, M.L. MARTINEZ-GINES, J.M. GARCIA-DOMINGUEZ, J.P. CUELLO, Y. HIGUERAS. Paced Auditory Serial Addition Test 3" (PASAT 3"): normative data for correct answers, dyads and omissions for Spanish population.

Objetive: Provide updated normative data for correct answers (CA) and normalisation of dyads (D) and omission errors (O) for three educational levels of PASAT 3" (Gronwall version, 1977) for healthy Spanish population (HC) and for patients with multiple sclerosis (MS).

Method: *Sample* 148 healthy controls (HC) (40.4%male; mean=36.5±13,42 age) and 151 MS patients (MS) (38.4%male; mean=42.39±10.44 age) were divided in homogenous groups according to three educational levels:(i) 8-12 years of schooling; (ii)13-16;and (iii) 17 or more years of formal education. *Procedure*: a complete neuropsychological battery was administered for every participant. We analysed the differences between groups; mean, mode and standard deviation of correct answers (CA) and dyads (D) for Pasat 3" were obtained for each group.

Results: We found significant mean differences between HC and MS for CA (HC:45.47±10.39; MS:40.76±11.98, p<0.01),D (HC: 42.33±13.84; MS:36.75±15.31, p<0.01) and O (HC:13,00±10,40; MS: 8,65±7,7) . The analysis between groups according to educational level showed the most significant differences between the highest educational level groups for CA (HC: mean=48.22±8.51; MS: mean=42.11±10.77, p<0.01) and D (HC: mean=45.78±11.51; MS: mean=38.31±13.97, p<0.01). We obtained mean, mode, standard deviation and percentiles for CA, D and O for HC and MS groups; differences among MS and HC educational levels (i) and (ii) are also provided.

Discussion: The results of this work present an updated normative data of PASAT 3" for healthy Spanish population and with MS; demonstrate the need to have normative data for the highest educational levels and provide a specific normalisation that facilitates the early detection of cognitive impairment for this population; finally we provide normative data for O and D that let discriminate the influence of different cognitive procceses in the execution of PASAT 3".

Correspondence: *Yolanda Higueras, Department of Neurology, Fundacion para la Investigacion Biomedica, Hospital Universitario de la Princesa, Madrid, Spain. E-mail: yolandahigueras@googlemail.com*

Keywords: multiple sclerosis, cognitive screening, PASAT

J.S. KAZMI, D.M. ERLANGER. The cross-cultural validity of the Repeatable Battery for the Assessment of Neuropsychological Status in Spanish-speaking TBI patients.

Objectives: The *Repeatable Battery for the Assessment of Neuropsychological Status* (RBANS) is a widely used measure of general cognitive functioning and a potential indicator for cognitive decline. Validity data is available for several presenting problems including traumatic brain injury (TBI). Most commonly on the RBANS, individuals suffering from TBI effects present cognitive deficits in domains of attention (AT), immediate memory (IM) and delayed memory (DM), but not in the domains of visuospatial skills (VS) or language (LN). Although the RBANS has been shown to be sensitive to TBI deficits generally, limited information is available on its psychometric properties in native Spanish-speaking TBI patients.

Participants and Methods: This analysis reports the cross-cultural effects of TBI in an English-speaking group (n=18) and age-gender matched Spanish-speaking individuals (n=14) using the *RBANS Updated Spanish Protocol* 18-60 months post trauma. The 32 males assessed were between

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24-71 years of age, and high-school graduates or less. The two groups had similar severities of TBI as shown by *Glasgow Coma Scale (GCS)* (Eng. M=13.6 SD=2.26 vs Sp. M=13.3 SD=3.12) and frequency of mild vs. moderate/severe classification (Eng. = 11% vs. Sp. 14%). All patients obtained passing scores on effort assessments.

Results: Native Spanish speakers' summary scores did not differ significantly from those of the English-speaking cohort. Significant or near significant correlations were identified between GCS and RBANS summary scores on domains expected to be affected by TBI (IM r= .38, AT r= .42, DM r= .33), but not in domains less sensitive to TBI (VS r= .05, LN r= .09). These findings were more pronounced for the native Spanish speaking cohort than for the English-speaking cohort.

Conclusions: These data demonstrate that the *Updated Spanish Protocol* for the RBANS accurately captured the effects of mild and moderate-severe TBI in native Spanish speakers.

Correspondence: *Jacob S. Kazmi, Department of Neuroscience, Bowdoin College, Brunswick, ME, USA. E-mail: jskazmi@bowdoin.edu*

Keywords: traumatic brain injury, test validity

I. VENTURELLA, D. CRIVELLI, M. FOSSATI, F. FIORILLO, M. BALCONI. Psychophysiological measures for vegetative state assessment.

Objective: The present research's aim was to find state of consciousness psychophysiological markers in response to sensorial stimuli where behavioural evidences of awareness are not clear: vegetative state patients.

Participants and Methods: A sample of 23 vegetative state patients was assessed with a set of multi-sensory stimuli. Tactile stimuli were a wrist hold and ice application; olfactory stimuli were vanilla and cinnamon fragrances. During the whole stimuli presentation, cortical activity (EEG) and physiological activation (biofeedback) were recorded.

Results: Results showed a physiological arousal increasing with greater skin conductance levels and heart rate in response to vanilla and ice compared, respectively, to cinnamon and wrist hold stimuli. Data from cortical activity confirmed physiological activation, with a higher Theta band activity in left frontal cortex for vanilla fragrance and at right for cinnamon fragrance. This lateralization seemed to highlight stimuli pleasantness (higher left frontal activation for vanilla) and stimuli unpleasantness (higher right frontal activation for cinnamon). The different physiological activation should be probably due to pleasantness for vanilla stimulus. Patients' responses to ice application, instead, were maybe due to a state of alert. More compromised patients, in fact, seemed to detect ice as a potentially dangerous stimulus for their organism and not only as a distress stimulus.

Conclusions: In conclusion, even if explicit stimuli processing and interpretation were probably impeded by cortico-talamic disconnections, covert responses, as shown by both EEG and autonomic results, could be used to bypass this obstacle.

Correspondence: *Irene Venturella, Research Unit in Affective and Social Neuroscience, Catholic University of the Sacred Heart; Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy. E-mail: irene.venturella@unicatt.it*

Keywords: vegetative state, psychophysiological measures, multi-sensory

M. DOKOUPILOVA, T. NIKOLAI. Verbal fluency tasks across time.

Objective: Verbal fluency tests are employed regularly during neuropsychological assessments of elderly, and deficits are common finding in patients with cognitive impairments. This study presents data for phonemic and semantic verbal fluency (VF). The aim is to provide an overview of performances of participants in VF tests and its correlation with various neuropsychological examinations.

Participants, Methods: The aim of this study is to analyze VF data of healthy control subjects (HC), patients with subjective cognitive complaints (SCD), amnestic mild cognitive impairment (aMCI) a non-amnestic mild cognitive impairment (naMCI), with respect to time gradient within one-minute interval, and to evaluate correlation of the scores with other neuropsychological tests. The study includes 665 subjects (189 SCD, 295 aMCI, 116 naMCI, and 65 HC), recruited from patients of the Czech Brain Aging Study. Their mean age was 67.96 years (SD = 11.43) and mean education was 14.49 years (SD = 3.28); 370 were women and 295 men. VF measures included semantic categories (animals and vegetables) and phonemic (letters N, K, and P). For all VF tests, number of correct answers, perseverations and other errors were recorded in 15 sec intervals.

Results: The groups differ in their numbers of correct answers (all $p < .001$), but not in the number of perseverations (all $p > .05$). The only condition that differs among other errors was the last interval in category vegetables ($p = .006$). Correlations with other neuropsychological tests were higher in aMCI and naMCI groups, compared to HC and SCD.

Conclusions: As the results are important to the early diagnostics of neurodegenerative diseases, one might relate them with biomarkers and MRI. As a

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possible output one may consider longitudinal studies of the subjects with SCD to survey possible decline and change of their case history. This particular study will be deepened by dealing with clustering and switching and setting these norms for the CR.

Correspondence: *Monika Dokoupilová, Department of Neurology and Centre of Clinical Neuroscience, Charles University, First Faculty of Medicine and General University Hospital in Prague, Prague, Czech Republic. E-mail: xdokoupilova@gmail.com*

Keywords: fluency, mild cognitive impairment, neuropsychological assessment

I. HEPDARCAN-SEZEN, S. CAN, H. CETINKAYA, G. ALANKUS. The reliability of hemodynamic measures obtained via functional near infrared spectroscopy (*f*NIRS) by using n-back task.

Objective: The present study aims to examine the reliability of the measures obtained through functional near infrared spectroscopy (*f*NIRS) which is used in specification of the executive functions related to the hemodynamic activity of the dorsolateral prefrontal cortex of the brain, during a verbal version of n-back task which is a widely used working memory task in behavioral and neuroimaging studies. In general, researchers investigated the reliability of *f*NIRS by applying test-retest method. In this study, besides test-retest method, alternate forms reliability was also examined.

Participants and Methods: A total of 14 healthy non-smoker right-handed university students, who were performed verbal n-back task before, were re-tested after 3 weeks with the same procedure in which includes 3 trials with different orders of 0-, 1-, 2-, and 3-back. N-back tasks were computerized and presented via MATLAB. Hemodynamic measurements were obtained by 16-channeled fNIR system via COBI (Cognitive Optical Brain Imaging) Studio Software. For the alternate forms reliability, verbal n-back task with different letters were presented by following the same procedure.

Results: Channel-wise linear mixed effects analysis used to investigate similarity of the responses on parallel tests and the stability of the behavioral and hemodynamic responses obtained from two testing situations.

Conclusions: The results showed consistent results both in hemodynamic and behavioral measurements.

Correspondence: *Ilgım Hepdarcan-Sezen, Izmir University of Economics, Izmir, Turkey. E-mail: ilgim.hepdarcan@ieu.edu.tr*

Keywords: fNIR, reliability, n-back task

D. DE FILIPPIS, M. BOSSOLA, I. VENTURELLA, L. ANGIOLETTI, M. BALCONI. Hemodialysis treatment on Quality of Life: assessment of the correlation between reward system and chronic fatigue.

Objective: End-stage renal failure, if not addressed in an adequate manner, can lead to death. However, haemodialysis treatment greatly influences the patient's life. Basic research on neuro-immune interactions has demonstrated that an alteration of the basal ganglia function may result in altered reward processes in chronic diseases, such as chronic hemodialysis patients (HD). Moreover, these patients have chronic fatigue, affecting the quality of life (QoL). Fatigue is a symptom, both physical and motivational. This last aspect is often associated with pain, affective and cognitive disorders. The aim of the present study was to investigate a possible correlation between the fatigue and the reward mechanisms that regulate the motivational disposition behaviours in HD patients with a significant impact on QoL.

Participants and Methods: Evaluative scales was administered to a sample of middle-aged haemodialysis patients (N=94). Fatigue Severity Scale (FSS) was applied to measure the impact of fatigue on motivation functionality. Behavioural Activation System (BAS) and Behavioural Inhibition System (BIS) Scale was administered to investigate the resulting in approach/avoidance behaviours to rewards. Finally, the State-Trait Anxiety Inventory (STAI-Y) and the Back Depression Inventory (BDI-II) were used to evaluate the presence of anxiety and depression disorders.

Results: Results showed a positive correlation between FSS and BDI score. The same for STA-Y score. The FSS score was significantly higher in patients with high BIS Z-score than in patients with low and medium BIS Z-score. Conversely, the BDI score and the STAI-Y1 and STAI-Y2 scores were similar among the high, medium and low BIS Z-score groups of patients. The correlation between the BIS score and the FSS score was statistically significant.

Conclusions: This study shows that there is a correlation between fatigue symptoms and reward system with possible consequences on patient's engagement and QoL.

Correspondence: *Daniela De FIippis, Research Unit in Affective and Social Neuroscience, Catholic University of the Sacred Heart & Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy. E-mail: daniela.defilippis@unicatt.it*

Keywords: Fatigue, End-Stage Renal failure, Reward Mechanisms

L. GONZALEZ-BURGOS, E. WESTMAN, D. FERREIRA, J. BARROSO. Semantic verbal fluency during the life-span: The role of compensatory factors.

Objective: Verbal fluency performance has been widely studied in the field of cognitive aging. However, compensatory processes that maintain optimal performance in verbal fluency with aging are not well known. The aim of this study was to investigate the association between age and semantic verbal fluency, taking into account both the influence of other demographic and cognitive variables and their possible compensatory effects.

Participants and Methods: A sample of 440 participants between 29 and 84 years of age was recruited. The sample was stratified into three age groups: middle-age (29-56 years), early elderly (57-70 years), and late elderly (71-84 years). Random forest regression analysis was applied in order to study the association of age and several demographic and cognitive variables with semantic fluency (animals) in each age group. Further ANOVA were performed (linear, quadratic and cubid contrasts) to test tendencies between semantic fluency and age.

Results: Age had a linear effect on the semantic fluency task. The most important variables to predict fluency in the middle-age group were working memory and processed speed. In the early elderly, these were lexical access, processed speed and inhibition capacity. In the late elderly, the most important variable was processed speed. The highest effect of Information Subtest as a proxy of cognitive reserve was observed in the early groups.

Conclusions: The effect of different variables on semantic verbal fluency varies with age. Processed speed presents an important role in this task in all age ranges. Cognitive reserve resulted as one of the most important compensatory factors, specially in the elderly groups. Other cognitive functions contribute to semantic fluency, specially, working memory and lexical access. These results may help to better understand compensatory effects against cognitive decline in normal aging, as well as to identify possible targets for cognitive intervention.

Correspondence: *Lissett González Burgos, Department of Clinical Psychology, Psychobiology and Methodology, University of La Laguna, San Cristóbal de La Laguna, Spain. E-mail: lgonzalb@ull.edu.es*

Keywords: language, fluency, cognitive reserve

A. ONIDA, A. DI VITA, F. BIANCHINI, D. RIVERA, A. MORLETT-PAREDES, C. GUARIGLIA, J.C. ARANGO-LASPRILLA. The Profession of Neuropsychology in Italy.

Objective: The purpose of this study was to analyze the characteristics of individuals working in the field of neuropsychology in Italy, their background, professional training, current work situation, types of assessment and preferred diagnostic procedures as well as rehabilitation techniques employed. Moreover, it explored targeted population, teaching responsibilities, and research activities.

Participants and Methods: A total of 154 Italian professionals working in the field of neuropsychology completed an online survey from April 28, 2016 thru June 30, 2016. The majority of participants were females, with a mean age of 42.6 years (range 24 – 71 years).

Results: Participants worked for the National Health System, in private practice, or private rehabilitation facilities, and reported being very satisfied with their work. Those who identified themselves as neuropsychologists primarily assessed individuals with dementia, stroke, movement disorders and traumatic brain injury (TBI). While the majority of participants declared no problems with the instruments used, some complaints were reported, including but not limited to the financial cost of current neuropsychological tests and the lack of good psychometric properties. The main perceived obstacles were the lack of willingness to collaborate among professionals, the scarcity of academic training programs, and the lack of clinical training opportunities.

Conclusions: Results from this study helped us identify four aspects in the field that need to be resolved: (1) the need for formal education, (2) recognition of professionals working in the field, (3) the need to increase the number of diagnostic and therapeutic instruments, (4) improve the psychometric validity and verify the effectiveness of existing ones.

Correspondence: *Juan Carlos Arango-Lasprilla, Department of Neurology, Nuoro, Italy. E-mail: jcalasprilla@gmail.com*

Keywords: Clinical Neuropsychology, Practice, Italy

A. BRANCO LOPES, G. WAUQUIEZ, A. PONCHEL, G. LEAL, D. RIVERA, J.C. ARANGO-LASPRILLA. State of the profession of neuropsychology in France: Results of an online survey.

Objective: The purpose of this study was to investigate sociodemographic characteristics, clinical and academic training and the types of activities engaged in by practicing psychologists specialized in neuropsychology in France.

Participants and Method: 804 French psychologists specialized in neuropsychology

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participated in an online-based survey between October and December 2017.
Results: 90% of the participants were women, with a mean age of 32 (range 22-60). In the total sample, 56% of the participants worked in the public sector, 41% in the private sector and 26% had a private practice job. Of the participants, 69% worked full-time and only 2.5% of the participants were unemployed. Psychologists specialized in neuropsychology expressed a willing to establish a board certification. 97.3% engage in evaluation, 74% in rehabilitation, 22.1% in research, and 35.8% in teaching. They work an average of 33.0 hours per week in the field of neuropsychology. Clinicians primarily work with individuals with stroke/vascular (56.7%), dementia (53.3%), depression (36.7%), and learning disabilities (34.5%). 95.9% believe that clinical neuropsychologists should have a degree in neuropsychology and 97.7% believe they should have a degree in psychology. The top perceived barriers to the field include: lack of willingness to collaborate between professionals (43.7%), lack of professional leaders in the field (40.7%), and lack of clinical training opportunities (24.9%). 53.1% of the clinicians indicate that normative data for their countries do not exist.
Conclusions: It is essential for psychologists specialized in neuropsychology in France to establish better-defined guidelines for academic and clinical education since there is no legally protection of the specialty and given that needs for neuropsychological services are increasing.
Correspondence: *Antony Branco Lopes, 77144, Clinique de Soins de Suite et Réadaptation de Montévrain, Montévrain, France. E-mail: antony.branco.lopes@gmail.com*
Keywords: neuropsychological practice, academic education, culture

H.H. KAAE, S.T. SØRENSEN, C. GULDBORG, J.Ø. RISS. Reliability of neuropsychological testning by videoconferencing.
Objective: The use of videoconferencing in neuropsychology are more common, as it can reduce costs, and help provide better treatment and rehabilitation to rural populations. Generally, there is a lack of empirical studies in this field and most existing studies have primarily focus on patients with dementia. Patients with acquired brain injury often have sensorimotor impairments, which may influence test performance. This study was conducted to determine the reliability of neuropsychological tests administered over videoconference to patients with acquired brain injury.
Participants and Methods: 20 patients recruited from an inpatient neurorehabilitation centre. All patients completed The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) and Block Design from Rigshospitalet in two conditions: face-to-face and videoconferencing. Afterwards the patients rated the experience on a questionnaire. The scores in the two conditions were compared using Intraclass Correlations (ICC) and limits of agreement (95%).
Results: All ICC were between moderate to excellent (.73-.94) and all significant. The tests requiring a motor response had the best ICC (.87-.94). Verbally mediated tests had an agreement between moderate to excellent ICC (.73-.94) and visually mediated tests had a good agreement ICC (.76-.83). The questionnaire showed that all patients were generally satisfied with the test form and overall felt comfortable. 40 % of the patients reported to have never tried videoconferencing of any kind before.
Conclusion: Results on tests that required motor responses suggest good to excellent agreement between the two conditions. Results on verbally and visually mediated tests were more sensitive to learning effect and random error, which may have affected the results. Overall, the findings support that video-based psychological testing is a reliable alternative to face-to-face testing in patients with acquired brain injury.
Correspondence: *Henriette H. Kaae, Neuroenhed Nord, Brønderslev, Regional Hospital, North Denmark, Brønderslev, Denmark. E-mail: h.kaae@rn.dk*
Keywords: videoconferencing vs. face-to-face, test reliability

Lunch Break

12:00–13:00

Paper Session 17. Neuromodulation and neurofeedback: Rehabilitation methods of the future

Moderator: Kevin Krull

13:00–13:55

D. CRIVELLI, G. FRONDA, I. VENTURELLA, M. BALCONI. Improving neurocognitive efficiency via technology-mediated mindfulness

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practice: electrophysiological and cognitive evidences.

Objective: Focused attention or open monitoring meditation practices may foster the development of focusing and cognitive skills. In particular, mindfulness, by combining those forms of mental practice, might allow for training attention orientation and monitoring thus leading to improved neurocognitive efficiency. Further, it has been suggested that such training can be reinforced and made more accessible even to beginners by supporting practice with wearable brain-sensing devices able to give the practicer a real-time feedback on his/her attentive/distracted mindset. We therefore devised the present study to test the specific potential of a technology-mediated mindfulness intervention for optimizing cognitive performance and improving markers of neural efficiency during mental effort.

Participants and Methods: Sixty participants were randomly divided in active control and experimental groups. Groups were involved in structured four-week mental training interventions. Unlike the active control group, experimental ones practiced mindfulness-based activities with the support of dedicated brain-sensing devices. The effect of training was tested by comparing pre- and post-intervention performance at standardized cognitive tasks, as well as resting-state and task-related electrophysiological measures.

Results: Data analysis highlighted increased measures of attention allocation (N2 event-related potential) and electrophysiological responsiveness (alpha-blocking metrics) and frequency profiles consistent with a relaxed mindset in the experimental groups. At the end of the intervention, experimental participants also performed better (reduced response times) at computerized tasks tapping on attention and executive control skills.

Conclusions: Findings suggest that mindfulness interventions supported by brain-sensing neurofeedback devices may be effective at improving the efficiency of information-processing and regulation of attention/cognitive resources.

Correspondence: *Davide Crivelli, Research Unit in Affective and Social Neuroscience, Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy. E-mail: davide.crivelli@unicatt.it*

Keywords: Neurocognitive empowerment, Mindfulness, Wearable devices

M.A. FRIEHS, C. FRINGS. Modulating response inhibition via tDCS.

Objective: The goal of these studies was to explore the possibilities of modulating Stop-Signal-Task (SST) performance via transcranial direct current stimulation (tDCS). The Stop-Signal Task (SST) is assumed to reliably measure response inhibition, that is, in this task participants sometimes have to withhold a response according to the onset of a sudden cue. The response inhibition process is calculated by the Stop-Signal Reaction Time (SSRT; for review see Verbruggen & Logan, 2009). The right dorsolateral prefrontal cortex (rDLPFC) plays a key role in goal directed cognitive control in general and crucially its activation is correlated with SST performance. It was hypothesized that anodal tDCS over the rDLPFC would lead to an improvement in the response inhibition process, while cathodal should impair it.

Participants: In total 102 participants were recruited for two subsequent studies. The first study contrasted the effects of anodal to sham tDCS in N = 57 healthy adults (38 female, mean age 24.86 ± 3.76). The second study contrasted the effects of cathodal to sham tDCS in N = 45 healthy adults (33 female, mean age 22.02 ± 2.53).

Methods: The rDLPFC was stimulated for 20 min in a pre-post design using a modified tDCS procedure compared to previous studies. A 9 cm² active electrode was always positioned over the rDLPFC while the 35 cm² reference was placed over the left deltoid. Anodal and cathodal tDCS effects were contrasted to sham stimulation. Post-hoc the data and results of both studies were combined.

Results: Analysis revealed a significant time x tDCS-condition interaction in the expected direction for both studies. Control analysis confirmed that the tDCS specific changes were not due to generally faster or slower reaction times. After combination of both data sets the effects remained stable.

Conclusion: Anodal and cathodal tDCS applied to the rDLPFC can modulate cognitive inhibition processes in a polarity specific way.

Correspondence: *Maximilian A. Friehs, Cognitive Psychology, University of Trier, Trier, Germany. E-mail: friehs@uni-trier.de*

Keywords: executive abilities, normal, inhibitory control, neurocognition

B.M. HAMPSTEAD, S. MA, F.G. HILLARY. HD-tDCS effects on resting-state functional connectivity and GABA in older adults.

Objectives: The neurophysiologic effects of transcranial direct current stimulation (tDCS) have generally been evaluated in healthy young individuals using motor evoked potentials or functional magnetic resonance imaging (fMRI). Less is known about the effects of High Definition (HD)-tDCS on non-motor cortex and in older adults and those with mild cognitive impairment (MCI). This double blind, randomized controlled study used

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fMRI and magnetic resonance spectroscopy (MRS) to evaluate the neurophysiologic effects of HD-tDCS.
Participants: 20 cognitively intact older adults and 20 MCI
Methods: Each participant completed 2 sessions in randomized order (active then sham or vice-versa). Active HD-tDCS was administered at 2mA for 20 minutes over the right superior parietal lobule (SPL) with the center (anode) over P2. Resting-state fMRI was acquired ~20 minutes after stimulation. GABA was measured by placing a seed in the targeted right SPL.
Results: Graph theory metrics, including a "cost" function (strength x Euclidian distance), were calculated through the 'igraph' package in R for both the active and sham sessions. There were no significant differences in connectivity using the active > sham session contrast in the entire sample or either subgroup. However, the change in local cost was inversely related to the volume of the targeted right SPL in the MCI group. This effect was also evident in the larger dorsal attention network (of which the SPL is part). Additionally, there was an inverse relationship between change in cost and change in GABA. Importantly, GABA and SPL volume were unrelated, suggesting distinct roles in HD-tDCS effects.
Conclusions: These findings provide evidence that HD-tDCS can change underlying neurophysiology in non-motor cortex in at least some individuals. Regional atrophy appears to be an important factor to consider when administering HD-tDCS. Factors affecting neurotransmitters also warrant further consideration.
Correspondence: *Benjamin M. Hampstead, VA Ann Arbor Healthcare System & University of Michigan, Ann Arbor, USA. E-mail: bhampste@med.umich.edu*
Keywords: tDCS, resting-state, Alzheimer's disease

Paper Session 18. Cognition in the context of serious medical Illness

Moderator: Sandra Lettner

13:00–13:55

M. TAYLOR-ROWAN. Pre-stroke frailty is independently associated with acute post-stroke cognition: a cross-sectional study.
Objective: Prior frailty may be an important risk factor for cognitive impairment after stroke. We investigated the association between pre-stroke frailty and post-stroke cognition.
Participants and Method: We studied consecutively admitted acute stroke patients in a single urban teaching hospital between February 2016 and December 2017. Cognition was assessed using the Mini-Montreal Cognitive Assessment (min=0; max=12). Higher scores indicate better cognition. The Rockwood Frailty Index (min=0.0; max=1.0) was used to generate frailty scores for each patient. Higher scores indicate the patient is more frail. Pre-stroke cognition was assessed via patient medical records (prior diagnosis of mild cognitive impairment or dementia), the General Practitioner Assessment of Cognition informant interview, or via a clinical interview using the Clinical Dementia Rating scale; delirium was assessed via the 4A Test; stroke type was defined according to Bamford classification. Univariate and Multiple linear regression analyses were conducted to investigate the association between pre-stroke frailty and post-stroke cognition. Age, sex, pre-stroke cognition, delirium & stroke type were included as covariates.
Results: Complete data was available for analysis of 155 patients. Mean age of patients was 68 years; 93 (60.0%) were male. Frailty prevalence based on Rockwood Frailty index scores of $\geq$0.24 was 60/155 (38.7%). Mean Montreal Cognitive Assessment score was 7.8. Pre-stroke frailty index was significantly associated with post- stroke cognition ($p<0.001$) and this effect was independent of covariates ($p=0.011$). As pre-stroke frailty scores increased, post-stroke cognition declined (*Beta*= -0.187).
Conclusion: Patients with pre-stroke frailty had lower post-stroke cognition. The association was independent of age, sex, pre-stroke cognitive impairment, stroke severity, and delirium status. These findings require to be replicated in other cohorts of stroke patients.
Correspondence: *Martin Taylor-Rowan, Glasgow University, Glasgow, UK. E-mail: m.taylor-rowan.1@research.gla.ac.uk*
Keywords: stroke, aging disorders, cognitive

E. VAN KESSEL, M. EMONS, I. HUENGES WAJER, K. VAN BAARSEN, M. BROEKMAN, P. ROBE, T. SNIJDERS, M.J.E. VAN ZANDVOORT. Tumor-related neurocognitive dysfunction in patients with diffuse glioma: A retrospective cohort study of neurocognitive functioning prior to anti-tumor treatment.
Objectives: Deficits in neurocognitive functioning (NCF) frequently occur in glioma patients. Both the tumor and its treatment contribute to these deficits. Data about the role of the tumor are scarce, because NCF has mostly been studied postoperatively. We aimed to quantify NCF in glioma patients before

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treatment and to investigate which factors affect NCF.
Participants and Methods: We performed a retrospective cohort study in diffuse glioma patients before treatment (awake surgery) according to STROBE criteria. We studied overall NCF and in five neurocognitive domains separately. We analyzed data for tmean cognitive functioning at group level and the percentage of impaired patients (at individual level).
Results: We included 163 consecutive patients between 2010 and 2016. In total, 17 different neurocognitive tasks over five different domains were used. At group level all domains were significantly affected compared to norm data. The percentages of serious neurocognitive impairments (-2 SD) were highest in executive functioning, psychomotor speed and memory (26.7, 22.6 and 19.3% respectively). The percentage of more subtle deficits were highest in executive functioning and memory (43.5 and 34.8 respectively for -1.5 SD and 57.8% in both domains for -1 SD). Patients with high-grade glioma were affected more severely, both on group and individual level. Tumor volume, IDH-status, WHO-grade and histology were associated with the occurrence of domain-specific impairments.
Conclusions: Cognitive impairment occurs in the majority of treatment-naive glioma patients. The domains executive functioning, speed and memory are involved most frequently. These impairments can only partly be explained by tumor location and volume, so other (biological) mechanisms might disturb larger cerebral networks. Our findings underline the importance of taken the pre-treatment level of cognitive functioning into account in both research as well as clinical practice.
Correspondence: *Martine van Zandvoort, Brain Center Rudolf Magnus, Department of Neurology & Neurosurgery, University Medical Center Utrecht, Utrecht, the Netherlands. E-mail: m.vanzandvoort@uu.nl*
Keywords: brain tumor, cancer, neuropsychological outcome

INS Early and Mid-Career Research Award Presentations

13:00–13:55

Paper Session 19. Applying advanced statistical approaches toward improved diagnostic decision making

Moderator: Jonathan J. Evans

13:00–13:55

N.R. DE VENT, J.A. AGELINK VAN RENTERGEM, H.M. HUIZENGA, J.M.J. MURRE, B.A. SCHMAND. Using the Advanced Neuropsychological Diagnostics Infrastructure to improve the neuropsychological diagnostic process.
Objective: The Advanced Neuropsychological Diagnostics Infrastructure (ANDI) is a web-based tool with a large aggregated database of neuropsychological test results. ANDI can be used by clinicians and researchers to aid them in their (clinical) evaluation of neuropsychological test data. It uses advanced, multivariate statistical techniques which enables sensitive evaluation of a patient's cognitive profile. We will present two proof of principle studies in which the ANDI database and methods have been applied.
Participants: The first study tried to predict decline to dementia in patients with newly diagnosed Parkinson's disease (N=123) during the first five years. The second study investigated decline to dementia in patients with subjective memory complaints (N=835). Follow-up duration was up to 17 years.
Methods*:* The first study compared conversion rates of Parkinson's patients to dementia using different diagnostic techniques and normative data (traditional criteria and norm tables versus ANDI). For the second study we compared the MCI diagnosis at baseline to the ANDI database and methods by means of survival analyses.
Conclusions*:* We conclude that ANDI and specifically the multivariate statistical technique, proved to be more sensitive and specific than the traditional criteria for Parkinson's disease with mild cognitive impairment. For the second study we concluded that ANDI is also useful in the context of predicting progression to dementia in the group of patients with subjective memory complaints. Currently, ANDI is a Dutch initiative, but it may easily be adapted to other countries, its methods may even be adapted to other disciplines.
Correspondence: *Nathalie R. de Vent, Psychology - Brain and Cognition, University of Amsterdam, Amsterdam, the Netherlands. E-mail: n.r.devent@uva.nl*
Keywords: Normative data, Diagnostic infrastructure, Dementia

S. DE LA FUENTE, R. OLMOS, S. LUZ. Natural Language Processing for Cognitive Status Prediction, a Latent Semantic Analysis approach.

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Objective: Dementia prevention has become globally paramount across research fields. We present an automatic approach to identify language features associated with cognitive decline. The rationale for using linguistic features is that, in addition to being impaired in dementia, language can act as a proxy for other cognitive abilities (e.g. executive functions) that are also known to be impaired in the disease.
Participants/Methods: 461 healthy participants from the HealthyAgeing dataset were included, aged 20-89 years old. They performed a storytelling task, engaging cognitive resources to generate a coherent structured plot. Latent Semantic Analysis (LSA), a Natural Language Processing method, was used to analyse the transcriptions of those tasks. Then, a stepwise regression with *working memory (WM)* as a dependent variable, was employed to test our hypothesis that some LSA indices would be predictive of *WM* scores (obtained through largely validated neuropsychological tests). We included the *age* covariate, as it is well established that it correlates negatively with *WM*.
Results: Almost every LSA index had a statistically significant correlation with both *age* and *WM*. Also, the regression model explains 32.3% of the *WM scores'* variability. These results hold after controlling for the effect of *age*.
Conclusions: This is an exploratory analysis to assess the potential of narrative discourse to track cognitive decline. Overall, the importance of the model is that, even when controlling for age (known to explain around 25% of the variance in *WM*), some of our indices remain significant predictors of cognitive status. The novel contribution is the use of LSA, based on word meanings and word-context relations, as an automated way to extract these indices. Our findings could contribute to novel inexpensive and non-invasive screening technologies. We acknowledge Pope, Davis (MUSC) and Wright (ECU) for the HA dataset. The Medical Research Council supports our research.
Correspondence: *Sofia de la Fuente Garcia, Edinburgh Medical School: Molecular, Genetic and Population Health Sciences, University of Edinburgh, Edinburgh, UK. E-mail: sofia.delafuente@ed.ac.uk*
Keywords: cognitive screening, computational linguistics, ageing

C. SUWARTONO, M.P.H. HENDRIKS, M.J.A.M. VAN DIJK, M. HALIM, P.T. VAN DER HEIJDEN, T. CLAASSEN. Bayesian Constraint-based Causal Discovery: an alternative method to explore the structure of the Indonesian version of the WAIS-IV.

Objective: With the use of explorative factor analysis (EFA) and confirmatory factor analysis (CFA), the literature has not yet reached consensus about the number of factors underlying the WAIS-IV. The Bayesian Constraint-based Causal Discovery (BCCD) algorithm is able to extract probabilistic reliability estimates of potential causal relations between subtests, creating a more refined structure than is possible with factor analysis. This study utilizes BCCD to investigate the structure of the Indonesian language version of the WAIS-IV (WAIS-IV-ID).
Participants and Methods: Intelligence profiles consisting of 10 core subtests of the Indonesian standardization sample (N=1824) were analyzed. First, EFA and BCCD were used to extract the underlying structure of the WAIS-IV-ID. These results were considered as input to perform CFA to test the relative fit of both models. The same procedure was repeated over all 15 subtests.
Results: With 10 and 15 subtests included for analysis, EFA revealed 3 factors (verbal comprehension, perceptual reasoning, processing speed). With BCCD, the 4-factor structure as proposed by Wechsler was retrieved. However, when all 15 subtests were included for analysis, Arithmetic clustered with verbal and perceptual subtests, but not with working memory subtests. In both cases, results from CFA revealed that the structure as proposed by BCCD fitted the data best.
Conclusions: The results from BCCD are largely in line with the proposed 4-factor structure, although the Working Memory Index (WMI) did not appear as a coherent factor. The clustering tendency when all 15 subtests are included indicates that the absence of WMI is very persistent.
Correspondence: *Marc Hendriks, Atma Jaya University, Jakarta, Indonesia. E-mail: m.hendriks@donders.ru.nl*
Keywords: psychometric structure, intelligence, neuropsychological assessment

Afternoon Coffee Break

13:55–14:10

Poster Session 6. Medical and neurologic conditions (movement disorders, MS, Epilepsy, tumors, HIV, diabetes, COPD, kidney disease, etc.)

14:05–15:55)

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N. MIGUEL, S. SANZ, S. FERNANDEZ, M. NAVARRO, M. SALA, A. BARAJAS, J. LÓPEZ, N. GÓMEZ, M. JÓDAR. HCV eradication with direct antiviral agents improves cognition and quality of life in HCV-HIV co-infected patients.

Objective: 1) To analyze if the eradication of HCV with direct antiviral agents in co-infected patients is associated with a better performance in cognitive function, 2) To examine the association between post-treatment results and clinical variables such as fibrosis level, pre-treatment HCV ARN, years of HCV infection, count of nadir CD4 and current ratio of CD4/CD8.

Participants: 39 HIV-HCV co-infected patients (28 men, 10 women), with a mean age of 49 years. All of them had controlled HIV load. Exclusion criteria were: current intake of alcohol or other substances, presence of minimal hepatic encephalopathy, history of psychiatric or neurological diseases and chronic renal failure.

Method: This is a quasi-experimental and prospective study with a cognitive assessment made before and after HCV treatment. Assessment included: attention (Digits, WAIS-IV), memory (RAVLT), verbal fluency (FAS and Animals) and processing speed (Symbol digit, WAIS-IV). Anxiety and depression were assessed with the Hospital Anxiety and Depression Scale (HADS) and quality of life was measured with the SF-36 scale. A mean comparison analysis (t-Student) and a Pearson correlation were made using $p<0.05$ (SPSS 19.0).

Results: After treatment, cognitive function improves in the following areas: memory [total learning ($p<0.001$), short-term memory ($p=0.003$), long-term memory ($p<0.001$)], verbal fluency ($p=0.037$) and processing speed ($p=0.04$). Depressive symptoms and perceived quality of life also improve [social functioning ($p=0.033$), vitality ($p<0,001$), general perception ($p=0.006$)]. A negative correlation is found between HCV ARN and post-treatment performance in FAS ($r=-0,04$; $p=0.018$).

Conclusions: VHC eradication in HIV patients improves cognitive function, affective symptoms and perceived quality of life. A lower pre-treatment viral load is associated with a better performance in phonetic verbal fluency once the HCV is eliminated.

Correspondence: *Merce Jódar, Clinical and Health Psychology, Universitat Autònoma de Barcelona, Barcelona, Spain. E-mail: mjodar@tauli.cat*

Keywords: HIV, HCV, Infeccious diseases and neuropsychology

S. SANZ, N. MIGUEL, S. FERNÁNDEZ, A. BARAJAS, J. LÓPEZ, N. GÓMEZ, M. VERGARA, M. CASAS, M. MIQUEL, M. JÓDAR. The eradication of HCV with direct antiviral agents improves memory.

Objective: To analyze if HCV infected patients improve memory after curative treatment with direct antiviral agents, and if the post-treatment performance is associated with medical variables: ARN VHC pre-treatment, fibrosis level, and years since HCV infection.

Participants: 29 HCV infected patients (17 men, 12 women) with a mean age of 57 years. Exclusion criteria were current intake of alcohol or other substances, presence of minimal hepatic encephalopathy, history of psychiatric or neurological diseases and chronic renal failure.

Method: Quasi-experimental prospective study with pre- and post-treatment cognitive assessment, which included measures of immediate memory (Direct digits, WAIS-IV), working memory (inverse digits, WAIS-IV) and verbal memory (RAVLT). A mean comparison analysis (Wilcoxon) and a Spearman correlation were used, giving $p<0.05$ (SPSS 19.0).

Results: Significant differences were found between pre- and post-treatment assessment in working memory ($p=0.001$) and verbal memory: total learning ($p<0.001$), short-term and long-term memory ($p<0.001$) and verbal recognition ($p=0.001$). ARN VHC was negatively correlated with total learning ($\rho=-0.435$; $p=0.018$) and short-term memory ($\rho=-0.384$; $p=0,04$). Fibrosis level is negatively correlated with working memory ($\rho=-0,363$; $p=0.05$).

Conclusion: HCV eradication improves working memory and verbal memory tasks. Furthermore, a lower pre-treatment viral load is associated to a better post-treatment performance in verbal memory; while a lower fibrosis level is associated to a better post-treatment performance in working memory.

Correspondence: *Merce Jódar, Clinical and Health Psychology, Universitat Autònoma de Barcelona, Barcelona, Spain. E-mail: mjodar@tauli.cat*

Keywords: HCV, Memory, infectious disease and neuropsychology

N. KABUBA. The effect of age and level of education on neurocognitive impairment in HIV positive Zambian adults.

Objective: Older age and lower education levels are known to be associated with worse neurocognitive (NC) performance in healthy adults, and individuals with HIV infection may experience accelerated brain/cognition aging. However, higher education may possibly protect against HIV associated neurocognitive disorders. The aim of the current cross-sectional study was to assess the effect of age and education in an HIV-1 clade C infected adult population in urban Zambia.

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Participants: The study assessed 286 HIV positive (+) males (37.1%) and females (62.9%) with a mean age of 41.35 (SD=8.56) and mean years of education =10.16, SD (2.18).
Method: Demographically corrected Zambian norms on a neuropsychological (NP) test battery were used to correct for normal age and education effects. A comprehensive neuropsychological (NP) Test Battery was used to assess cognitive domains frequently affected by HIV: attention/working memory, learning /and delayed recall, executive function, verbal fluency, processing speed, verbal and visual episodic memory, and fine motor skills.
Results: Younger HIV+ Zambians, higher education evidenced protective effects against NC impairments overall, and specific domains of executive functions, learning and speed of information processing. Impairment scores did not support accelerated overall brain aging although the restricted age range and relative youth of our total sample may have precluded detection of such tendencies.
Conclusions: The present study, raises the need to investigate factors that could be implicated in the poor neurocognitive performance among the younger less educated HIV+ individuals in Zambia.
Correspondence: *Norma Kabuba, Psychology, The university of Zambia, Lusaka, Zambia. E-mail: zewelanjik@gmail.com*
Keywords: NeuroAIDS, Age, Education

S.E. NIGRO, S. YANG, M. WU, Z. BELL, P. PASTICCIO. Impaired Verbal Memory in HIV-Positive Cocaine Users.
Objective: Our study aimed to understand the effect of cocaine use and HIV on verbal memory. We utilized the Hopkins Verbal Learning test - Revised version (HVLT-R) to assess verbal memory abilities.
Participants: We recruited a total of 69 participants that made up our four groups. HIV-positive, cocaine users (HIV/Cocaine; n = 20); HIV-negative cocaine users (Cocaine Only; n = 13); HIV-positive, non-cocaine users (HIV/No Cocaine; n = 15); and HIV-negative, non-cocaine users (Healthy Control; n = 21).
Methods: Group differences of Total Recall and Delayed Recall were analyzed using univariate analysis of covariance (ANCOVA's) with group type as the between-subjects variable and age and WRAT-4 scores as the covariates. A repeated measures ANCOVA was used to assess verbal learning, with group type as the between-subjects factor and the mean number of words recalled on each of the three learning trials as the within-subjects factor and age and WRAT-4 scores as the covariates.
Results: Significant group differences in Total Recall, $F(3, 69) = 3.00$, $p = .04$, $\eta 2 = .12$ and Delayed Recall, $F(3, 69) = 2.69$, $p = .05$, $\eta 2 = .11$, were found. For total recall the HIV/Cocaine group performed significantly worse than the control group ($p = .03$). Whereas, in the delayed recall both the HIV/Cocaine group ($p = .02$) and the HIV/No Cocaine group ($p = .02$) performed significantly worse than the control group. A significant linear trend was found across the three HVLT learning trials for all groups, $F(1, 64) = 8.77$, $p = .004$, $\eta 2 = .12$.
Conclusion: Our findings indicate cocaine use exacerbates verbal memory and learning deficits in individuals with HIV. HIV negatively impacts memory abilities. Cocaine alone did not significantly affect memory abilities. However, when an individual who has HIV uses cocaine, there is a significant deficit in both immediate and delayed recall abilities.
Correspondence: *Sarah E. Nigro, Psychiatry, University of Illinois at Chicago (UIC), Chicago, USA. E-mail: snigro@adler.edu*
Keywords: HIV, Cocaine, Verbal Memory

M. HARCIAREK, A. MAŃKOWSKA, B. BIEDUNKIEWICZ, A. DĘBSKA-ŚLIZIEŃ, J. MICHAŁOWSKI, J.B. WILLIAMSON, K.M. HEILMAN. Kidney Transplantation Corrects the Increased Leftward Spatial Bias Associated with Kidney Failure and Dialysis.
Objectives: Patients with end-stage renal disease (ESRD) being treated with dialysis often have attention deficits. Our recent study has revealed that these patients also have an increase in their leftward spatial attentional bias. Although there is evidence that a successful kidney transplant improves cognitive functions of dialyzed patients, the impact of a kidney transplant on their allocation of spatial attention has not been investigated. Thus, the aim of this study was to learn if successful kidney transplantation might diminish the abnormal leftward attentional bias seen in patients receiving dialysis.
Participants & Methods: Participants were 19 non-demented dialyzed patients with ESRD, 19 non-demented demographically matched patients with ESRD who received a kidney transplant, and 21 matched healthy controls. All participants performed standard horizontal line bisection tests. A general cognitive status, depression and anxiety were also controlled.
Results: All three groups had a leftward bias while bisecting horizontal lines. When compared to the healthy participants, dialyzed patients revealed a significantly greater leftward bias. In contrast, the leftward bias of the group who received kidney transplant did not differ from that of the healthy controls.

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Conclusions: This study confirms that dialyzed patients with ESRD have an increase in their leftward spatial attentional bias. Although the reason for this increased bias remains unclear, these patients might have right frontal-subcortical dysfunction with a disinhibition of their right parietal lobe, and an increase in the allocation of left-sided attention. In addition, these results suggest that a successful kidney transplant normalizes these patients' ability to allocate spatial attention. Future studies are needed to better understand both the mechanism inducing this significantly greater leftward bias in dialyzed patients as well as why this bias is normalized with successful kidney transplantation.

Correspondence: *Michal Harciarek, Social Sciences, Institute of Psychology, University of Gdansk, Gdansk, Poland. E-mail: psymh@ug.edu.pl*

Keywords: chronic kidney disease, hemispatial neglect, attention

J. RAUDENSKA, A. SKVOROVA, A. JAVURKOVA. Algophobia and Kinesiophobia in Chronic Back Pain Patients.

Objective: The goal of this work was to find out how are together related fear of pain, fear of movement and pain.

Participants: Overall was examined 107 patients with chronic back pain, of which 61 women and 46 men. The average age of respondents was 52 years (from 16 to 84 years). The most respondents suffered from low back pain (n-82; 77%).

Methods: Semi-structured interview, The Tampa Scale for Kinesiophobia (TSK-CZ), Fear of Pain Questionnaire (FPQ III-CZ), Numeric pain scale (intensity/unpleasantness).

Results: We found in 58% of patients (n-62) high fear of movement (kinesiophobia) and in 26% of patients (n-25) high fear of pain (algophobia). We found statistically important positive relationship among global score of TSK-CZ and global score of FPQ-III-CZ (r=0,24; p=0,012). We found statistically important positive relationship between fear of small pain in FPQ-III-CZ and pain unpleasantness measured by Numeric pain scale (r= 0,22; p=0,030). We found positive relationship among fear of movement in TSK-CZ and pain intensity (r=0,25; p=0,012) and pain unpleasantness (r=0,25; p=0,013). Further was found statistically important negative relationship between fear of medical interventions measured by FPQ-III-CZ and age of respondents (r=-0,28; p=0,004). Was found statistically important relationship between score of fear of movement in TSK-CZ and sleep (r=-,212; p=0,030). Was found statistically important association between fear of movement and sport (F=3,61; p=0,031), as using of analgetics (F=3,964; p=0,022). Prediction regression model chose for prediction of scale FPQ-III-CZ these variables: dull pain, sport, drugs and feelings of armor and for prediction of scale TSK-CZ these variables: sleep and pain intensity.

Conclusion: In our work we have been demonstrated predictors for fear related pain in population of patients with chronic back pain. These results could be practically implicated into multidisciplinary management of nonmalignant chronic pain.

Correspondence: *Jaroslava Raudenska, Dpt of Nursing, Dpt of Clinical Psychology, 2nd Faculty of Medicine, Charles University and Motol University Hospital, Prague, Czech Republic. E-mail: jaroslava.raudenska@fnmotol.cz*

Keywords: algophobia, kinesiophobia, chronic back pain

T. LOETSCHER, C. CHEN, R. CALLAHAN, E. ROSENICH, L. BRADNAM. Need for spatial exploration assessments in Cervical Dystonia?

Objective: Cervical Dystonia (CD) is a neurological disorder characterised by involuntary neck muscle contractions that may lead to abnormal head and neck postures. The objective of this study was to investigate the consequences of an abnormal lateral head posture on spatial exploration while walking. The hypothesis was that lateral head rotations affect the detection of stimuli placed on the contralateral space in patients with CD.

Participants and Methods: Ten patients with CD and 11 age-matched healthy controls walked a designated circular course in clockwise and anti-clockwise directions (counterbalanced order). While walking, the participants were asked to locate coloured visual targets placed along the walls of the course. There were 20 left-sided and 20 right-sided targets and the dependent measure was a spatial asymmetry score calculated as right-sided minus left-sided target omissions.

Results: The CD patients did not differ from the controls on a group level ($t=0.86$, $p>0.4$). Inspection of the data revealed that one patient with a head rotation towards the left-side failed to detect most right-sided targets (asymmetry score of -13). Bayesian single case statistics confirmed that this asymmetry was significantly different from the controls (Bayesian $p<0.002$).

Conclusions: Most CD patients adequately compensated for their lateral head rotations and did not demonstrate difficulties in attending to the contralateral side while walking. However, one patient showed severe signs of neglect. This finding warrants further investigation into the prevalence of

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neglect in CD and its implications for function and participation in everyday life.
Correspondence: *Tobias Loetscher, University of South Australia, Adelaide, Australia. E-mail: tobias.loetscher@unisa.edu.au*
Keywords: neglect, visuospatial, activities of daily living / adaptive functioning

X. PRATS-SOTERAS, M.Á. JURADO, J. OTTINO-GONZÁLEZ, B. SEGURA, I. GARCÍA-GARCÍA, X. CALDÚ, C. SÁNCHEZ-CASTAÑEDA, S. LUÍS, I. MATÉS, M.J. SENDER, C. SÁNCHEZ-GARRE, N. MIRÓ, T. FONT, E. TOR, M. GAROLERA. Cortical thickness reductions in healthy obese adolescents.
Objective: To explore possible differences in cortical thickness between lean and obese adolescents.
Participants and Methods: We recruited thirty-three healthy obese (body mass index [BMI] > 95th age-gender based percentile for pediatric age group, or ≥ 30 kg/m^2 for subjects older than 18 years old) and 33 normal-weight adolescents. All participants (aged 12-21) without psychiatric, neurological, nor metabolic diagnosis, underwent a structural MRI acquisition (Siemens 3T trio). Cortical thickness analysis was performed with FreeSurfer (v.6.0). The effects of age, sex and estimated IQ (WISC-IV/WAIS-III vocabulary subtest raw score) were set as nuisance factors.
Results: Groups did not differ in any demographic variables (i.e., age, sex, or vocabulary raw score). Lean participants showed thicker surfaces in two clusters located in the left postcentral gyrus (size= 2944.40 mm2, X= -54, Y= -18, Z= 43, Z-value= 3.186, p-corrected= 0.001) and in the right rostral middle frontal gyrus (size= 1847.61 mm2, X= 21, Y= 59, Z= -10, Z-value= 3.560, p-corrected= 0.044).
Conclusions: Regardless the potentially biasing effects of age, sex and intelligence, the results show that brain morphology changes regarding obesity occur even at early ages. Particularly, the cortical thickness reduction was observed in frontoparietal areas which are known for their role in supervising behavior.
Correspondence: *Maite Garolera, Department of Clinical Psychology and Psychobiology, University of Barcelona, Barcelona, Spain. E-mail: mgarolera@cst.cat*
Keywords: cortical thickness, obesity, adolescents

J. OTTINO-GONZÁLEZ, M.Á. JURADO, I. GARCÍA-GARCÍA, X. PRATS-SOTERAS, I. MATÉS, S. LUÍS, X. CALDÚ, E. TOR, M.J. SENDER-PALACIOS, M. GAROLERA. Abdominal obesity increase is linked to impairments in cognitive function.
Objective: Address the relationship between abdominal obesity and cognition.
Participants and Methods: One-hundred and thirteen lean-to-obese healthy volunteers (aged 21-40, 62% females) underwent neuropsychological evaluation. Participants did not meet criteria for cardiometabolic, neurological, or psychiatric disorders. Additionally, subjects with an estimated intelligence quotient below 85 did not enter study. The waist-to-height ratio (WtHR) is the result of dividing the waist-circumference by the height (range 0.40 – 0.80) and served as a measure of abdominal obesity. Cognitive performance was reduced into composites, such as speed processing (Trail Making Test Part A, Grooved Pegboard Test, Symbol-Digit Modalities Test and Colour-reading of the Stroop Test), executive function (perseverative errors in the Wisconsin Sorting Card Test, Controlled Oral Word Association Test, interference in the Stroop Test, commission errors in the Continuous Performance Test II, and Trail Making Test Part B minus Part A), working memory (Letters and Numbers and N-back task), and memory (California Verbal-Learning Test II). The influence of intelligence (Vocabulary and Block Design, WAIS-III), age, and sex over cognition were controlled. Spearman correlations (r_s) were conducted between the WtHR and each composite's standardized residual in IBM SPSS Statistics (v.21). All p-values were corrected with a False Discovery Rate (FDR).
Results: The increase of the WtHR was related with cognitive slowness (r_s= -0.29, p-corrected= 0.004), lower executive functioning (r_s= -0.24, p-corrected= 0.019) and poorer memory performance (r_s= -0.25, p-corrected= 0.014). The link between WtHR and working memory did not survive the FDR correction (r_s= -0.19, p-corrected= 0.070).
Conclusions: The isolated effect of the increase in abdominal obesity is linked to impairments in cognitive functions known to be related to pathological aging as well as for negatively impact caloric ingestion.
Correspondence: *Maite Garolera, Clinical Psychology and Psychobiology, University of Barcelona, Barcelona, Spain. E-mail: mgarolera@cst.cat*
Keywords: obesity, overweight, cognition

J. GRAU, O. GELONCH, M. TORRENS, M. GAROLERA. Association between decision-making and cognitive flexibility in fibromyalgia, and their impact on functional status and well-being.

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Objective: The aim of the study was to examine the association between cognitive flexibility and decision-making in women with fibromyalgia (FM), and their predictive power on the functional status and well-being.
Participants and Methods: The sample was composed of 88 women with FM aged between 31 and 54. Cognitive flexibility was evaluated by Wisconsin Card Sorting Test (WCST), decision-making with the Iowa Gambling Task (IGT) and the functionality and well-being with the Fibromyalgia Impact Questionnaire (FIQ). Pearson correlation was used to analyse association between WCST perseverative errors and IGT (Net total and deck choices). A two-way ANOVA with repeated measures was conducted to examine differences between high (n=48) and low (n=40) cognitive flexibility groups (cutoff=13) in the Net of the five IGT blocks. Linear regression was conducted to evaluate the capacity of both factors (Net total and perseverative errors) to predict FIQ. Alpha level was set at 0.05. Statistical analyses were performed with SPSS version 21.
Results: Correlational analyses revealed that perseverative errors were associated with the Net Total in IGT (r=-.290, p=.008), DeckD choices (r=-.289, p=.008) and DeckB choices (r=.244, p=.025). The two-way ANOVA showed an interaction between the five IGT blocks and the group factor ($F_{(3.302)}$=3.351, p=.016): those with high cognitive flexibility presented an ascending learning curve, whereas the other ones did not improve their score. The regression model only included decision-making as a predictor of functionality and well-being (p=.018), explaining a 6.66% of the variance.
Conclusion: Our results support the association between cognitive flexibility and decision-making in a sample of people with FM. In addition, a poor performance in decision-making predicts a small portion of functional status in FM. Despite the fact that this is a preliminary data, it might be interesting and useful for improving psychological intervention for FM.
Correspondence: *Maite Garolera, Unit of Neuropsychology, Consorci Sanitari de Terrassa, Terrassa, Spain. E-mail: mgarolera@cst.cat*
Keywords: Fibromyalgia, Cognitive flexibility, Decision-making

M. TORRENS LLUCH, O. GELONCH, J. GRAU, M. GAROLERA. Association between pain reported and executive functioning in women with fibromyalgia.
Fibromyalgia has been associated with cognitive dysfunction, including objective and subjective neuropsychological evidence. Notwithstanding cumulative data collected, the relation remains unclear. The aim of the current study is to explore the relationship between pain and executive function, especially initiative and planning aspects.
A total sample of *110* female participants diagnosed with fibromyalgia -aged between 30 and 54- were assessed, recruited from public health care centers. PMR (Spanish verbal fluency) and Trail Making Test (TMT part B) were administered as objective measures of executive function and Behavioral Rating Inventory of Executive Function (BRIEF-A) as subjective measure of executive functioning. Visual Analogue Scale (VAS) was used to evaluate pain's magnitude -measured twice-. Alpha level was set at 0.05.
Pearson correlation analyses showed that pain levels were significantly related to PMR(r=-.247; p=.009), TMT-B(r=.249; p=.01), BRIEF-A Initiate(r=.280; p=.004) and BRIEF-A Plan/Organize(r=.208; p=.033). It is also observed that objective (PMR) and subjective (BRIEF-A Initiate) measures of initiative does not correlate, neither objective (TMT-B) nor subjective (BRIEF-A Plan/Organize) test for planning. Multiple linear regression was performed, executive outputs predicts 14.4% of variance in VAS marks. Stepwise regression analysis enlighten that Initiate contribute to explain 13.1% of the variance in pain levels, nevertheless Planning, by itself, is not significantly predictive of pain.
Poor initiating and planning function were positively associated with pain level. Lower initiate capacity predicts greater pain magnitude. Findings reported apply to either objective or subjective measures indistinctly. These insights might be valuable for the treatment of fibromyalgia and may highlight the importance of behavioral activation. This relationship could be taken into account in order to adapt the management of pain.
Correspondence: *Maite Garolera, Unit of Neuropsychology. Hospital de Terrassa, Consorci Sanitari de Terrassa, Terrassa, Spain. E-mail: mgarolera@cst.cat*
Keywords: fibromyalgia, executive functioning, initiate

V. DOSTALOVA, S. KOLECKAROVA, M. KUSKA, M. PRETL, O. BEZDICEK. Effects of Continuous Positive Airway Pressure on Neurocognitive and Neuropsychiatric Function in Obstructive Sleep Apnea.
Objective: Obstructive sleep apnea (OSA) resulting in cerebral hypoxemia disturbs sleep fragmentation and leads to increased excessive daytime sleepiness. The main neuropsychiatric OSA consequences are cognitive dysfunction and a higher degree of anxiety and depressive symptoms. The aim of this

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prospective study was to characterize the neurocognitive clinical picture of OSA patients and to determine the effect of continuous positive airway pressure (CPAP) treatment to neuropsychiatric functioning.
Participants:126 OSA patients were involved in the study, 43 of them were indicated to CPAP treatment and were retested by neuropsychiatric test battery.
Methods: The following tests were performed: Montreal Cognitive Assessment (MoCA) for the evaluation of cognitive impairment, Beck Depression Inventory (BDI-II) and the State-Trait Anxiety Inventory (STAI) together with Epworth Sleepiness Scale (ESS) for the evaluation of neuropsychiatric symptoms and a person's general level of daytime sleepiness.
Results: 126 OSA patients did not suffer from cognitive impairment or significantly higher level of anxiety and depressive symptoms. We did not find any cognitive improvement in the MoCA ($p = 0.213$) after 3 months of CPAP usage. However, OSA patients with CPAP showed significantly less daytime sleepiness, anxiety and depressive symptoms (all $p < 0.001$).
Conclusions: 3-months CPAP treatment has no significant effect on cognitive performance in OSA patients, but has a positive effect on the level of depressive and anxiety symptoms as well as excessive daytime sleepiness.
Correspondence: *Veronika Dostálová, Department of Psychiatry, First Faculty of Medicine and General University Hospital in Prague, Charles University, Czech Republic; Prague College of Psychosocial Studies, Prague, Czech Republic; Neurology and Sleep Clinic INSPAMED, Prague, Czech Republic, Prague, Czech Republic. E-mail: dostal.veronika@gmail.com*
Keywords: cognition, mood disorders, obstructive sleep apnea

D. GARCÍA-PIÑERA, G. LASECA-ZABALLA. A preliminary study of executive and emotional problems in diabetic population.
Objective: Diabetes Mellitus (DM) include a set of metabolic diseases with multifactorial and polygenic pathogenesis. In recent years, the question of how diabetes affects the brain, involving different cognitive functions and emotions, has become increasingly interesting. Among the scientific literature in the diabetic population, deficits in executive functions and emotional problems have been widely investigated. However, an active life and years of schooling seem to have a protective effect. The objective of this research will be to observe if there is any kind of positive relationship between executive and emotional problems, on the contrary, if the sociodemographic variables have some kind of protective effect.
Participants and Method: The sample had 50 people (18H and 32M) with diabetes and ages between 20 and 55 years (M = 34.5) from Spain and Mexico. The data was collected through *googleforms*. The battery had a request for informed consent, a test that included the clinical and sociodemographic variables, the *Inventario de Sintomatología Prefrontal abreviado* (ISP-20) and the *Listado de Síntomas Breves* (LSB-50). We performed a bivariate Pearson correlation analysis with the statistical program SPSS 22.0.0.
Results: The results obtained show that there are statistically significant positive correlations ($r = p < 0.05$) between the ISP-20 and LSB-50 factors. In addition, a statistically significant inverse correlation ($r = p < 0.05$) was found between the years of studies and the executive functions, but not for the practice of sports.
Discussion. It can be concluded that in diabetic patients the greater the executive problems in people with diabetes, the greater their emotional problems. Also, it is observed that a longer time studying could protect from a premature deficit in executive functions among people who have diabetes.
Correspondence: *Daniel García Piñera, Neuropsicología, Polibea Concierto SL, Madrid, Spain. E-mail: elnida182@gmail.com*
Keywords: executive functions, diabetes, emotions

A. SMITS, M. BIESBROEK, H. KUIJF, P. ROBE, M. RAEMAEKERS, N. RAMSEY, E. DE HAAN, M. VAN ZANDVOORT. The influence of etiology in lesion-behavior association studies.
Objective: Lesion studies have long been used to study neuroanatomical correlates of a given behavior and to (further) develop cognitive models. The results of these analyses are highly depended upon the spatial distribution of lesions, a priori dictated by the underlying etiology. The inclusion of different etiologies would increase the statistical power but has been critically debated. In the current study, we investigate the influence of ischemic stroke versus tumor on lesion-behavior associations.
Methods: 90 first-ever ischemic stroke patients and 92 treatment-naive brain tumor patients were assessed on four internationally acknowledged neuropsychological tests. All participants completed the Rey-Osterrieth Complex Figure (ROCF) test, the Auditory Verbal Learning Test (AVLT), the Digit Span test WAIS-III/IV and Letter Fluency. The impact of etiology (stroke/ tumor) and lesion location (left/right hemisphere) was evaluated, controlling for age, sex and education.

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Results: At group level (MANOVA), we found main effects of lesion side (left < right; $p<0.01$) and etiology (stroke < tumor; $p=0.05$) and an interaction effect between lesion side and etiology ($p<0.05$). As expected, verbal memory (AVLT) and letter fluency are more impaired when the lesion is in the left hemisphere in both populations. In the stroke group, performance on the ROCF is significantly worse in right-sided patients. This effect however is absent in the tumor group.
Conclusions: Overall, we find that the effect of etiology on lesion-behavior associations is dependent upon the neuropsychological measure of interest. While the effect of lesion side is comparable for verbal memory and fluency, the right hemispheric dominance for visuoconstruction (ROCF) found after stroke, is not evident in tumor patients. Differences in pathological mechanisms that underlie cognitive symptoms in stroke and tumor are discussed. These findings will be extended with a multivariate lesion-symptom mapping analysis.
Correspondence: *Anouk Smits, Neurology and Neurosurgery, University Medical Center Utrecht, Utrecht, the Netherlands. E-mail: a.r.smits@uva.nl*
Keywords: stroke, brain tumor, lesion mapping

A. ROJCZYK, A. DZIEWANOWSKA, A. MARYNIAK. A musician without temporal lobes.
Objective: This case study aims to establish whether the cognitive development of a music school student was affected by the presence of large congenital malformations within his brain.
Participants and Methods: An 11 years old boy, J.J., prenatally diagnosed with large arachnoid cysts, which did not allow major parts of his brain to develop correctly, was examined using a battery of neuropsychological methods to test his intellectual potential as well as the level of development of language and other cognitive abilities.
Results: The boy achieved high to outstanding scores in all tests except for two trials that require good cognitive control from the subject.
Conclusions: The boy's test results suggest that normal and above-average development of cognitive abilities is possible even for a person whose central nervous system differs structurally from what is expected in a healthy subject.
Correspondence: *Agnieszka Rojczyk, Department of Health Psychology, Children's Memorial Health Institute, Warsaw, Poland. E-mail: agnieszka.rojczyk@gmail.com*
Keywords: neuroplasticity, arachnoid cyst, cognitive development

J. LANDA, O. BAR, U. NACHSHON, A. LIVNY-EZER, G. TSARFATY, T. SILBERG, T. KRASOVSKY. Natural History of Pediatric Multifocal Secondary Dystonia: report of 3 cases.
Objectives: Dystonia is a movement disorder involving sustained or intermittent muscle contractions which result in involuntary movements and/or postures of the limbs, trunk, neck or face. Dystonia which emerges following an acquired brain insult is termed "secondary", is less common than primary dystonia and may be characterized by a different underlying pathophysiology. Since most research is focused on primary dystonias documented mainly in adults, and given the detrimental long-term consequences of dystonia on activities of daily living (ADLs) and quality of life, the current study's aim was to document the natural history of *pediatric secondary dystonia* and the effect of interventions on its symptomatology.
Participants & Methods: Three case-studies of girls, age 8, 9 and 11 years at the time of injury, who developed multifocal dystonia secondary to an acquired brain injury are presented. The girls were followed for 8-33 months post-injury and underwent routine functional and cognitive evaluations as-in and outpatients of pediatric rehabilitation.
Findings: In our 3 cases, dystonia appeared 1-3 months after the first insult, and in no case was there an alleviation of the symptoms over time. In two of the three cases, several years after injury the dystonic hand was used as an assisting hand only, whereas in the third case it was completely non-functional. All girls were independent to some extent in basic ADLs and attended a regular school with an assistant.
Conclusions: The current case series reports the natural history of multifocal dystonia secondary to brain injury in three pediatric cases. Our results demonstrate that over time, function in the dystonic body part(s) gradually deteriorates despite pharmaceutical and rehabilitation interventions which are attempted. This discouraging prognosis warrants the attention of rehabilitation professionals who are working with pediatric patients susceptible to developing secondary dystonia.
Correspondence: *Janna Landa, Pediatric Rehabilitation, Sheba Medical Center, Ramat-Gan, Israel. E-mail: janna.landa@sheba.health.gov.il*
Keywords: Activities of daily living / adaptive functioning, Rehabilitation, Brain injury

M.I. GUTIERREZ MARTIGNON, M. RODRIGUEZ CAMACHO, D.M.B. PRIETO CORONA, A. GARCIA MENDEZ. Neuropsychological effects of intracerebral hemorrhage in pediatric patients. Three case reports.

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Objective: Intracerebral hemorrhage (ICH) has been defined as the extravasation of blood within the brain secondary to rupture of a blood vessel. There are only few studies that describe the cognitive effects in the childhood population in Mexico and in most cases are reported according with screening tests without mentioning the outcome in detail. The aim of the study is to describe the cognitive effects of pediatric ICH in the acute phase and six months after the event.
Participants and methods: A cognitive assessment was carried out in the acute phase and 6 months post-event. The participants were three female patients of 5, 6 and 14 years of age respectively, diagnosed by physicians assigned to the pediatric neurosurgery service of the National Medical Center "La Raza" in Mexico City based on clinical and radiological studies.
Results: In the first assessment, executive function deficits characterized by dorsolateral prefrontal alterations such as affective indifference, verbal hypo-spontaneity, apathy, lack of initiative and loss of cognitive sensitivity was found in the 14 year old participant, six months later the cognitive flexibility was the only domain significantly altered. The 5-year-old patient presented a fluctuating profile in both assessments and the most consistently affected domains were cognitive flexibility and processing speed. The 6-year-old patient failed in most of the cognitive domains especially in attention, memory and executive function in both assessments.
Conclusions: The most affected domains in the participants were attention, processing speed and executive function while the verbal domain was the least affected. The present research concludes that the long-term outcome regarding the cognitive effects of these pediatric cases is not linear because is associated with factors, such as the age of presentation, moment of the assessment, altered cognitive domain, localization and size of the lesion.
Correspondence: *Minerva Itzel Gutierrez, Universidad Nacional Autonoma De Mexico, Mexico City, Mexico. E-mail: neuromine06@gmail.com*
Keywords: Intracerebral hemorrhage, Cognitive outcome, Pediatric

A. PALACIOS BUSTAMANTE, A.R. DÍAZ VICTORIA, C.L. ESPARZA FIGUEROA, O.R. MARRUFO MELENDEZ. Organization of Movement task and expressive Language in a left frontal arteriovenous malformation: a fMRI Study.

It has been shown that the lack of cognitive deficits in congenital lesions, such as arteriovenous malformations (AVM), is due to the fact that brain can develop an atypical functional organization related to functional migration. An important limitation of these studies is the heterogeneity of their patients' conditions when they were evaluated, so it is not certain if the deficits or the absence of them are due to the AVM, to the hemorrhage or to the effects after treatment.
Objective: Neuropsychological examination and Functional Imaging in order to observe the functionality and location of expressive language and motor task in a patient with a left frontal AVM, non-hemorrhagic and without cognitive deficits.
Participant: A 26-year-old male with a left frontal AVM.
Method: A Neuropsychological evaluation was applied as a baseline, then a Superselective Neuropsychological Evaluation and a Functional Magnetic Resonance Imaging (fMRI) study with Motor and Language paradigms.
Results: The patient obtained an above-average IQ and a conserved cognitive profile. In the Superselective Evaluation he presented a paralexia during shot 1 and a decrease in phonological verbal fluency elements in shot 2. Improvements were also observed in syllables repetition and spontaneous language.
Under motor paradigms a stronger activation appeared in non-primary motor areas, such as post-central gyrus, middle cingulate, inferior parietal areas, insula and supplementary motor area. Concerning the language paradigms, higher activation was found in left middle frontal gyrus, left middle cingulate, bilateral calcarine, bilateral cuneus, left precentral gyrus, left insula, left supplementary motor area, left inferior parietal gyrus and left superior temporal gyrus.
Conclusion: A reorganization of the motor and expressive language processes was observed in a patient with an AVM, activating regions connected or adjacent to the affected structures, either ipsilaterally or bilaterally to the lesion.
Correspondence: *Alejandra Palacios Bustamante, National Autonomous University of Mexico & National Institute of Neurology and Neurosurgery, Mexico City, Mexico. E-mail: a.palacios.bustamante@gmail.com*
Keywords: Arteriovenous malformations, Superselective Neuropsychological Evaluation, Functional Magnetic Resonance Imaging

A. PALACIOS BUSTAMANTE, J. MORENO VILLAGÓMEZ, A.R. DÍAZ VICTORIA. Pre- and post-operative report of a case with open lip schizencephaly and porencephalic cyst.

Schizencephaly is an uncommon congenital neuronal migration disorder of cerebral cortical development. Due to its low prevalence and broad

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spectrum in its clinical manifestations it has been difficult to know the prognosis of these patients.
Objective: Pre- and post-operative neuropsychological examination to know the neurodevelopment in a patient with open lip schizencephaly and porencephalic cyst.
Participant: The patient was 11 months old in the pre-operative and 19 months old in the post-operative examination.
Method: A neuropsychological examination with Battelle Development Inventory was performed before the ventriculoperitoneal shunt and six months later.
Results: In the first examination no clinical data were reported, and a normal global development was observed, with attentional and gross motor deficits. Therefore, it was recommended to attend to early stimulation therapy.
In the follow-up, the patient had not attended to early stimulation and the gross motor deficiencies continued, this impacted on the patient independence and other development areas, so it was reported a global neurodevelopmental delay. Between the first evaluation and the follow-up, there was also a remarkable decline in expressive communication, but also an improvement in attention and normal development in fine motor, receptive communication and cognition.
Conclusion: It is pertinent that the patient should be included in a suitable therapeutic program that allows the maximum possible development, since it has been reported that extensive but lateralized neuronal migration disorders can be associated with complete reorganization and full recovery of function realized by the contralateral hemisphere, through possible mechanisms of cerebral plasticity. This emphasizes the importance of comprehensive neuropsychological studies in order to understand and research the impact of prenatal neural insult on the functional reorganization of the brain and subsequent neurobehavioral functioning.
Correspondence: *Alejandra Palacios Bustamante, National Autonomous University of Mexico & National Institute of Neurology and Neurosurgery, Mexico City, Mexico. E-mail: a.palacios.bustamante@gmail.com*
Keywords: Schizencephaly, porencephalic cyst, Neuropsychological examination

J. MORENO VILLAGÓMEZ, M.G. YÁÑEZ TÉLLEZ, B. PRIETO CORONA, Y. RODRÍGUEZ AGUDELO, A. GARCÍA MÉNDEZ. Neuropsychological functioning in preschool children with single suture craniosynostosis.

Objective: Single suture craniosynostosis (SSC) is the premature fusion of one or more cranial sutures in the infant calvaria that has been related with neuropsychological deficits. The purposes of this study were: assess the cognitive function of preschool children with SSC and compare it with case-control pairs, examine if there was a difference between the children who had the surgery before or after one year of age and assess the cognitive functioning between the different SSC types.
Participants and methods: 31 children with SSC and 31 control pairs were assessed within 3 to 5 years 11 months. The following neuropsychological test were used: WPPSI-III, the quantitative, memory and motor scales of McCarthy Scales, Behavioral Assessment System for Children and speech and executive functioning experimental tasks. The comparitions were made between the clinical and control group and between the children who had the surgery before or after one year of age by an independent-sample t-test or a Mann-Whitney U test. The comparition between the different SSC types was made by a Kruskal-Wallis H test.
Results: Patients had significantly lower scores than controls on language, visual perception, processing speed, memory, motor and the Full Scale Intelligence Quotient (FSIQ). Cases that had undergone surgery after one year of age had lower scores on language and the FSIQ. Coronal synostosis had lower scores than the others types of craniosynostosis on processing speed, motor and Performance Intelligence Quotient.
Conclusions: Preschool children with SSC have more risk to develop cognitive difficulties than children without this condition. Is important to make a long term follow up of this patients in order to detect and treat difficulties that might appear. Specially children that has had surgery after one year of age or with coronal synostosis, because they tend to present more cognitive difficulties.
Correspondence: *Julieta Moreno Villagómez, National Autonomous University of Mexico, Tlalnepantla, Mexico. E-mail: julietamoreno27@gmail.com*
Keywords: single suture craniosynostosis, neuropsychological assessment, pediatric neuropsychology

C. CORTI, V. MANFREDI, M. POZZI, M. MASSIMINO, L. GANDOLA, A. BARDONI, G. POGGI. Differences in neurocognitive functioning between male and female brain tumor survivors.

Objectives: The aim of the present study was to investigate differences in cognitive functioning between male and female pediatric brain tumor

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survivors. Reports in the literature indicate that female gender is a risk factor for cognitive impairment, but information on the specific cognitive domains in which females score lower is still lacking.
Participants: 171 school-age children (6-16 years) who were recruited at a Neuro-oncological and Neuropsychological Rehabilitation Center participated in the study. 71 were females and 100 were males.
Methods: The intellectual performance of children at Wechsler Intelligence Scales Third-Edition (WISC-III) was considered for this study. Differences were tested not only on intellectual quotients (IQs), but also on WISC-III subtests, which allow assessing different core cognitive abilities. Stepwise multiple regression analyses and analyses of variance were performed to evaluate relationships between gender and IQs and differences between males and females in WISC-III subtests, respectively. The other main risk factors for neurocognitive impairment (e.g., age at diagnosis, time since diagnosis, adjuvant therapies and tumor location) were taken into account. Analyses were performed for the whole sample and dividing children based on the supratentorial vs infratentorial location of the tumor, to control for the effects associated to damage to different brain regions.
Results: Stepwise multiple regression analyses yielded gender as the only predictor of Verbal IQ in the whole sample and in the supratentorial group. Females, including those having infratentorial tumor, performed worse than males in certain verbal subtests. Males performed worse only at Performance subtest Coding, when having infratentorial tumor.
Conclusions: Our results confirm female gender as a risk factor for verbal impairment. This vulnerability is discussed considering the potential negative effects of radiotherapy on white matter in females.
Correspondence: *Claudia Corti, Neuro-oncological and Neuropsychological Rehabilitation Unit, Scientific Institute IRCCS E. Medea, Bosisio Parini, Italy. E-mail: claudia.corti@bp.lnf.it*
Keywords: brain-tumor, neurocognitive-functioning, gender

J. PERRIER, F. EUSTACHE, N. MOREL, D. ALLOUACHE, S. NOAL, C. LEVY, F. JOLY, A. VIARD, B. GIFFARD. Self-representations in breast cancer patients: insights from functional connectivity at rest.
Objective: Psychological distress is frequent during breast cancer (BC) process and may have deleterious effects on autobiographical memory (AM). AM is important for grounding personal identity (self). AM is supported by a cortical network that substantially overlaps with the default mode network (DN), in which resting state functional connectivity (FC) alterations have been repeatedly shown in BC patients. The aim of the current investigation was, in relationship to self-representations and anxiety, to study the longitudinal changes in resting state FC before and after adjuvant chemotherapy for BC.
Participants and Methods: 26 healthy controls and 17 BC patients completed self-representations and anxiety questionnaires, and resting state functional MRI before (T1), one month (T2) and one year (T3) after chemotherapy. Differences in FC between groups was evaluated at T1 and T3 using *t*-test and longitudinal changes in patients were assessed using within-subject ANOVA.
Results: At T1, patients had greater connectivity compared to controls in the left superior parietal gyrus. In patients, results showed lower connectivity at T3 compared to both T1 and T2 in the right middle temporal and right superior parietal gyri. At T1, larger anxiety scores in patients compared to controls were correlated with FC in the anterior cingulate gyrus. In patients, larger anxiety scores at T3 compared to T1 were correlated with FC in the parahippocampal gyrus and lower self-representations scores at T2 compared to T3 were correlated with connectivity in the right inferior occipital and left posterior cingulate gyri.
Conclusions: Our results suggest compensation mechanisms in the Fronto-Parietal Network in BC patients at T1 and delayed effects of chemotherapy on FC both in the DN and Fronto-Parietal Network. Self-representations and anxiety difficulties in BC patients seem to be linked to FC within the DN and the Salience Network.
Correspondence: *Joy Perrier, Neuropsychologie et Imagerie de la Mémoire Humaine, Normandie Univ, UNICAEN, PSL Research University, EPHE, INSERM, U1077, CHU de Caen, Caen, France. E-mail: joy.perrier@unicaen.fr*
Keywords: breast cancer, neuroimaging, functional connectivity, memory complaints

M. BOLTON, E. BROWNE, K.M. MALONE, N. TUBRIDY, E. HEFFERNAN, R. KILLEEN, R. O'LAOIDE, S. YOUNG, K.C. MURPHY, Z. AZVEE, M. FITZGERALD. 'This Beloved Tumour of Mine': Meningioma Masquerading as Mental Illness.
Introduction: Over a third of all primary brain/central nervous system (CNS) are meningeal in origin, with meningiomas comprising 96% of these. Incidence is associated with advancing age, female gender and race (non-caucasians have 1.2-fold

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higher incidence). Meningiomas are the most common brain tumour to present with psychiatric symptoms.

Case Presentation: A 50-year-old female was brought by the police to the Emergency Department due to behaving in a disinhibited manner, including damaging parked cars on a street with a knife. She exhibited grandiose, persecutory and paranoid delusions and was responding to auditory hallucinations. Physical examination, routine laboratory investigations and mid-stream urine were normal. She did not wish for voluntary admission and was detained under the Mental Health Act due to the nature of her presentation, risk to herself and others. She showed no response to antipsychotic treatment. A CT brain demonstrated a 5 cm mass overlying the right frontal lobe with mild adjacent vasogenic oedema and sulcal effacement. A presumptive diagnosis of meningioma was given, requiring neurosurgical intervention. When informed about the findings, she referred to it as her "genius, this beloved tumour of mine" and expressed the belief that she could be cured by exercise and yoga. She underwent a right frontoparietal craniotomy under court order. The post-operative course was complicated by an initial delirium, left sided weakness and foot drop. These gradually improved with time and therapy and psychotic symptoms were absent at discharge.

Conclusion: The above case highlights that individuals with meningiomas may present with only psychiatric symptoms and no focal neurological deficits. Local guidelines include CT Brain in baseline assessment of all first-episode psychosis, however, international guidelines vary. This case highlights the importance of imaging in the identification and management of organic pathology in psychiatric presentations.

Correspondence: *Marie Bolton, Department of Psychiatry and Mental Health Research, St. Vincent's University Hospital, Elm Park, Dublin, Ireland. E-mail: marie.bolton@ucdconnect.ie*

Keywords: frontal lobe, imaging, psychosis

C.J. ORTEGA. Triple X Syndrome and Failed Validity Testing: How to Bridge the Gap Between Poor Effort and Patient Care.

Triple X syndrome, also called trisomy X or 47,XXX, is characterized by the presence of an additional X chromosome in each of a female's cells. It is often associated with neurodevelopmental differences, particularly with a delay in the areas of motor and speech skills. Language-based learning disabilities are also common. In addition, individuals with Triple X syndrome are at risk for behavioral and emotional difficulties, and there is an increased incidence of anxiety and attention deficit hyperactivity disorder. However, there are no controlled studies on behavioral or emotional abnormalities in children who have trisomy X, and the incidence of such conditions is unknown. With this background in mind, the topic of validity testing is one that is not often mentioned specifically with regards to this population. However, this poster will evaluate the neuropsychological profiles of three individuals with Triple X syndrome who all failed validity testing during neuropsychological assessment. Potential contributing factors include language and speech delays as well as anxiety, which were prevalent among all three children. General risk factors such as family stressors, noncompliant behavior, iatrogenic factors, and a potential "cry for help" also warrant consideration. Overall, the results pose the question of whether or not this population is at greater risk of feigning or demonstrating noncredible effort during an evaluation. Future research may also wish to assess response to failure, task engagement and persistence, and compliance with task demands in this population. Looking forward, identifying risk factors as well as strategies to manage noncredible performance during assessment will allow neuropsychologists to provide a higher level of care to individuals with Triple X syndrome, which would truly improve our efforts to bridge science and humanity.

Correspondence: *Christina J. Ortega, Neuropsychology, Phoenix Children's Hospital, Phoenix, USA. E-mail: cwaksmunski@gmail.com*

Keywords: Triple X syndrome, Effort, Genetics

B. PRIETO-CORONA, C. SERRANO-JUÁREZ, C. VENEGAS, G. YÁÑEZ, M. RODRÍGUEZ-CAMACHO, J. SILVA-PEREYRA, H. SALGADO. Phenotype/genotype relationship in patients with Williams syndrome.

Williams syndrome (WS) is a genetic disease caused by a microdeletion in the chromosomal region 7q11.23. In 92% of the cases, the affected region contains 1.55 Mb of sequence and code for 25 genes. The other 8% have a deletion greater than 1.8 Mb that affects two other genes, one of them the GTF2IRD2. There is no consensus on the phenotype/cognitive-behavioral genotype relationship of patients with Williams syndrome since the implication of different genes results in a different neuropsychological profile.

Objective: The aim of this study was to identify the role of GTF2IRD2 in the cognitive behavioral profile of patients with SW. Participants and

Methods: Eight patients without deletion of the GTF2IRD2 gene and three patients with deletion of this gene. The patients were between 7 and 16 years

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old and were clinically diagnosed by a geneticist. The size of the deletion was determined using the Optimal CytoScan microarray technique, and a neuropsychological battery was used to assess cognitive and behavioral performance.
Results: The results indicate that patients with GTF2IRD2 deletion had greater visuospatial difficulties and greater behavioral problems associated with social cognition (emotional recognition, empathy, and theory of mind).
Conclusions: Our findings provide new evidence of the involvement of GTF2IRD2 in behaviors that are related to social cognition and visuospatial abilities since this gene has been associated with the development of the cerebellum and the prefrontal areas (dorsolateral and orbitofrontal).
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Correspondence: *Belén Prieto-Corona, FES Iztacala, National Autonomous University of Mexico, Mexico, Mexico. E-mail: bemapado@gmail.com*
Keywords: William's syndrome, Genetics, Neuropsychology

R.L. ROELOFS, E. WINGBERMÜHLE, R.P.C. KESSELS, J.I.M. EGGER. Clinical Neuropsychological Management of Noonan syndrome: Future Directions.
Objective: After a decade of research regarding cognitive functioning in Noonan syndrome (NS), an overview of the findings is provided. NS is a genetic disorder, generally associated with a (low-)average intelligence, lowered processing speed, and higher levels of alexithymia and social discomfort in adulthood. In children, more diffuse (social) cognitive difficulties have been found. Mood and anxiety disorders may be present more frequently in NS.
Participants and Methods: In several studies, we investigated intellectual development in NS (N= 16), and the social cognitive profile of women with NS was compared to that of healthy controls, and patients with Turner syndrome (TS) - a phenotypically comparable but genetically different syndrome (total N= 106). A meta-analysis regarding the effectiveness of social cognitive interventions in neuropsychiatric populations was performed. Based on these findings, a NS-specific social cognitive intervention was developed and its feasibility evaluated (N= 11).
Results: Performance IQ increased from childhood to adulthood, suggesting a delay in the development of executive functioning. Women with NS and TS demonstrated different patterns of emotion recognition and alexithymia. Social cognitive interventions in neuropsychiatric patients were effective in improving social cognition. A NS-specific social cognitive intervention was feasible and showed encouraging results regarding emotion recognition.
Conclusions: NS can be considered a developmental disorder in which (social) cognitive functioning seems to be more affected in childhood, while in adulthood a distinctive cognitive profile has been found as well. A NS-specific social cognitive intervention provides a relevant addition to the psychological healthcare for this population. Future studies should further evaluate the effectiveness of this intervention, focusing on psychopathology, personality, and coping, and addressing the development of (social) cognitive functioning.
Correspondence: *Renée L. Roelofs, Centre of Excellence for Neuropsychiatry, Vincent van Gogh Institute for Psychiatry, Venray, the Netherlands. E-mail: rroelofs@vvgi.nl*
Keywords: Noonan syndrome, genetic neuropsychology, social cognition

E. DE HAAN, N. SEIJDEL, A. SMITS. Plasticity versus chronicity: 40 years stability of perceptual and cognitive impairment after encephalitis.
Objective: What is the long-term trajectory of perceptual and cognitive deficits in patients who have suffered structural brain damage? The traditional view is that after an initial recovery period, the mature human brain has little capacity to repair or reorganize. More recently, it has been suggested that the central nervous system is plastic with the ability to change in neural structure, connectivity, and function. The latter observations are, however, largely based on normal learning in healthy subjects.
Method: MS is a patient who suffered bilateral ventro-medial damage after herpes encephalitis in 1971. He was seen regularly in the eighties, and we recently had the opportunity to re-assess his perceptual and memory impairments. Colour perception was tested with the Farnsworth-Munsell test. The test entails 88 hues in four groups (orange/magenta; yellow/green; blue/purple and purple/magenta hues) that are presented in random order. MS was asked to sort them according to hue. Category fluency requires the retrieval of words within a category. MS was asked to produce as many exemplars as possible in one minute for 4 categories with living items (animals, fruit, birds, vegetables) and 4 with non-living items (occupations, clothes, sports, furniture). This task was repeated three times on consecutive days.
Results: The total summed error of MS on the Farnsworth Munsell test was 1268 in 2017 and in

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1245 in 1980. The normal range for age-matched observers is 170-195, and a score of 1200 indicates random responding. MS's performance on the fluency test shows a stable but significant difference between his average scores on the living (now: 6.8; then 6.8: both very poor compared to controls) versus the non-living (now 14.3; then 15.0: both better than healthy controls) categories.
Conclusion: We suggest cautiousness when extrapolating the concept of brain plasticity, as observed during normal learning, to plasticity in the context of structural brain damage.
Correspondence: *Edward de Haan, Psychology Department, University of Amsterdam, Amsterdam, the Netherlands. E-mail: e.h.f.dehaan@uva.nl*
Keywords: Plasticity, colour perception, category-specific semantic memory

Y. SANTOYA MONTES, K. GUTIÉRREZ RUIZ, P. PUENTES ROZO, J. ROJAS MARTÍNEZ. Executive functioning in two patients with Hereditary Sensory Autonomic Neuropathy: Single case study.
Objective: The Hereditary Sensory and Autonomic neuropathy (HSAN) is a rare group of neuropathies with genetic origin that affects the Sensory and Autonomic nervous system. The patients do not have the ability of sensing different sensations such as pain and temperature, which tends to lead to different injuries. HSAN is divided into 8 types according to the age of onset, clinical features, and inheritance. Currently, it is known that some types of HSAN co-exist with intellectual disability, however, cognitive functioning as a critical factor related to children overall developmental trajectory has not been studied in HSAN. The present work describes the executive functioning of two HSAN cases.
Participants and Methods: Our cases are one 5-yr old girl diagnose with HSAN-IID and one 12-yr old girl diagnose with HSAN-IV from consanguineous parents. We administered a battery of executive functions (verbal fluency, numbers in regression, rhythm and Wisconsin Card Sorting Test) and a measure of intelligence.
Results: The 5-yr old patient with HSAN-IID has a global cognitive ability and executive functioning according to her age, while the 12-yr old patient with HSAN-IV presents intellectual disability and executive function deficits mainly in cognitive flexibility, working memory, inhibition, sequencing and planning.
Conclusion: HSAN is a medical condition that can be affected by cognitive deficit; however, this may vary depending on the subtype. In the case of HSAN-IID, no intellectual disability was found with executive functioning according to age, while in the case of HSAN-IV, intellectual disability was found with a deficit in executive functioning. Clinical implications of study findings are discussed.
Correspondence: *Yanin Santoya, Psychology, Universidad Tecnológica de Bolívar, Cartagena, Colombia. E-mail: kgutierrez@utb.edu.co*
Keywords: genetic neuropsychology, executive functioning, hereditary sensory autonomic neuropathy

L.C.M. VAN DONGEN, E. WINGBERMUHLE, W.M. VAN DER VELD, C.W. OCKELOEN, T. KLEEFSTRA, J.I.M. EGGER. Cognition and behaviour in KBG syndrome: A case-control study.
Objective: KBG syndrome (KBG) is a neurodevelopmental disorder caused by mutations in the *ANKRD11*-gene. The prevalence is still unknown, but the amount of cases has increased tremendously since genome-wide sequencing has become available. KBG is characterized by intellectual disability, structural brain anomalies, craniofacial dysmorphisms, and short stature. Cognition and behaviour have hardly been studied yet, but anecdotal evidence suggests higher frequencies of ADHD-symptoms and social-emotional impairments. The cognitive profile of KBG will be explored, in order to examine if and how cognitive deficits contribute to behavioural difficulties.
Participants and Methods: 18 Patients with KBG syndrome and a control group consisting of 17 patients with other genetic disorders, but similar intelligence levels (p=0.90), completed neuropsychological assessment and behavioural questionnaires. Age-appropriate tasks were selected, covering attention, memory, executive functioning, social cognition and visuoconstruction. Results were compared using multiple independent t-tests and by inspecting Cohen's d effect sizes.
Results: No significant differences were found for any of the cognitive variables, but patients with KBG syndrome showed relatively lower scores on sustained attention (D2: d=.37, p=.29), shifting (IED CANTAB: d =.47 p=.20), and visuoconstruction (Beery VMI: d=.43, p=.26; Rey CFT: d=.41, p=.29).
Conclusions: The cognitive profile of KBG syndrome indicates (disproportional) problems in attention and executive functioning, that may underlie observed impulsive behaviours. Contrary to expectations based on previous (case) reports, no deficits were found in social cognitive functioning in this sample. These findings are important for counselling purposes, for tailoring educational trajectories, and for the development of personalized treatment.

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Correspondence: *Linde C.M. Van Dongen, Centre of Excellence for Neuropsychiatry, Vincent van Gogh Institute for Psychiatry, Venray, the Netherlands. E-mail: lvandongen@vvgi.nl*
Keywords: genetic neuropsychology, cognitive phenotyping, attention deficit hyperactivity disorder

L. KRAMSKA, Z. VOJTECH, L. HRESKOVA. Neuropsychological factors in patients with psychogenic non-epileptic seizures (PNES).

Objective: The aim of this study is to monitor health and psychosocial factors during and at least one year after hospitalization at Epilepsy Monitoring Unit and after the communication of the PNES diagnosis.
Materials and methods: Patients with PNES (125w/49m) were examined using semi-structured interview focused on the change in the frequency and severity of seizures, consumption of health care, changes in subjective quality of life in respect to the seizures. Patients were assessed by RBANS, MMPI-II, a structured interview focused on the stressors in childhood, social learning and the stressors preceding seizures, and by emotional relationships in childhood questionnaire (PBI).
Results: At least one year after hospitalization the frequency of seizures was significantly lower (p<.001) and the frequency of hospitalizations decreased. Nearly 30% of patients suffered from persistent frequent seizures. In comparison with control group higher frequency of stressors in childhood was found in patients with PNES. General psychopathology (the majority of clinical scales in MMPI-II) was significantly increased against the norm. The cognitive performance in patients´ group in comparison with healthy controls was significantly lower in all (p<.001).
Conclusions: Multifactorial approach in the understanding of pathogenesis of PNES is essential for correct diagnosis. Integral part of neuropsychological assessment is evaluation of history of traumatic events, post-traumatic stress disorder, mood and personality disorders, and cognitive impairment. Differential diagnosis of epileptic and psychogenic seizures is important for appropriate treatment. Our results demonstrated seizures persistence and high levels of psychosocial, economical and health impacts. The relatively low percentage of change during one year supports the need for specialized interventions in this group of patients.
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Correspondence: *Lenka Kramska, Neurocenter, Clinical Psychology, Na Homolce Hospital, Prague, Czech Republic. E-mail: kramska.lenka@icloud.com*
Keywords: psychogenic non-epileptic seizures, stressors in childhood, psychopathology

N. CANARIO, M.H.M. COSTA, M. VEIGA, N. ABREU. Family Environment and ADHD/ODD symptoms in children with Rolandic Epilepsy.

Objective: We verified associations between family environment variables and ADHD / ODD symptoms in children with Rolandic Epilepsy (ER).
Participants and Methods: 22 parents of children with a diagnosis of RE (54.5% boys, aged 6,7 to 13,1 years old) answered a sociodemographic questionnaire (including Brazilian Economic Classification Criteria BECC), the Home Environment Resources Scale (HERS) and the MTA-SNAP-IV (scale including inattention, hyperactivity and oppositional/defiant behaviors). Spearman Correlation Coefficients were obtained from associations between the considered variables.
Results: hyperactivity symptoms were associated with BECC (ρ= -0,581; *p*<,01), maternal (ρ=-0,461; *p*<,05) and paternal (ρ=-0,646; *p*<,01) education, HERS-Total (ρ= -0,556; *p*<,01), HERS-Material Resources (ρ= -0.436; *p*<.05) and HERS-Parental Support of School Routines (ρ=-0,496; *p*<,05). Oppositional/defiant behaviors were associated with paternal education (ρ=-0,646; *p*<,01), HERS-Total (ρ= -0,569; *p*<,01), HERS-Parental Support of School Routines (ρ=-0,553; *p*<,01) and HERS-Interaction with Parents (ρ= -0,524; *p*<,05).
Conclusions: Previous studies with non-epileptic children with ADHD/ODD have shown association between behaviour regulation and family variables. In children with RE, symptoms of hyperactivity and ODD also appear to be more vulnerable to environmental influence. Symptoms of inattention, however, are possibly best explained by the presence of epilepsy.
Correspondence: *Neander Abreu, Psychology, Universidade Federal da Bahia, Salvador, Brazil. E-mail: neandersa@hotmail.com*
Keywords: Hyperactivity, Attention, Executive Function

A. BALA, M. SZANTROCH, A. RYSZ, A. MARCHEL. Emotion recognition and understanding in patients with drug resistant mesial temporal lobe epilepsy.

Objective: There is a widely studied relation between the presence of epileptic focus in the temporal lobe and lower ability of emotion processing by limbic structures. The aim of this study was to investigate how patients with drug resistant mesial temporal lobe epilepsy (MTLE) recognize and understand emotions.

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Participants and Methods: The study included patients with intractable MTLE (n=40) and a control group of healthy volunteers (n=40). In group of patients the average time of epilepsy duration was 15,9 years (SD=7,2) and the average number of seizures (monthly) was 6,9 (SD=7,1). It was a case-control study, groups were matched in terms of age, sex, handedness and level of education. The subjects from both groups were examined with three tests evaluating: emotion recognition on photographs of faces (SIE-T test) and on pictures of eyes area (Reading Mind in the Eyes Test - RMET), as well as knowledge about emotions and metaemotional processes (TRE test).
Results: The results of the research supported the hypothesis about the lowered ability of emotion recognition on faces ($t = 2,37$; $p < 0,05$), eyes ($t = 1,19$; $p < 0,01$) as well as lowered level of theoretical understanding of emotional processes ($t = 4,68$; $p < 0,001$) in patients with MTLE, which is in line with previous findings.
Conclusions: Mesial temporal lobe epilepsy can affect the ability of recognizing and understanding emotions. These findings should be taken into account in setting the standards of the proper diagnosis and treatment of patients with epilepsy.
Correspondence: *Aleksandra Bala, Faculty of Psychology, University of Warsaw, Warsaw, Poland. E-mail: aleksandra.bala@gmail.com*
Keywords: MTLE, social cognition, emotion recognition

M.R. GARCÍA-JUÁREZ, Y. RODRÍGUEZ-AGUDELO, H. SALGADO-CEBALLOS, J. BERNAL-HERNÁNDEZ. Social cognition in adolescents with epilepsy.

Epilepsy is a chronic neurological disease with predominantly global prevalence. Children with epilepsy have three times of risk to develop cognitive deficits, like attention, memory, visuospatial, language and executive functions impairments. Cognitive functioning is important to psychosocial adaptation and quality of life, which are aspects linked to social cognition (SC). SC permits recognize, manipulate and respond to social information. It is especially important in adolescence that is a period heightened sensitivity to social cognitive development. The aim of our study was to investigate SC abilities in adolescents with temporal (TLE) and frontal lobe epilepsy (FLT). We administrated a neuropsychological battery plus a SC battery which evaluates causes, consequences, social judging, absurdities to nineteen adolescents with TLE and eleven adolescents with FLT and 19 matched healthy controls. Compared with controls, adolescents with TLE and FLT showed significantly lower performances on two SC tasks: causes and social judging. Impairments in cognitive functions and SC in adolescents with epilepsy have to be considered as important aspects which affect social functioning and for therapeutic interventions.
Correspondence: *Maria R. García-Juárez, National Autonomous University of Mexico, Mexico, Mexico. E-mail: rosgj@comunidad.unam.mx*
Keywords: social cognition, epilepsy, adolescent

K.D. HARTLINE, S. SAVITE, S. MULATI, A.H. HAMILTON. Emotional dysregulation in children diagnosed with intractable epilepsy and subependymal gray matter heterotopia.

Objective: The authors present the cases of three children with localization-related intractable epilepsy and subependymal gray matter heterotopia adjacent to the left lateral ventricle, presenting with a unique constellation of epileptiform activity, neurocognitive abilities, and behavioral symptoms.
Participants and Methods: Three patients (one female, two male) ages 7-14 were diagnosed with intractable epilepsy and subependymal gray matter heterotopia presenting with significant behavioral dysregulation. Each patient had focus of subependymal gray matter heterotopia adjacent to the left lateral ventricle on MRI and abnormal EEG epileptiform activity arising from a posterior quadrant including parietal, temporal, and/or occipital lobes. A comprehensive neuropsychological evaluation, clinical interview, and psychosocial questionnaire were administered.
Results: Neuropsychological findings indicated intact intelligence for all patients ($M = 100.67$, $SD = 11.93$). Findings were not suggestive of focal impairments on tasks of executive functioning or those corresponding to cortical areas near the heterotopia or epileptogenic activity, defined as scores at least one standard deviation below the mean. Based on behavioral observation, clinical interview, and psychosocial questionnaire completed by parents, all patients exhibited significant behavioral and emotional disturbances, which appear unaccounted for on neuropsychological measures (e.g., executive functioning tasks).
Conclusions: The current case series provides preliminary evidence that behavioral dysregulation may be present in children with complex partial seizures and subependymal gray matter heterotopia without corresponding abnormality (e.g., frontal lobe, corticolimbic system) on neuroimaging, electrophysiological monitoring, or performance on neuropsychological measures. Further research is necessary to establish possible causal links between heterotopia, epilepsy, behavior, and mood regulation.

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Correspondence: *Kenneth D. Hartline, Division of Neurology, Children's Hospital Los Angeles - University of Southern California, Los Angeles, USA. E-mail: khartline@chla.usc.edu*
Keywords: Executive abilities, abnormal, Seizure disorders / epilepsy, Intellectual functioning

M. HIROZANE, D. SONE, S. WATANABE, Y. MURATA, M. OKAZAKI. Relationship between category-specific naming performances and 18F-FDG-PET in patients with unilateral temporal lobe epilepsy.

Objective: Previous studies indicate that the left hemisphere plays an important role in visual naming. However, in patients with temporal lobe epilepsy (TLE), naming disorders, including category-specific disorders, are sometimes observed both in those with left TLE (L-TLE) and right TLE (R-TLE). The present study investigates whether certain brain regions are critical for specific category naming performances by evaluating the relationship between category-specific naming performances and the decline of ^{18}F-FDG-PET in L-TLE and R-TLE patients.

Participants and Methods: Twenty-four patients with TLE participated (7 male, 17 female; 19–56 yrs. old; L-TLE 16, R-TLE 8). Visual naming performance was assessed using the Test of Lexical Processing in Aphasia (TLPA; naming 20 words in each of 10 categories, e.g. building, body). One patient with L-TLE was excluded from the analysis because of the outlier of the naming performance of TLPA. All patients underwent EEG, MRI, and FDG-PET.

Results: TLPA indicated that 8 of 15 patients with L-TLE and 4 of 8 patients with R-TLE had naming disorders. ^{18}F-FDG-PET in L-TLE patients revealed a significant positive correlation (t=7.66, cluster p=0.003) only between scores for "body" and regional glycometabolism in right BA 4. Those of R-TLE patients indicated a significant positive correlation (t=27.64, cluster p=0.000) between scores for "building" and regional glycometabolism in left BA 38 and a significant positive correlation (t=32.39, cluster p=0.003) between "parts of the house" and regional glycometabolism in left BA10.

Conclusion: We infer that R-TLE patients may present category-specific naming disorders due to reduction of metabolism in critical brain areas. Some L-TLE patients may suffer from category-specific naming disorders. We infer that no critical brain areas for naming were observed in ^{18}F-FDG-PET because seizures and regional glycometabolism influenced various areas of the left hemisphere.

Correspondence: *Mayumi Hirozane, Dept. of Language, Speech and Hearing Therapy, Teikyo Heisei University, Tokyo, Japan. E-mail: m.hirozane@thu.ac.jp*
Keywords: category-specific naming, 18F-FDG-PET, unilateral temporal lobe epilepsy

Y. MEGURO, H. KIKUCHI, M. KOBAYASHI, T. OTSUKI, T. SOGA, J. FUJIMORI, I. NAKASHIMA. Accelerated Long-Term Forgetting associated with Temporal Lobe Epilepsy: A case whose memory impairment and its recovery with treatment were clarified.

Objective: Accelerated long–term forgetting (ALF) is a form of memory impairment associated with temporal lobe epilepsy (TLE), in which newly acquired memories fade over days to weeks. Patients with ALF frequently perform normally on standard neuropsychological tests of memory and it appears to be a problem how to evaluate the severity and therapeutic effect of ALF.

Participants and Methods: A man who was 63 years old at the initiation of the treatment participated. He complained repeated loss of episodic memories which occurred at awakening from sleep. His memory was within normal range on WMS-R (Delayed recall 86). The sole witnessed complex partial seizure led to the diagnosis of TLE and the initiation of antiepileptic drugs. We inspected how much he could retrieve information after a long retention period of 1 week from learning, both before and after the treatment. As the verbal memory test, according to the procedure of Auditory Verbal Learning Test, he first learned an auditorily presented list of 15 words five times repeatedly, then he was asked to retrieve the words after a 30-minute retention. Finally, after a 1-week retention, he was asked to retrieve the words again. As the visual memory test, he first learned 10 unknown faces five times repeatedly, then he was asked to detect the learnt target faces among serially presented 20 faces containing 10 targets and 10 distracters after a 30-minute retention. Finally, after a 1-week retention, he was asked to detect the learnt target faces again, among 20 faces containing 10 targets and 10 new distracters.

Results: Before the treatment, at the retrieval after a 1-week retention, he could recognize none of the 15 words in the verbal test, and none of the 10 faces in the visual test. One year after starting the treatment of epilepsy, he could recognize 14 words and 8 faces in each test.

Conclusions: The inspection clarified the initial impairment of ALF associated with TLE and its recovery with the treatment.

Correspondence: *Hirokazu Kikuchi, Section of Speech Language Therapy and Neuropsychology, Department of Rehabilitation, Tohoku Medical*

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Pharmaceutical University Hospital, Sendai, Japan. E-mail: kiku0215@hosp.tohoku-mpu.ac.jp
Keywords: accelerated Long-Term Forgetting, temporal lobe epilepsy, therapeutic effect

S.Y. MUSIL, A.R. CARLEW, L.E. PIPER, D. KWAN. Successful neuropsychological treatment of non-epileptic seizures in a patient with comorbid epilepsy.

Objective: To demonstrate the value of treatment by a neuropsychologist that is specifically targeted for non-epileptic seizures (NES) in a patient with comorbid epilepsy (ES).

Participants & Methods: JP is a 35-year-old woman with a college degree and occipital lobe epilepsy beginning at age 2 due to cortical dysplasia. She had partial resection of the epileptic zone at age 28. Seizures continued and the conclusion from multiple inpatient admissions for continuous video EEG (cvEEG) was that these were NES. Psychotherapy was recommended.

Results: Treatment was initiated using a manualized CBT program for NES. JP was diligent with readings and homework but required extensive additional psychoeducation and work with cognitive restructuring and relaxation skills. Eventually, JP was able to recognize fear as antecedent to seizures. The case conceptualization was that JP had developed a number of conditioned fears associated with childhood seizures. Manualized treatment was discontinued and the plan was to engage in exposure therapy. However, before this plan could be implemented, JP changed to a new neurologist. Subsequent diagnostic evaluation revealed JP was experiencing ES that quickly evolved to NES. She became a candidate for RNS treatment, about which she was ambivalent. Continued psychoeducation about seizures and RNS was provided and more detailed CBT tracking of seizures was carried out to try and distinguish ES from NES. This, coupled with close coordination with JP's neurologist, revealed that she was no longer experiencing NES, with cvEEG now clearly showing bitemporal lobe seizures. Treatment continues while she undergoes surgery.

Conclusions: 1) Psychotherapy with NES patients must be flexible and close coordination with neurology is key. 2) Neuropsychologists are best positioned to provide this treatment. 3) Different patients require different modalities of treatment. 4) For comorbid NES and ES, psychotherapy to treat NES can facilitate treatment of ES.

Correspondence: *Suzanne Y. Musil, Behavioral Sciences, Rush University Medical Center, Chicago, USA. E-mail: suzanne_musil@rush.edu*

Keywords: seizure disorders / epilepsy, seizures disorders / non-epileptic, cognitive-behavioral therapy

L. SEGALÀ, J. MEYLOR, A. HIGHTOWER, E. WIGGS, W. THEODORE, K. ZAGHLOUL, S. INATI. Cognitive Outcomes Following Temporal Lobe Surgery for Drug Resistant Epilepsy.

Objective: Epilepsy surgery can be an effective treatment for patients with drug-resistant focal epilepsy. While there is risk for postoperative cognitive impairment, some studies have reported improvements in cognition. The aim of this study was to examine how cognition is affected by surgery in a sample of patients undergoing right or left (unilateral) hemisphere resections.

Participants and Methods: Fifty-nine right-handed patients underwent left (50.9%) or right (49.2%) hemisphere surgical resections, with most patients undergoing anterior temporal lobectomies (59.3%). Mean age at time of surgery was 36 years old and duration of epilepsy was 21 years on average. Neuropsychological evaluations were completed prior to and one year after surgery. Postoperatively, 56% of patients were seizure-free. No changes in drug treatment were made during the pre-and post-operative period.

Results: Overall, preoperative scores were one standard deviation below the mean on naming, phonemic verbal fluency, select measures of episodic memory, and working memory. Postoperatively, there were no significant changes in scores. However, a more detailed analysis controlling for side of resection (left vs. right temporal) showed that postoperatively, performance was worse on a measure of spatial ability for those who underwent a right temporal lobectomy, whereas patients who underwent a left temporal lobectomy obtained decreased scores in factual knowledge (semantic memory) and word learning with built-in cueing. Right-sided resections produced modest improvement in verbal memory.

Conclusions: Consistent with previous reports, our results reinforce the influence of side of resection on cognitive outcome after epilepsy surgery, with the greatest risk of memory decline observed following left temporal resections. Follow-up research with seizure-free patients only will clarify the relation between surgical resection and cognitive function in the absence of ongoing epileptiform activity.

Correspondence: *Laura Segalà, National Institutes of Health, Bethesda, USA. E-mail: laura.segala@nih.gov*

Keywords: seizure disorders / epilepsy, surgical treatment

G. SAVAGE, A. ZEMAN, C. BUTLER. Accelerated long-term forgetting and autobiographical amnesia in subtle temporal lobe epilepsy.

Patients with temporal lobe epilepsy or transient epileptic amnesia often experience accelerated long-term forgetting (ALF), whereby events are remembered normally for days to weeks, but then become forgotten. Such patients may also experience autobiographical amnesia for events from their past. Less frequently diagnosed cases with 'Epileptic Amnesic Syndrome' experience varieties of memory disturbance often overshadowing the existence of subtle temporal lobe seizures, which may only be diagnosed subsequently. Empirical studies of ALF and autobiographical amnesia are warranted in this group.

We studied a group of adults ranging in age from young to elderly, who sought medical advice about poor memory for past events; detailed questioning also suggested ALF, and investigations led to a diagnosis of subtle epilepsy. We employed a novel test of forgetting over delays of 30 minutes, 24 hours, 4 days and 4 weeks, testing recall of arbitrary word pairings. Lifetime recall of personal events was probed using a speeded autobiographical fluency task; autobiographical event responses were compared with those for personal semantic memory (recall of people known across the lifespan).

Data are presented for seven cases who reported ALF and autobiographical amnesia on interview, corroborated by questionnaire responses, and seven age-and sex-matched controls who did not. All clinical cases achieved at least 75% recall by a third trial of cued recall of word pairings, and all revealed ALF by 4 weeks and recalled fewer life events on the fluency task (particularly for pre-adolescent life) relative to controls. Empirical and subjectively reported measures of ALF correlated significantly, and degree of ALF on testing also correlated with autobiographical amnesia in terms of event fluency.

ALF and autobiographical amnesia can be related presenting features of otherwise inconspicuous epilepsy, and increased attention should be paid to memory complaints in apparently healthy adults.

Correspondence: *Greg Savage, ARC Centre of Excellence in Cognition and its Disorders, Department of Psychology, Macquarie University, Sydney, Australia. E-mail: greg.savage@mq.edu.au*

Keywords: memory disorders, seizure disorders / epilepsy, memory complaints

D. BARAJAS-TOLEDO, M. RODRÍGUEZ-CAMACHO, A. JAIMES-BAUTISTA, Y. RODRÍGUEZ-AGUDELO. Semantic memory and semantic priming in patients with Parkinson's disease (PD).

In PD, deficits in tasks assessing semantic memory (SM) and in paradigms of semantic priming (SP) have been described. However, there is some controversy whether memory failure as such, or deficiencies in executive functions (EF), as the cause of the semantic deficits.

Objective: To evaluate the access and retrieval of explicit semantic processing (neuropsychological tests) and implicit semantic processing (lexical decision tasks) in patients with PD.

Participants and Methods: Twelve patients diagnosed with PD (mean age 62.3, S.D. 7.2; stage < 3 in Hoehn & Yahr scale) all with pharmacological treatment were evaluated during "on" phase, as well as ten subjects that formed the control group (CG). Semantic verbal fluency tests, Boston naming test, backward digit span, self-directed pointing, stroop, spontaneous memory curve, verbal memory retrieval, Rey-Osterreith complex figure and a computerized lexical decision task were used.

Results: In the SM tests, no significant between groups differences were found, while in EF tests a tendency of lower performance in PD patients in the number of correct answers ($p=0.068$) and omissions ($p=0.053$) of the self-directed pointing test was found. On the other hand, all participants showed an SP effect. Although no significant between groups differences were found for SP, PD patients obtained a lower percentage of correct answers and longer response times in both automatic and controlled SP, respect to CG. PD group showed as well a better performance in the automatic than in the controlled SP task.

Conclusions: Although frank cognitive alterations were not found in patients with PD, the results suggest difficulties in the access and retrieval of semantic information, that is, in the EF intervening in semantic processing. The findings of this study can be explained regarding the relationship between cognitive impairment, the magnitude of dopaminergic depletion, as well as the duration and severity of the disease.

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Correspondence: *Mario Rodríguez-Camacho, FES Iztacala, National Autonomous University of Mexico, Mexico, Mexico. E-mail: marcizta@gmail.com*

Keywords: Parkinson's disease, semantic memory, executive functions

A. FENDRYCH MAZANCOVA, R. JECH, E. RUZICKA, J. ROTH, O. BEZDICEK. Classification accuracy of four screening

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measures that indicate mild cognitive impairment in Parkinson's disease.

Objective: Parkinson's disease (PD) patients suffer from the cognitive dysfunction that occurs even at the time of PD diagnosis and is heterogeneous. We investigated the discriminative properties and classification accuracy of three screening measures for assessing global cognitive abilities, Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA), Mattis Dementia Rating Scale, Second Edition (DRS-II), and one measure for screening executive functions, Frontal Assessment Battery (FAB).

Participants and methods: 21 PD without cognitive impairment (PD-NC; mean age: 63.1±4.3, education: 14.8±3.1), 38 PD mild cognitive impairment (PD-MCI; mean age: 63.9±7.9, education: 13.2±2.7) according to IPMDS criteria at Level II, and 43 controls (mean age: 64.0±6.1, education: 14.8±3.1).

Results: There were significant between-groups differences in MoCA, DRS-II, FAB (all $p<.001$) and MMSE ($p=.001$; Kruskal-Wallis test). However, post-hoc comparisons showed no differences between PD-NC and controls in MMSE ($p=.714$), MoCA ($p=.874$), MDRS ($p=.862$), but not so in the case of FAB ($p=.002$). All four scales differentiated between PD-MCI and PD-NC, MMSE ($p=.003$), MoCA ($p=.004$), DRS-II ($p<.001$) and FAB ($p=.001$), and, also between PD-MCI and controls (all $p\leq.002$). The most promising test (FAB) analysis yielded based on a ROC curve an AUC of 76 % (95 % CI 64-88) for PD-MCI versus PD-NC and an AUC of 73 % (95 % CI 59-86) for PD-NC versus controls.

Conclusions: The present results indicate that screening measures MMSE, MoCA, DRS-II and even FAB are useful for distinguishing between PD-MCI and PD-NC, and FAB has also a potential to differentiate PD-NC from controls.

Correspondence: *Adela Fendrych Mazancova, Department of Neurology and Centre of Clinical Neuroscience, First Faculty of Medicine and General University Hospital in Prague, Prague, Czech Republic. E-mail: adelamazancova@gmail.com*

Keywords: cognitive screening, mild cognitive impairment, Parkinson's disease

C.R. SMITH, D.J. BURN, H. MORRIS, N. WOOD, Y. BEN-SHLOMO, T. FOLTYNIE, N. BAJAJ, R. BARKER, K. GROSSET, M. LAWTON, N.M. WILLIAMS, J. CAVANAGH, D.G. GROSSET, B. CULLEN. Factor Structure of the Montreal Cognitive Assessment in Parkinson's Disease.

Objectives: The Montreal Cognitive Assessment (MoCA) is a widely used tool for screening dementia and mild cognitive impairment. Previous research has shown evidence of a factor structure that maps to various cognitive domains (short-term memory, visuospatial, executive, language, attention/concentration/working memory, and orientation) in samples of people with Alzheimer's disease (AD). We aimed to test this factor structure in a large sample of people with Parkinson's disease (PD) in the United Kingdom.

Participants and Methods: Complete MoCA data were available for 1738 patients with PD (64.6% male; mean age 67.6 years, SD 9.2) recruited to the Tracking Parkinson's cohort. Confirmatory factor analysis (CFA) was applied to test previously reported six- and two-factor models, in both the total sample and in a subgroup with possible cognitive impairment (defined by a MoCA score <26; n = 797). Secondary analyses were conducted using exploratory factor analysis (EFA; principal factors with oblique rotation).

Results: The mean MoCA score was 25.3 (SD 3.4, range 10-30). In the total sample, the fit statistics in the six-factor CFA model ($\chi2/df$ 17.77, RMSEA .10, CFI .74, TLI .69, SRMR .07) indicated poorer fit than previous studies in AD. Results were similar in the two-factor CFA model, and in the MoCA<26 subgroup analyses. A six-factor EFA suggested a different structure (memory, visuospatial/executive, abstraction, expressive language, attention/short-term memory, and orientation/attention), although the factor loadings were varied.

Conclusions: The factor structure of the MoCA in this PD sample was not consistent with previous research in AD. This may reflect higher cognitive performance and different demographics in our sample. The current results do not strongly support a domain-specific factor structure in this group, suggesting that the MoCA screening results should be followed up with more detailed assessment to obtain clinically informative cognitive profiles.

Correspondence: *Callum R. Smith, Institute of Neuroscience and Psychology, University of Glasgow, Glasgow, UK. E-mail: c.smith.3@research.gla.ac.uk*

Keywords: Cognitive screening, Parkinson's disease, Psychometric constructs

V. PLZAKOVA. The feasibility of cognitive rehabilitation and its benefits to patients with Parkinson's disease: pilot data.

Background: Mild cognitive impairment in Parkinson's disease (PD) can be in particular characterized by disruption of executive functions, attention and working memory. These changes may already occur in the early stages of the disease. Cognitive rehabilitation (CR) is one of the non-

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pharmacological approaches to alleviate or compensate for cognitive deficits. The goal of CR is to delay the onset of cognitive changes.

Participants: Participants with PD (n = 16) underwent a neuropsychological examination to distinguish the presence of mild cognitive impairment. Four women and four men were included in the experimental group (n = 8), the average age of participants was 68.1 years, the average length of education 15.6 years, the average score in DRS-II = 140.9, 3 participants with freezing. Four men and four women were included in the control group (n = 8), the average age of participants was 65.6 years, the average length of education 15 years, the average score in DRS-II = 141, 3 participants with freezing.

Design: The single-blind randomized pilot study compares the effect of CR (experimental group) against relaxation therapy (control group). Both types of interventions were carried out in groups, once a week for 60 minutes for 12 weeks. The control group underwent only relaxation therapy. The experimental group went through CR to train cognitive functions in the context of daily activities. The participants of the experimental group also performed exercises at home.

Results: CR had a positive effect on the improvement of memory functions. Significant improvement was demonstrated in learning (p= .012), retention (p = .044), delayed recall (p = .020), memory capacity for verbal material (p = .012).

Conclusion: The pilot study supports the feasibility of CR in clinical practice and its positive contribution to the memory performance in short-term perspective of patients with PD.

Correspondence: *Vladimíra Plzáková, Department of Neurology and Centre of Clinical Neuroscience, Neuropsychology Laboratory, Charles University, First Faculty of Medicine and General University Hospital in Prague, Prague, Czech Republic. E-mail: malikovavladka@gmail.com*

Keywords: Parkinson´s disease, cognitive functioning, cognitive rehabilitation

L. MEKKI BERRADA, A. DEGHAN, J. DE ROY, R.B. POSTUMA, K. JERBI, J.F. GAGNON. Application of Machine Learning methods for identification of markers of dementia in Parkinson's Disease.

Objective: The prevalence of dementia in Parkinson's disease (PD) ranges from 24% to 50% and more than 75% of PD patients will develop dementia in the course of the disease. Current research aims to identify and characterise early stages of dementia in PD to better identify patients at risk. We aimed to apply machine-learning methods in PD to examine its predictive value on later dementia conversion, and evaluate their ability to discriminate PD patients who developed dementia (PDD) from healthy controls (HC).

Participants and Methods: Eighty PD patients were followed for a mean of four years. At follow-up, 23 patients developed dementia and 57 were still dementia-free (DF). We pair-matched for age, sex, and education each of the PDD patients with two HC (2:1). All participants underwent at baseline polysomnographic, clinical, neurological, and neuropsychological exams. A supervised learning approach was implemented using an alternating decision tree (ADTree) classifier. Different classifications were carried out and for each one, a data cleaning, and permutation tests were conducted to assess the significance of the decoding accuracy (DA).

Results: The classifier differentiated PDD vs. DF patients (DA = 0.69 +/- 0.06; p=0.0178). Significant differences were also found for the other comparisons (PDD patients vs. HC, DA = 0.82 +/- 0.04, p=0.0001; DF patients vs. HC, DA = 0.75 +/- 0.03, p=0.0001).

Conclusions: Our results suggest that machine-learning methods allow identifying PD patients at risk for dementia in a mean of 4 years before clinical dementia diagnosis. Further studies with larger sample size are needed to better assess the capacities of these methods to differentiate conversion subtypes in PD population

Correspondence: *Loubna Mekki Berrada, Psychology, Université de Montréal, Montréal, Canada. E-mail: loubnamb@hotmail.ca*

Keywords: Dementia, Cognition, Machine Learning

L. BUSTEED, C. GARCÍA-SANCHEZ, B. PASCUAL-SEDANO. Verbal and Visual Fluency in Different Parkinson's Disease Conditions: Stable, Fluctuating, and with Bilateral Subthalamic Deep Brain Stimulation.

Frontal dysfunction is one of the neuropsychological characteristics of Parkinson's Disease (PD). Some studies maintain that verbal fluency relies more on the left frontal cortex, while nonverbal fluency tasks utilize both right and left frontal networks. Deep Brain Stimulation (DBS) in PD patients may have damaging effects to some cognitive aspects, such as a reduction in verbal fluency.

Objective: To study the performance of verbal and design fluency tasks in three different PD groups: stable, fluctuating, and patients with bilateral subthalamic DBS.

Methods: 60 non-demented PD patients in the ON condition (20 stable, 20 fluctuating, 20 DBS) were evaluated with verbal (phonetic, semantic,

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alternating) and visual fluency tasks. The battery of tests included the design fluency (DF) task (a visual fluency task) from the Delis-Kaplan Executive Function Scale (D-KEFS), the Parkinson's Disease Dementia-Short Screen (PDD-SS), and the FAS verbal fluency test.

Results: Patient groups were comparable in terms of age (stable: 69.7+11.9/fluctuating: 63.15 + 9.8/DBS: 64.5+6.6) and education level (stable: 11.4+4/fluctuating: 10.9+4/DBS: 10.4+3.4). Patients differed in terms of disease evolution time (stable: 6.6+3.6/fluctuating: 4.2+5.4/DBS: 20.1+7.8). Performance of visual fluency was better than verbal fluency in all groups and conditions, but only significant between design fluency and semantic fluency (stable: p=.002/fluctuating: p=.001/DBS: p=.007). Pairwise comparisons within patient groups revealed that the performance of alternating verbal fluency was significantly worse (p=.000) than alternating visual fluency. Overall for all the conditions, DBS patients had the worst performance, followed by fluctuating, and the best performers were stable patients.

Conclusion: These results demonstrate that the better performance on visual fluency tasks is due to the recruitment of both frontal lobes rather than the left frontal cortex alone, which occurs in verbal fluency tasks.

Correspondence: *Laura Busteed, Neurology, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain. E-mail: lbusteed2@gmail.com*

Keywords: Parkinson's Disease, frontal lobes, verbal fluency

F. SCARPINA, S. CAPPELLI, L. PRIANO, A. MAURO. Linear and central space representation in Parkinson's Disease: a comparison between haptic and visuo-haptic sensory modalities.

Objective: Controversial results are reported about spatial representation difficulties in Parkinson's Disease (PD), when line bisection task is used. However, counting strategies might be adopted to solve it. Thus, the circle centring task is proposed as an approximate analogue of the line bisection task; however, it promotes the adoption of spatial strategies. In the present work, we adopt both tasks to explore spatial representation difficulties in PD. Moreover, both tasks are presented in two different modalities, haptic and visuo-haptic, in order to disentangle the role of different sensory input.

Participants and Methods: 15 individuals with PD and 20 healthy individuals are enrolled. The line bisection task and the circle centring task are proposed in haptic and visuo-haptic modalities. Independently for the two tasks, the amount of bisection error is computed and compared between groups and conditions.

Results: In the line bisection task, the healthy individuals show a reduction of the bisection error in the visuotactile modality respect to the tactile one, as expected. Instead, the individuals with PD show no difference in the two conditions. In the circle bisection task, the two groups show a similar performance.

Conclusions: Participants with PD seems to have an adequate spatial representation, independently from the sensory modalities, when the circle bisection task is adopted. A poor performance emerges in the line bisection task, suggesting a possible role of PD motor or cognitive symptoms on performance.

Correspondence: *Federica Scarpina, IRCCS Istituto Auxologico Italiano - Ospedale San Giuseppe, Piancavallo (VCO), Italy. E-mail: federica.scarpina@gmail.com*

Keywords: Parkinson's Disease, visuospatial, sensory integration

F. SCARPINA, V. BRUNO, M. RABUFFETTI, L. PRIANO, S. TAGINI, P. GINDRI, A. MAURO, F. GARBARINI. Bimanual coupling effect in Parkinson's Disease: the effect of lateralized sensory motor symptoms on motor intentionality and planning.

Objective: When healthy individuals simultaneously trace out lines with one hand and circles with the other, the two hands influence each other, i.e. bimanual coupling effect. This effect is linked to motor intentionality and planning. By using a Circles-Lines task, we investigated the spatial bimanual coupling effect in patients with Parkinson's Disease (PD), that are generally characterized by poor temporal bimanual coordination. Based on previous data in temporal domain, we predicted that interference (coupling effect) induced by the affected hand on the intact one might be greater than the complementary interference induced by the intact hand on the affected one.

Participants and Methods: 40 PD patients, 20 with left- and 20 with right-lateralized symptoms (lPD; rPD), and 20 healthy controls were enrolled. Circles-Lines task consisted in the following conditions: *unimanual,* in which participants draw lines with one hand; *congruent bimanual*, in which participants contemporary draw lines with both hands; *incongruent bimanual*, in which participants draw lines with one hand and circles with the other. The ovalization index (OI) for the lines trajectories was calculated.

Results: Significant difference between PD patients and controls was found only in incongruent

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onditions. Healthy controls showed a significantly greater interference effect of the left hand on the right hand than *vice versa* (i.e. higher OI values for right than left hand trajectories). lPD patients showed a similar pattern, but with an overall lower OI. In rPD patients, a different pattern with respect to both controls and lPD patients was found (i.e. the difference in OI between right and left hand was abolished).

Conclusions: PD sensory motor symptoms might alter the bimanual spatial coupling, depending on the deficit lateralization. Our prediction was confirmed for the rPD group. A negative effect of aberrant sensory input on motor intentionality and planning might be suggested.

Correspondence: *Federica Scarpina, IRCCS Istituto Auxologico Italiano - Ospedale San Giuseppe, Piancavallo (VCO), Italy. E-mail: federica.scarpina@gmail.com*

Keywords: Parkinson's Disease, motor function, bimanual coupling effect

M. CHÁVEZ-DETRIANA, I. REYES, I.Y. DEL RÍO, S.G. JUÁREZ. Reduced cerebrovascular reactivity and cognition in Parkinson Disease.

Objective: Cerebrovascular reactivity (CVR) alteration is a greater decrease in cerebral blood flow velocity in response to a vasodilatory or vasoconstrictive. Has been reported the association between CVR reduction and cognitive decline in different neurodegenerative diseases. The CVR alteration In Parkinson's disease (PD) haven't been fully determined and the impact in the cognition. The purpose of the study was to evaluate the relationship between the alteration in CVR and cognitive impairment in PD.

Participants and methods: Twenty-nine PD patients, sixteen with a diagnosis of mild impairment and thirteen without PD patients. Patients were recruited for Institute of Medical Sciences and Nutrition. The assessment of cognitive performance was carried out through the brief neuropsychological test battery (NEUROPSI), standardized and normalized in Spanish. The CVR was evaluated with Transcranial Doppler Ultrasonography (TCD) using maximum voluntary apnea technique.

Results: A positive correlation was found between CVR and cognitive performance (r^2= .572, p=.001) and a linear regression analysis were performed to examine if CVR impacts on the cognitive performance of PD patients observed predicts cognitive performance significantly (b= .453, p=.02).

Conclusions: These results suggest a relationship between the cognitive impairment and the decrease of cerebral blood flow velocity this indicated that the decrease in CVR is a probable predictor for presenting cognitive impairment in PD patients related to pathological processes such as degeneration in the cerebral microvasculature.

Correspondence: *Mireya Chávez, Master in Clinical Neuropsychology, National Autonomous University of Mexico, Mexico, Mexico. E-mail: mireyachavez1106@gmail.com*

C. GARCÍA-SÁNCHEZ, B. PASCUAL-SEDANO, A. GIRONELL, J. PAGONABARRAGA MORA, R. RODRIGUEZ, J. KULISEVSKY. Performance of Parkinson´s Disease Cognitive Scale Rating Scale (PD-CRS) in patients with subthalamic nucleus deep brain stimulation.

Objective: Deep brain stimulation of subthalamic nucleus (STN-DBS) is a widely performed surgical method to treat advanced Parlkindon's disease (PD). STN-DBS alleviate motor and non-motor fluctuations. It also has some effects on cognitive function. Most studies on cognitive functioning after STN-DBS have found significant decline of both semantic and phonemic verbal fluency, and some deficits in inhibitory and executive control domain. Other authors observed minor cognitive impairment. The Parkinson´ s Disease Cognitive Rating Scale (PD-CRS) was designed for evaluate and capture the full range of cognitive deficits of PD and specifically divide the items in both fronto-disexecutive and posterior cortical tasks. Attending the needs to obtain valid and comparable ratings we postulate that this scale can be used in the cognitive work-up of patients candidates to receive DBS.

Our objective is to study the performance of PD-CRS before and after STN-DBS.

Participants and Methods: We conducted a prospective study including 22 patients with PD who underwent STN-DBS (63,9.2±3,4 years old; mean duration of PD 12,8±2,9 years). All patients were assessed before STN-DBS and six months after surgery.

Results: There was a significant decline on the performance of PD-CRS six months after STN-DBS lower subtests of sustained attention [(8,48±1,53; 7,67±1,71; p<.020), working memory (5,95±1,66; 4,95±1,75; p < .011) and alternative (9,43±4,13; 7,00±4,68; p<.019) and action (13,86 ± 4,98;11,14±3,89;p<.031) fluency.

Conclusion: The present results on the utility of PD-CRS for evaluating the cognitive performance of PD patients with STN-DBS are in line with previous studies of the literature regarding the decline on fluencies. Additionally, in the present sample the PD-CRS detected impairment on the sustained attention and on the working memory in our sample.

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We conclude that the PD-CRS is a useful scale in the detection of cognitive changes of PD after STN-DBS.

Correspondence: *Carmen García-Sánchez, Neuropsychology unit, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain. E-mail: cgarcias@santpau.cat*

Keywords: Parkinson's disease, test validity, test development

E. VAKIL, M. NEVET-PEREZ, S. SCHWIZER. ASHKENAZI, S. HASSIN-BAER. Implicit Sequence Learning in Individuals with Parkinson's Disease, Measured by an Oculomotor-Activated Serial Reaction Time Task.

Objectives: Patients with Parkinson's disease (PD) consistently show impairment in implicit sequence learning, including the Serial Reaction Time (SRT) task. The fact that this task requires manual motor response raises the possibility that the impairment observed is due to the motor component of the task. In a new version of the task that uses an eye-tracker, the responses are oculomotor-activated, thus bypassing the manual response. Furthermore, this version enables us to generate an anticipation score in addition to the standard reaction time (RT).

Participants and Methods: Twenty-four individuals with PD and 24 matched controls were tested with the oculomotor-activated SRT containing an identical sequence in the first six blocks (1-6), followed by the interference block (7) with a novel sequence, and terminated by the recovery block (8) with the original sequence. Participants were instructed to look at the target dot when it appeared on one of four squares arranged as a diamond shape. The slides were oculomotor-activated. Eye movements were recorded by the SMI RED-M remote eye-tracker, with a sampling rate of 120Hz.

Results: Three phases of learning were analyzed separately: Learning (Blocks 1 to 6), Interference (Block 6 vs. Block 7) and Recovery from Interference (Block 7 vs. Block 8). Both RT and anticipations performance showed a similar pattern; in all three components of the task, individuals with PD were slower and had a lower anticipation rate. The interactions in these phases of the task indicate that the learning rate was steeper for the controls, while individuals with PD were less affected by the transfer and smaller recovery effect.

Conclusions: Our study demonstrates that the tested individuals with PD show implicit sequence learning impairment - whether measured by RT or anticipation - even when the manual aspect of the task is eliminated. Thus, the impairment is not dependent on motor factors.

Correspondence: *Eli Vakil, Psychology, Bar Ilan University, Ramat Gan, Israel. E-mail: vakile@mail.biu.ac.il*

Keywords: Parkinson's Disease, Skill learning, eye tracking

J. DE ROY, R.B. POSTUMA, D. GÉNIER MARCHAND, F. ESCUDIER, M. PANISET, S. CHOUINARD, J.-F. GAGNON. Detecting the Cognitive Prodrome of Dementia in Parkinson's Disease.

Objective: More than 75% of patients with Parkinson's disease (PD) will develop dementia during the course of the disease. Non-invasive and non-expensive tools to predict dementia in PD are important to identify in clinical setting individuals at high risk of dementia in this population. This study aims to identify some cognitive tests as predictors of dementia in patients with PD.

Methods: At baseline (T0), 100 PD patients without dementia were recruited. They underwent polysomnography, a neurological exam, and a complete neuropsychological evaluation to assess attention, executive functions, episodic memory, visuospatial abilities, and language. At follow-up (T1, mean follow-up of 4.3 years), 80 of these patients underwent cognitive and neurological assessments. Cognitive performance and proportion of patients with clinically impaired performance (z score < -1.5) were compared at T0 between patients who developed dementia and patients who remained dementia-free, using Student's t tests and Chi-square tests. Moreover, PD patients who developed dementia were pair-matched at T0 according to age, sex, and education to controls (2:1) and receiver operating characteristic curves were calculated to identify the psychometric properties of cognitive tests to predict dementia.

Results: At T1, 23 patients developed dementia and 57 were still dementia-free. At T0, PD patients who developed dementia had poorer performance and a higher proportion of clinically impaired performance on several cognitive tests assessing attention, executive functions, episodic memory, and visuospatial abilities. Two cognitive tests assessing executive functions (Trail Making Test part B and semantic Verbal Fluency) were the best predictors of dementia in PD compared to controls (area under the curve > 0.90).

Conclusion: This study shows that cognitive tests assessing executive functions strongly predict conversion to dementia in PD patients.

Correspondence: *Jessie De Roy, Department of Psychology, Université du Québec à Montréal, Montreal, Canada. E-mail: de_roy.jessie@courrier.uqam.ca*

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Keywords: Parkinson's disease, Dementia, Neuropsychological assessment

G. VECHETOVA, T. NIKOLAI, M. SLOVAK, E. BOLCEKOVA, M. VRANKA, Z. HANZLIKOVA, A. ZUNOVA, E. RUZICKA, T. SERRANOVA. Attentional processes in patients with functional movement disorders.

Objective: Although the subjective cognitive complaints are common in functional (psychogenic) movement disorders (FMD) patients, our knowledge of neurocognitive aspects of FMD is still very limited. Abnormalities in attentional processes seem to play an important role in the manifestation of functional neurological symptoms. Our objective was to assess attentional aspects of cognitive functioning in patients with FMD and study its relation to frequently reported non-motor symptoms such as depression, anxiety, fatigue and pain.

Methods: Nineteen patients with clinically established FMD (mean age 48.6±10 years, 5 males) and 19 age and sex matched controls underwent a neuropsychological assessment covering attention, executive functions, processing speed and working memory (Trail making test- TMT, Digit span, Stroop task, Digit symbol-coding test). To evaluate non-motor symptoms the Beck Depression Inventory, the State-Trait Anxiety Inventory, the Cognitive Complaints Questionnaire, the Fatigue Severity Scale and the PainDetect were used.

Results: Patients showed worse performance in all neuropsychological tests and reported higher scores of all measured non-motor symptoms than the controls ($p<.05$). Attentional scores (the Digit span forward, TMT A, Stroop test word and colour condition) negatively correlated with higher depression, anxiety, fatigue and pain scores in patients ($p<.05$).

Conclusions: This study confirmed abnormalities in cognitive functioning and a higher level of subjective cognitive complaints, anxiety, depression, pain and fatigue in FMD patients. Additionally, patients showed decreased processing speed and impaired attention, which correlated with depression, anxiety, fatigue and pain. Further studies could address attentional processes and clarify whether cognitive complaints represent a comorbid functional symptom perhaps resulting from abnormally focused attention and working memory deficits or from a mood disorder or other associated syndromes.

Correspondence: *Gabriela Vechetova, Dept. of Neurology and Center of Clinical Neuroscience, Neuropsychology Laboratory, First Faculty of Medicine, Charles University and General University Hospital in Prague, Prague, Czech Republic. E-mail: gabriela.vechetova@gmail.com*

Keywords: Functional movement disorders, Neuropsychology, Attention

M.A. COENEN, D. SIVAL, R. BRANDSMA, M.A.J. TIJSSEN, J.M. SPIKMAN. Cognition and emotion regulation in early onset ataxia.

Objective: Early onset ataxia (EOA) is a movement disorder caused by a dysfunction of the cerebellum or its networks, developing before the age of 25. Recent research has emphasized the cerebellum's role in cognition and emotion regulation. Deficits concerning executive functioning, language, working memory, and spatial perception have been reported, but systematic evaluation and an investigation of the relation with emotion regulation is lacking. We therefore strive to evaluate cognition and emotion regulation of EOA patients.

Participants and Methods: In 24 EOA patients (19 male, MAge=19 yrs, SD=8.38, MIQ=78.75, SD=17.95) we performed a neuropsychological assessment covering intelligence (subtests from the WISC or WAIS), memory (RAVLT, Doors, Digit span), attention and processing speed (LDST, TMT), executive functions (BADS-C zoo map), social cognition (FEEST-36, ToM Nepsy-II) and language (Fluency). Patients' proxies filled in the CBCL or ABCL to assess anxiety and withdrawn behavior. Test data were compared to an age- and gender matched healthy control group (n=24, 17male, MAge=19 yrs, SD=7.88, MIQ=102.75, SD=11.71).

Results: After controlling for verbal IQ, verbal learning ($p=.032$) was significantly lower in the EOA patients. Other tests did not differ between the two groups. Anxiety was negatively correlated with emotion recognition ($p=.02$). Withdrawn behavior was negatively correlated with ToM ($p<.041$) and emotion recognition ($p=.033$).

Conclusions: Apart from deficits in verbal learning, our patients showed intact cognitive functions. Deficits in verbal learning have not been reported earlier in EOA. This finding can have implications for treatment as studies on other patient groups have shown that deficits in verbal learning can hinder treatment compliance. In addition, we found an association of social cognition and emotion regulation in EOA patients. Future research needs to find out more about consequences of this relation.

Correspondence: *Maraike A. Coenen, Neurology/neuropsychology, University Medical Center Groningen, Groningen, the Netherlands. E-mail: m.a.coenen@umcg.nl*

Keywords: Ataxia, Memory, Social cognition

D. CRIVELLI, L. PEDULLÀ, A. BISIO, M.D. SABOGAL RUEDA, M. BOVE, M. BALCONI.

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Action perception and suboptimal motor performances: electrophysiological correlates.

Objective: The activation of sensorimotor cortical structures can be enhanced by observing actions. Such cross-modal interaction is influenced by expertise, as shown by studies focused on complex expert gestures and on high-level motor proficiency. Conversely, the potential influence of familiarity with suboptimal motor performances on observers' sensorimotor activation is still poorly explored, notwithstanding potential practical implications in clinical contexts. Following on a preliminary TMS study, we then devised an electrophysiological (EEG) investigation of processes supporting observation of complex actions performed by healthy individuals and patients affected by multiple sclerosis (MS).

Participants and Methods: Twenty volunteers were asked to carefully observe videos depicting a healthy confederate, a minimally-impaired MS patient, a mildly-impaired MS patient, or a confederate trying to simulate mild motor difficulties who were performing a task tapping on fine motor abilities. EEG activity was recorded during the observation of videos. EEG frequency components were then extracted to analyse their modulation across conditions and video reiterations.

Results: Data analysis highlighted globally lower beta power during the observation of patients' videos with respect to confederate's videos, even when he simulated poor motor performances. In addition, EEG activity in the beta range over somatosensory regions proved to gradually increase across videos reiterations, but only while participants observed the minimally-impaired patient' performance.

Conclusions: Findings suggest that even observation of suboptimal motor performances leads to a modulation of the activity of sensorimotor structures and corroborate the hypothesis that familiarity with peculiar kinematic patterns might modulate sensorimotor responses to observed actions, as if such suboptimal motor performances were progressively integrated into the individual repository of motor schemata.

Correspondence: *Davide Crivelli, Research Unit in Affective and Social Neuroscience, Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy. E-mail: davide.crivelli@unicatt.it*

Keywords: Action understanding, EEG, Suboptimal motor performance

J. PÉREZ-FLORES, A. HERNÁNDEZ-TORRES, F. MONTÓN, A. NIETO. The impact of depression on health-related quality of life in Friedreich ataxia.

Objective: Neuropsychological studies of cerebellar ataxias have focused on a possible cognitive impairment but depression and quality of life have rarely been explored. Friedreich ataxia (FRDA) is the most frequent hereditary ataxia characterized by progressive ataxia, dysarthria and mild cognitive deterioration. Almost all patients with Friedreich ataxia (98%) have homozygous expansions of an intron 1 GAA trinucleotide repeat in FXN as the causative mutation. Our aim was to study the health-related quality of life in FRDA and to explore the influence of depression, demographic and clinical variables.

Participants and Methods: Forty-six patients with genetic diagnostic of FRDA participated in the study (mean age= 38.4, SD=11.7; 52% male). SF-36V2, a generic HRQOL measure, was administered. The SF-36V2 is comprised of 36 items that are grouped into eight scales: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. Depression was assessed with the Beck Depression Inventory. Severity was measured with the Cerebellar Ataxia Clinical Rating Scale

Results: All the SF-36 subscales mean scores of FRDA patients were significantly lower than the mean scores in the general population ($p < .01$). Age was negative and significantly correlated with Role Physical (r = -.44) and Bodily Pain (r = -.37). Severity of ataxia correlated with Physical Functioning (r = -.52). Mean BDI is significantly higher than the mean score in the general population ($p < .01$) and BDI scores are negative associated with Role Physical (r = -.29), General Health (r = -.45), Vitality (r = -.34) and Mental Health (r =.44)

Conclusions: Our results showed quality of life in the FRDA population is significantly reduced. Depression has a negative impact on health-related quality of life of FRDA patients in both physical and psychological dimensions, whereas demographic and clinical variables are only associated with physical factors.

Correspondence: *Javier Pérez-Flores, Clinical Psychology, Psychobiology and Methodology of Behavioral Sciences, Universidad de La Laguna, San Cristobal de La Laguna, Spain. E-mail: jperezfl@ull.edu.es*

Keywords: Ataxia, Depression, Quality of Life

T. COSTABILE. Exploring Mental Imagery in Relapsing Remitting Multiple Sclerosis.

Motor Imagery (MI) is defined as a dynamic state during which a subject mentally simulates a given action, activating the same brain areas as performed actions.

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Objective: Explore MI abilities in Relapsing Remitting Multiple Sclerosis (RRMS) patients, and their correlations with motor and cognitive features.
Methods: 20 RRMS and 20 healthy controls (HC) underwent Mental Rotation of Hands, of letter "R", of hands in front view bodies and of hands in back view bodies; Montreal Cognitive Assessment (MOCA); Frontal Assessment Battery (FAB); Beck Depression Inventory (BDI); Pittsburgh Sleep Quality Index; Modified Fatigue Impact Scale; Expanded Disability Status Scale (EDSS). Analysis of Variance was used to compare RRMS and HC with phenotype as a between-subject factor while task, orientation and side as within-subject factors.
Results: Total reaction times were significant different between groups p=0.033, task p<0.001 and orientation p<0.001. The interaction between task and orientation was also significant p=0.005. At the letter task test there was no specific difference between RRMS and HC. At the hand rotation task we found significant differences with the right hand at 90° p=0.011 and 180° p=0.011 and with the left hand when 0° p=.005, 180° p=.014. No differences between groups were found at front/back view of bodies tasks.
Correlations between cognitive and motor features showed different results in RRMS, while absent in HC. In RRMS, EDSS correlated with Mental Rotation of Hands in front view bodies (R=.471 p<0.05), MOCA with Mental Rotation of hands (R=-.625 p<0.001) and, finally, FAB with Mental Rotation of "R" (R=-.841 p<0.001), and Mental Rotation of hands in both front and back view bodies (R=-.685 p<0.001; R=-.623 p<0.001)
Conclusions: RRMS are able to generate MI, requiring more time than HC. Correlations with cognitive impairment suggest that MI is a complex cognitive function that needs a deep assessment before been used as a rehabilitation tool.
Correspondence: *Teresa Costabile, Department of Neurosciences, Odontostomatological and Reproductive Sciences, University of Naples "Federico II", Naples, Italy. E-mail: teresa.costabile@gmail.com*
Keywords: Multiple Sclerosis, cognitive rehabilitation

L. KADRNOZKOVA, J. MOTYL, J. BLAHOVA DUSANKOVA, M. ANDELOVA, B. BENOVA, K. NOVOTNA, K. KUCEROVA, J. LIZROVA PREININGEROVA, E. KUBALA HAVRDOVA, D. HORAKOVA, T. UHER. Depressive and anxiety symptoms in multiple sclerosis patients with impaired information processing speed and episodic memory.

Objective: Information processing speed (IPS) and episodic memory (EM) are the most commonly impaired cognitive domains in multiple sclerosis. However, in clinical practice, cognition is often evaluated as impaired or not-impaired without describing affected cognitive domains. Our objective was to compare IPS and EM impaired cohort in patient-reported outcomes of depressive and anxiety symptoms.
Participants and Methods: A total of 1038 patient (69% females, at baseline:mean age:38.1±8.8; mean disease duration:9.6±7.1; median of the Expanded Disability Status Scale:2.0;median years of education:14) after the first demyelinating event suggestive of MS or with clinically definitive MS were included in this cross-sectional study. The Brief International Cognitive Assessment for Multiple Sclerosis, Paced Auditory Serial Addition Test (PASAT), the Beck Depression Inventory (BDI) and the Beck Anxiety Inventory (BAI) were administered. Performance 1.5 standard deviation below normal in the Symbol Digit Modalities Test (SDMT) and the PASAT was evaluated as IPS impaired, in the California Verbal Learning Test II (CVLT-II) and the Brief Visuospatial Memory Test-Revised (BVMT-R) as EM impaired. Kruskal–Wallis and Mann-Whitney U test was used to compare each group.
Results: 113 (11%) patients failed in both administered tests at least in one cognitive domain from which 92 (81%) patients were impaired on both tests of IPS, 5 (4%) patients on both tests of EM and 16 (14%) on both test types. IPS impaired and IPS+EM impaired groups reported a significantly higher depressive and anxiety symptom burden ($p \leq 0.000$-0.036) than patients without cognitive impairment.
Conclusions: Cognitive impairment in processing speed and episodic memory is associated with patient-reported depressive and anxiety symptoms. These symptoms should be considered in MS patients with processing speed and episodic memory deficit.
The project was supported by the Czech Ministry of Education project Progres Q27/LF1.
Correspondence: *Lucie Kadrnozkova, Department of Neurology and Center of Clinical Neuroscience, First Faculty of Medicine, Charles University and General University Hospital, Prague, Czech Republic. E-mail: lucie.kadrnozkova@vfn.cz*
Keywords: multiple sclerosis, cognitive screening, depression

F. SACCÀ, T. COSTABILE, A. CAROTENUTO, A.M. BARBARULO, E. SIGNORIELLO, G. LUS, V. BRESCIA MORRA. The EDSS

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integration with the Brief International Cognitive Assessment for Multiple Sclerosis and Orientation Tests (iEDSS).

Objective: Despite cognitive tests have been validated in Multiple Sclerosis (MS), a neuropsychological evaluation is not implemented in the Expanded Disability Status Scale (EDSS) scoring.

Participants and Methods: We used the Brief International Cognitive Assessment for MS (BICAMS) and orientation tests (OTs) to measure the Cognitive Functional System (CFS) score of the EDSS, and to evaluate its impact on the EDSS final score. We compared EDSS calculated as usual (Native-EDSS) with the EDSS integrated with the use of BICAMS and OT (iEDSS). We then re-tested a subgroup of patients one year later to quantify the effect of neuropsychological test on disability measurements.

Results: We tested 604 MS patients with BICAMS, OTs, and EDSS. 384 patients (63.6%) had at least one altered test at the BICAMS. Older age, lower education, higher native-EDSS, and male gender, were independently associated with at least one impaired BICAMS test. Native-EDSS was different from NPS-EDSS (-0.112;$p<0.001$) in 99 patients (16%). When considering patients with a Native-EDSS ≤4.0, the proportion of miscalculated EDSS was 25%.

Follow-up data were available for 306 patients and showed a mismatch between Native-EDSS and iEDSS in 15% of patients, and in 22.6% of patients with an EDSS ≤4.0.

Conclusions: The use of brief neuropsychological tests leads to a more accurate CFS assessment in two-thirds of patients, and to a more accurate disability measurement at baseline and follow-up. The iEDSS may help recognize cognitive impairment in everyday clinical practice, and correctly assess No Evidence of Disease Activity (NEDA) during follow-up.

Correspondence: *Francesco Saccà, NSRO, University Federico II, Naples, Italy. E-mail: francesco.sacca@unina.it*

Keywords: EDSS, BICAMS, Integration

Symposium 17. The future transformation of clinical neuropsychology: conceptual, practical and ethical issues

Chairs: Robin Morris, Jessica Fish

14:10–15:40

R. MORRIS, J. FISH. The future transformation of clinical neuropsychology: conceptual, practical and ethical issues.

Symposium Summary: What does the future hold for the profession of clinical neuropsychology? A dystopian view might predict the eventual demise of the field as we know it, with assessment and rehabilitation becoming automated processes based on algorithms and devoid of human interaction, neuropsychologists having been replaced by artificially intelligent avatars. A more optimistic perspective considers the potential for advances in technology to enhance the practice of clinical neuropsychology, enabling the development of new assessment and intervention procedures, with new modes of delivery, and with wider dissemination of neuropsychological care. Within this view, neuropsychologists remain vitally involved in providing the frameworks for understanding neuropsychological processes and guiding the development of the field. This symposium includes five talks that address a range of technological and conceptual developments in current neuropsychological practice, which have potential to shape practice in the near future. They include a report on the development and standardisation of a new tablet-based method of screening mood and cognition, two talks on digital health technologies for cognition in people with brain injury, a review of the ethical challenges associated with robotic or artificial intelligence interventions for people with dementia, and a case report describing a novel intervention for spontaneous confabulation. Professor Barbara Wilson, originator of many advances in the field, will be the discussant, considering how we can continue to improve neuropsychological practice and embrace future technologies while retaining the focus on the individual. We think the symposium will be relevant to anyone with an interest in how we might hope to continue to 'bridge science and humanity' as is the theme of this year's meeting, in the years to come.

Correspondence: *Jessica P.C. Fish, Department of Psychology, Institute of Psychiatry, Psychology & Neuroscience, King's College London, London, UK. E-mail: jessica.fish@kcl.ac.uk*

T. MANLY, N. DEMEYERE, A. BATEMAN, S. GHAROONI, E. SLAVKOVA. Future IT approaches to neuropsychology screening: OCS-BRIDGE.

UK National Health Service (NHS) guidelines recommend cognitive/mood screening for people with conditions such as stroke, as there are simply too few neuropsychologists for all patients to receive

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a full evaluation. Although fine pencil and paper cognitive screens exist, most are 'domain-general' pass/fail measures developed for dementia. They can lack sensitivity and inclusivity for other conditions, and none include mood.

Here we describe OCS-BRIDGE, a screening app for touchscreen tablets developed collaboratively by academic researchers and NHS clinicians. The app leads therapists through the assessment, indicating what to say and do and providing context-specific advice throughout. The first part is a digitized version of a cognitive screen widely used in the UK, providing an ultra-brief (approx.15 min) assessment of picture naming, semantics, orientation, visual field integrity, reading and language production, gesture imitation, spatial bias, numerical cognition, executive function and memory. The second part provides supplementary assessments (20-30 mins) including of visual acuity, working memory, emotion recognition, reaction time and prospective memory. The final part presents two well-established mood questionnaires.

OCS-BRIDGE presents stimuli for precise durations and captures responses, reaction times and detailed sequences of actions. It adapts to patient characteristics (e.g. giving multiple-choice buttons for patients who cannot speak). Scores are automatically compared with norms from 300 healthy adults (19-90 years) and immediately converted into an easy-to-understand report. OCS-BRIDGE is not designed to replace clinical neuropsychologists. Rather, it is a highly portable, attainable and time-saving screening device to supplement and aid their work. Supported by the Wellcome Trust, OCS-BRIDGE will soon be available on free-to-use research licence for appropriately qualified professionals.

Correspondence: *Tom Manly, Medical Research Council Cognition & Brain Sciences Unit, University of Cambridge, Cambridge, UK. E-mail: tom.manly@mrc-cbu.cam.ac.uk*

Keywords: cognitive screening, technology, stroke

J.J. EVANS, M. JAMIESON. Digital health technology for neuropsychological rehabilitation: the future.

Impairments in memory, attention and executive functions disrupt everyday life, making it difficult to remember to carry out intended actions or complete complex tasks involving 'goal management'. Though simple prompting technology, such as NeuroPage (Wilson et al. 2001), is effective in increasing completion of everyday tasks, surveys over the last 20 years show that whilst use of reminding technology has increased, uptake remains low, being around 38% amongst people with acquired brain injury and <10% amongst people with dementia (Jamieson, 2016, 2017). There is a clear need for user interfaces that make reminder entry easier and more accurate, and that prompt users to enter reminders. One such example, ApplTree (Jamieson, 2016), has been found to produce more accurate entries than the industry standard (Jamieson, 2016).

Alerting technology is also used to support metacognitive strategy training (Fish et al., 2007; Tornas et al., 2016; Gracey et al., 2017). Using SMS text messages, the user is prompted to engage in a 'goal review', which can be effective in increasing goal achievement across longer time periods (e.g. make a phone call this afternoon).

Emerging technologies also hold much promise. Augmented reality (via smartphones or devices such as Google Glass) has the potential to support object, face and emotion recognition as well as deliver prompts. Our group is also investigating voice-based interaction through Amazon's Alexa and Google Home for planning reminders and scaffolding multi-step task learning (e.g. using the GUIDE system, O'Neill et al., 2013).

There is huge potential to improve the lives of people with cognitive impairments through applications of technology. Assistive technology for cognition is currently underused, and its power is not being harnessed sufficiently. With greater collaboration between experts in rehabilitation and computing science, and technology companies, the future for assistive technology for cognition could be bright.

Correspondence: *Jonathan Evans, Institute of Health and Wellbeing, University of Glasgow, Glasgow, UK. E-mail: jonathan.evans@glasgow.ac.uk*

Keywords: assistive technology, cognitive impairment, functional abilities

M. JAMIESON, R. JACK, B. O'NEILL, B. CULLEN, M. MCGEE-LENNON, S. BREWSTER, J.J. EVANS. Assistive Technology to Encourage Meaningful Activities following Brain Injury.

Background and aims: Cognitive and behavioural difficulties after acquired brain injury (ABI) may lead to reduced engagement in leisure and social activities. Increasing participation is a goal of neuropsychological rehabilitation and assistive and behaviour change technology can play an important role in this.

Method: We held focus groups with people with ABI (n = 9), caregivers (n = 3), family members (3) and clinicians (n = 9) in order to understand the barriers to engaging in meaningful activities and what helps to overcome these barriers. A collaborative thematic analysis was performed by a

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multi-disciplinary research team using an approach based on Grounded Theory.

Results: Five central, interlinked, barriers were found; 'Practical Issues', 'Physical Disabilities', 'Cognitive Difficulties', 'Anticipation' (of Physical or Cognitive Difficulties) and 'Low Motivation'. To overcome these barriers participants mentioned 'External Motivation' from both 'Other People' and 'Technology', discussed Technology as a Platform for Social Motivation and mentioned different aspects of Being Planful.

Conclusions: The results illuminate future directions for the development of effective assistive technology. Technology that is social, persuasive, adapts to individuals needs and supports people to plan activities are likely to be particularly useful within neuropsychological rehabilitation both at present and in the future.

Correspondence: *Matthew Jamieson, Institute of Health and Wellbeing, University of Glasgow, Glasgow, UK. E-mail: matthew.jamieson@glasgow.ac.uk*

Keywords: Assistive technology, Persuasive technology, qualitative

R. MORRIS. Ethical Issues and Robotic or Artificial Intelligence Care for People with Neuropsychological Conditions.

Robotic systems or artificial intelligence (or 'machine care') has the potential to substantially increase the rehabilitation and care of people with disabilities, including neurological conditions. Currently, personalised robots are being developed for a variety of care purposes and though they are mainly at an early stage of development, the benefits are thought to be many (e.g. assistance with daily activities, monitoring function, companionship). Since neuropsychologist have been at the forefront of developing humane neuropsychological rehabilitation approaches, arguably they should be involved in not just machine care development but also considering the principles of use, including practical and ethical issues.

To address these issues, a short questionnaire, the 'Dementia Psychological Care Benchmarking Scale' (or 'DeBs'), has been developed on the basis of a recent report on person-centred care in dementia (Clare et al., 2016). The DeBs includes questions such 'Is the approach advocating individualised care, taking into account the person's individual needs?'. The answer to each question is rated on a five point scale according to the extent to which the research matches the question content. This scale has been used in a literature search to appraise recent papers on robot assisted care for people with dementia. The findings provided a ranking of the extent to which researchers were addressing care issues, with attempts to individualise care ranked highly, and ranked lower, issues such as involving the person in making decisions about their own care.

Preliminary conclusions include that: current approaches are relatively unsophisticated but this will change; much more thought is needed on how machines could impact the broader care context; a framework is needed that takes into account in the needs of the individual; and that a philosophy of use that equals the Turing Test in terms applicability and interest needs to be developed.

Correspondence: *Robin Morris, Department of Psychology, King's College London, Institute of Psychiatry, Psychology & Neuroscience, London, UK. E-mail: robin.morris@kcl.ac.uk*

Keywords: technology, dementia, person-centred care

J. FISH. A third-wave approach to neuropsychological rehabilitation of confabulation.

Then phenomenon of confabulation, in which memories that are false, distorted, or misplaced in time are produced (and presumably experienced as) undifferentiated from veridical memories, has been the subject of extensive neuropsychological research. Confabulation has been specifically associated with damage to the orbitofrontal and ventromedial prefrontal cortex (Turner, Cipolotti, Yousry & Shallice, 2008), but is most frequently observed in the context of diffuse damage and associated impairment of autobiographical memory and executive functioning (Bajo, Fleminger, Metcalfe, & Kopelman, 2017). Its theoretical underpinnings are, hence relatively well understood, although competing theories exist.

By contrast, only a very small proportion of the confabulation literature concerns treatment, and virtually all such studies concern the first year post-injury. Hence, when clients present to neuropsychological services with confabulation in the chronic phase post-injury, there is little evidence upon which to guide practice.

In this talk, we present the case of Joe, a 24 year old man presenting with chronic behaviourally spontaneous confabulation more than three years after severe traumatic brain injury. We describe the application of a novel formulation-based treatment approach informed by neuropsychological models combined with principles and techniques from neuropsychological rehabilitation and so-called "third-wave" cognitive behavioural therapies. Further, we present Joe's own descriptions of how he came to understand his confabulation, and to manage it effectively, using a range of compensatory

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strategies to identify whether or not evidence was available to support the veracity of potentially confabulated memories. The implications of this work for future directions in clinical neuropsychology will be discussed.

Correspondence: *Jessica Fish, Department of Psychology, King's College London, Institute of Psychiatry, Psychology & Neuroscience, London, UK. E-mail: jessica.fish@kcl.ac.uk*

Keywords: confabulation, traumatic brain injury, psychological formulation

Paper Session 20. Emotional processing in TBI, FTD, and MCI

Moderator: Jennifer Vasterling

14:10–15:40

T.A. WEARNE, K. OSBORNE-CROWLEY, E. WILSON, J. RUSHBY, S. MCDONALD. Understanding how others feel: evaluating the relationship between emotion recognition and empathy following traumatic brain injury.

Objective: The ability to recognize how others feel is crucial in a variety of social situations, with traumatic brain injury (TBI) routinely associated with reductions in emotional and cognitive empathy. Difficulty recognizing emotional displays is also commonly reported in TBI. In this study, we tested whether problems identifying emotional displays in others is related to self-reported emotional and cognitive empathy, and whether this relationship differs between individuals with TBI and healthy controls.

Participants and Methods: Individuals with a TBI (n = 29) and controls (n = 30) matched for age, gender and education, were tested on an emotion intensity rating and recognition task. Self-reported emotional and cognitive empathy questionnaires, together with a neuropsychological battery, were also administered.

Results: Participants with TBI had reduced emotional and cognitive empathy relative to healthy controls. TBI was also associated with reduced accuracy in recognizing emotion, although there was no difference between TBI and controls in identifying the intensity of emotions or differentiating amongst emotional displays. The ability to differentiate amongst emotions predicted emotional empathy for healthy participants but not for individuals with TBI. Neither cognitive ability nor emotion perception predicted cognitive empathy.

Conclusions: Emotional perception, specifically the ability to differentiate amongst emotional affects, is important for emotional empathy. The results suggest that while individuals with TBI may be able to differentiate amongst emotions, they are unable to utilize this information to share and understand the emotions and feelings of others. These results could have implications for understanding poor interpersonal relationships and impaired social functioning following TBI.

Correspondence: *Travis A. Wearne, Psychology, University of New South Wales, Sydney, Australia. E-mail: t.wearne@unsw.edu.au*

Keywords: traumatic brain injury, emotion recognition, empathy

K. OSBORNE-CROWLEY, E. WILSON, F. DE BLASIO, T. WEARNE, J. RUSHBY, S. MCDONALD. Normal subjective responses despite impaired physiological responses to facial feedback in people with TBI.

Objective: Facial feedback refers to the subjective emotional experience generated when an emotional expression is posed and has been shown to be impaired in people with TBI. Past findings, however, may have been influenced by desirable responding in controls, since controls are more likely to correctly guess the true aim of the experiment. The current study sought to replicate past results with a task that better concealed the true aim of the experiment. Additionally, skin conductance (SC) was measured to determine whether physiological responses contributed to the subjective experience of emotion.

Participants and Methods: Participants were 26 people with severe TBI and 30 controls. They were presented with 16 images (8 of people, 8 of objects) and rated the pleasantness of each (neutral condition). Participants saw and rated the images again but were asked to pull their eyebrows down for images of people (frown condition) and to pull the corners of their mouth up for images of objects (smile condition). Participants saw the images a final time with the reverse instructions. To conceal the true aim, participants were told that the speed of their muscle movements was being tested. SC responses were also recorded.

Results: Participants with TBI did not differ from controls on the effect of facial feedback on pleasantness ratings (p=.927) but did show impaired SC responses in the frown condition (p=.007).

Conclusions: In contrast to past research, these results suggest that people with TBI may not have impaired subjective experience from facial feedback. Physiological responses to facial feedback from negative expressions were impaired, in line with past findings of selective impairment in processing of

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negative emotion in TBI. These results suggest that intact physiological responses are not required for normal subjective responses to facial feedback. Rather, intact higher-order inferential processes may be involved in generating the normal subjective experience.

Correspondence: *Katie Osborne-Crowley, Neurodegenerative Diseases, University College London, London, UK. E-mail: k.osborne-crowley@ucl.ac.uk*

Keywords: brain injury, affective processing disorders, facial affect

C. STRIKWERDA-BROWN, Z.L. GOLDBERG, J.R. HODGES, O. PIGUET, M. IRISH. For the greater good? Reduced emotional response to morally conflicting dilemmas in frontotemporal dementia.

Objective: Would you harm another person to potentially save the lives of many others? Resolving highly conflictual moral dilemmas requires the consideration of several, often competing, variables including societal norms, personal belief systems, emotional reactions, and reasoning. The behavioural variant of frontotemporal dementia (bvFTD) involves a progressive breakdown in emotional and reasoning processes and the eventual decay of conceptual knowledge, offering a unique opportunity to explore the cognitive and biological mechanisms underlying moral decision making.

Participants & Methods: Moral reasoning was explored in 26 bvFTD patients and 23 healthy controls using a novel, vignette-based paradigm. Participants made yes/no decisions about highly conflictual moral dilemmas and provided subjective ratings of feelings towards the decision. Participants also completed a questionnaire measuring conceptual knowledge of social norms. Voxel-based morphometry, based on structural MRI scans, was used to examine grey matter correlates of task performance.

Results: Overall, patients and controls did not differ in the actual decisions endorsed. Notably, however, a significant group difference emerged for the affective ratings provided by participants, with bvFTD patients reporting reduced emotional concern compared with controls. This lack of remorse in the patient group correlated with impaired knowledge of socially acceptable behaviour. Neuroimaging analyses further revealed significant associations between moral reasoning performance and key regions implicated in emotional and conceptual processes, including the medial prefrontal cortex and anterior temporal lobe.

Conclusions: Our findings suggest that reduced emotional concern in response to highly conflicting moral dilemmas in bvFTD, is modulated, in part, by loss of fundamental knowledge of social norms. The emergence of these deficits likely reflects the spread of atrophy into temporal regions with disease progression.

Correspondence: *Cherie Strikwerda-Brown, Psychology, University of Sydney, Sydney, Australia. E-mail: cherie.strikwerda-brown@sydney.edu.au*

Keywords: dementia, other cortical, neuroimaging, structural, social cognition

N.S. VAN DEN BERG, J.M. SPIKMAN, F.R. REESINK, E.H.F. DE HAAN, R.B. HUITEMA. Fear recognition and risk behavior in patients with dementia or MCI.

Objective: Impairment in the recognition of the emotional facial expression of fear has been found to correlate with risk-taking behavior in patients with traumatic brain injury. The aim of this study was to evaluate whether this relationship also exists in patients with dementia or Mild Cognitive Impairment (MCI), in which emotion recognition may also be impaired.

Participants and Methods: 25 Dementia patients (11 Alzheimer's disease, 7 Frontotemporal Dementia (FTD), 7 Lewy Body Dementia), 15 MCI-patients and 16 matched healthy controls were included in this study. Emotion recognition was assessed with the FEEST. Participants performed the IOWA-gambling task and the Hayling Sentence Completion Test to assess risk-taking behavior and impulse control and the Action Selection Test (AST) to assess hazard anticipation in traffic situations.

Results: Fear recognition and IOWA scores did not significantly differ between groups, but FEEST total scores did differ between healthy controls and dementia patients. Within the dementia group, only FTD-patients scored significantly lower on the FEEST compared to healthy controls. Hayling scores were significantly lower in dementia patients compared to healthy controls and MCI-patients. Based on the AST, dementia patients and MCI-patients took significantly more risks than healthy controls. Furthermore, fear recognition scores correlated with AST scores in healthy controls and dementia patients. In healthy controls, fear recognition scores correlated with Hayling scores. Fear recognition scores did not correlate with IOWA scores.

Conclusions: Impaired fear recognition was related to increased risky hazard anticipation, in both healthy controls and dementia patients. As risk-taking behavior is important in the assessment of fitness to drive, especially in patients with behavioral changes such as FTD, this study implies that

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assessing emotion recognition might improve the assessment of fitness to drive in these patients.
Correspondence: *Nils S. van den Berg, Department of Neuropsychology, University Medical Center Groningen, University of Amsterdam, Groningen, the Netherlands. E-mail: n.s.van.den.berg@umcg.nl*
Keywords: Emotion recognition, Risk-taking behavior, Dementia

Symposium 18. Current topics of research in Latin American neuropsychology. A sampler

Sponsored by the Sociedad Latinoamericana de Neuropsicología (SLAN)

Chairs: Alberto L. Fernandez, Aldo R. Ferreres

14:10–15:40

A.L. FERNANDEZ, A.R. FERRERES. Current topics of research in Latin American neuropsychology. A sampler.

Symposium Summary: The development of neuropsychology in Latin America involves varied topics as corresponds to a vast region. In this symposium a sample of some of these topics will be addressed. The presentations represent the scientific work produced in three different countries: Brazil, Mexico and Argentina.

Dr. Abreu, from Brazil, will show their local work on the negative consequences of Manganese on the cognitive performance of children. Dr. Salvador, from Mexico, will present on the ability of the performance on the Rey-Osterrieth Copy Figure to identify visuoperceptual neurological soft signs in school children. Dr. Ferreres, from Argentina, will expose on the appropriateness of the current acquired dyslexia categories for the analysis of reading problems in a transparent language such as Spanish. Finally, Dr. Fernandez, from Argentina, using this country as an example, will describe the current situation of neuropsychological test use and development in the region.

Correspondence: *Aldo Ferreres, Neuropsychology, Universidad Catolica de Córdoba, Córdoba, Argentina. E-mail: aldoferreres@gmail.com*

N. ABREU. Memory, executive functions and hyperactivity in Brazilian children Exposed to Environmental Manganese.

Introduction: High levels of Mn in the human body have been associated with losses in neuropsychological performance and behavioral problems in children. This study aimed to compare the neuropsychological performances among children environmentally exposed to Mn and to correlate hair Mn levels with their performances in neuropsychological tests.

Methods: We compared the neuropsychological and behavioral performances of 70 children exposed to Mn and 137 children without history of exposure to Mn, in Bahia-Brazil. The cognitive functions tested were: memory, inhibitory control, verbal fluency and motor speed. We have used Conner's Rating Scale for teachers to assess students' behaviors of hyperactivity. Manganese hair levels in children a priori exposed to Mn were analyzed and correlated with their respective performance on the tests.

Results: The group of children exposed to Mn compared to controls showed lower performance in Verbal Fluency and Verbal Memory, and a greater number of errors and more time spent to complete an inhibitory control test. Spearman correlation analyses showed that in girls higher levels of MnH were correlated with hyperactivity behavior on the Conners Scale, Verbal Fluency Initial Letter and Memory List A5. Higher levels of MnH were associated with A7 Trial – free recall after interference list and Delay Effect Difference. Dfferences were found for girl (higher MnH levels were associated with Delay Effect on List Memory Test and hyperactivity behavior) and boys (higher MnH levels were associated with A7 - Free Recall of short-term and the Interference Effect Index).

Conclusion: Our results suggest that airborne Mn exposure may be associated with lower performance in executive function, verbal learning memory and on incidence of hyperactivity behaviors. Discussion about low socioeconomical level and its influence on neuropsychological performance is presented.

Correspondence: *Neander Abreu, Instituto de Psicologia, Universidade Federal da Bahia, Bahia, Brazil. E-mail: neandersa@hotmail.com*

J. SALVADOR, C. ARMENGOL DE LA MIYAR, C. AGUILLÓN SOLÍS, J. BARRÓN. Visuoperceptual neurological soft signs (V-NSSs) and lateralization in Mexican school children: Performance on the Rey-Osterrieth Complex Figure (ROCF).

Introduction: Visuospatial deficits can be detected at a very early age. Their presence is associated with underlying non-localized nervous system compromise or neurodevelopmental delay, and they have likened to Neurological Soft Signs (NSSs). Their association with later difficulties in various aspects of everyday functioning underscores the importance for their early detection and remedial

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intervention. This study sought to identify V-NSSs via children's performance on the ROCF.
Methods: Eighty-four 7-year olds elementary school children from greater Mexico City were administered the Rey-Osterrieth Complex Figure and the Lateralization Indicators from the Neurological Soft Signs Scale-Mexico (SNB-MX).
Results: Eight-two percent were right-lateralized, 3 % left-lateralized, and the rest showed no defined preference. Significantly less feature placement errors on the ROCF were made by children with defined eye and hand preferences (Fischer: 6.342, p-.039; 23.286, p=.010). Similarly, children with defined eye preference made less distortion errors (Exact Fischer: 8.663, p=.040). A quantitative analysis of each perceptual unit revealed uncoordinated traces and poor closure among most children who had no lateralizing preference. As for the visuoperceptual condition, erroneous localization or displacement of perceptual units was observed.
Conclusions: Both visuoperceptual difficulties appear thus to be related to the absence of a definition in overall lateralization among children studied. Results suggest that the attainment of hand and eye preference during development are key to the integration of the visuoperceptual, visuospatial and visuomotor systems.
Correspondence: *Judith Salvador, Departamento de Posgrado e Investigación., FES Zaragoza UNAM, México, Mexico. E-mail: salvadcj1@gmail.com*

A.R. FERRERES. Acquired dyslexias in Spanish and the neurocognitive approach. Does it work?
Objectives: To review the evidence about the pertinence of the pattern of acquired dyslexia described by the cognitive Neuropsychology (NPS) to characterize the disturbance of the reading in Spanish-speaking patients. The cognitive NPS described several forms of acquired dyslexia (phonological, deep, surface) on the basis of performance in reading different types of stimuli (irregular words, pseudowords, etc.) and the pattern of errors (semantic paralexias, regularization errors, etc.). Most of these studies were conducted in Anglo and French-speaking patients who used writing systems called "opaque" that have a significant degree of inconsistency between graphemes and phonemes. In contrast, the Spanish grapheme-phoneme relationships are completely regular for reading. This makes it impossible to observe errors of regularization (because all words are regular for reading) and rare others (i.e. semantic paralexias). This led some authors to deny the existence, in Spanish-speaking patients, of the acquired dyslexia patterns described by the cognitive NPS.
Participants and methods: published cases of Spanish-speaking patients with acquired dyslexia, both from our service and from the literature, were analyzed, comparing reading performance and error pattern.
Results: the analysis of 20 acquired dyslexia cases in Spanish-speaking patients shows that their patterns of reading disturbance correspond to some of the patterns described by the cognitive NPS.
Conclusions: Despite the high grapheme-phoneme consistency of Spanish, the case studies show that the abnormal reading patterns found correspond to those described by the cognitive NPS. The identification of these patterns required the use of tests and stimuli specifically designed for Spanish. Group studies are necessary to specify the degree of generalization of these conclusions.
Correspondence: *Aldo R. Ferreres, Neuropsychology, Universidad de Buenos Aires, Ituzaingó, Argentina. E-mail: aldoferreres@gmail.com*

A.L. FERNANDEZ. Neuropsychological Testing in a Spanish-Speaking Country: A Model for Advances, Challenges and Future Developments.
Objectives: testing constitutes one of the fundamental elements of a neuropsychological assessment. Most of the current tests under use in the world have been developed in those countries where neuropsychology is highly developed. In this presentation the current situation of use and development of neuropsychological tests in Argentina will be used as an example of the situation in the region.
Methods: currently adapted and developed neuropsychological tests in Argentina will be summarized. A description of their use will also be made.
Results: a correct use of these tests implies an adaptation process to the target culture where they are intended to be applied. However, this is not always the case, and many neuropsychological tests are just translated rather than adapted. Interestingly, several adapted/developed tests are not frequently used. The Argentinean situation is similar to the situation of many other countries in Latin America and other regions in the world, thus it can be considered an example of how neuropsychological testing is addressed in those regions where neuropsychology is not fully developed.
Conclusions: although there has been a considerable progress in test adaptation and development there is still a paucity of appropriate test for the assessment of some neuropsychological domains and also of special populations such as low educated individuals

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or aboriginals. Some possible directions for the future will be proposed.
Correspondence: *Alberto L. Fernandez, Neuropsychology, Universidad Católica de Córdoba, Córdoba, Argentina. E-mail: albertolfernan@gmail.com*

Workshop. Imaging techniques in neuropsychology

Sponsored by the INS Student Liaison Committee

Presenter: Josef Vymazal

14:10–15:40

J. VYMAZAL, A.M. RULSEH. Imaging techniques in neuropsychology.

The emergence of imaging techniques changed nearly all fields of medicine. In the neurological sciences, the introduction of computer-assisted tomography (CT) in the nineteen seventies enabled non-invasive human brain imaging for the first time. Relatively low image contrast, a lack of functional properties and high radiation dose are major drawbacks of CT. Magnetic resonance imaging (MRI) was introduced in the nineteen eighties with higher tissue contrast and no radiation burden. T1 and T2 weighting provide the primary contrasts in structural MR imaging, allowing superior characterization of soft tissues. MRA and MRS provide additional information with respect to blood flow and metabolic properties of tissues. These techniques are useful in the evaluation of vascular malformations and tumors. In the nineties, functional MRI was introduced; the dependence of the magnetic properties of hemoglobin on oxygenation state enabled the blood oxygenation level dependent (BOLD) technique that has been used in clinical medicine as well as in experimental science, from detecting eloquent brain areas before neurosurgery to possible use as a lie-detector or locating centers for understanding humor. FMRI can also be performed with EEG to obtain a combination of MR images with brain activity at high temporal resolution. Resting state BOLD MRI is a tool to study a number of neurological diseases including those of neurodegenerative origin. Differences in Brownian motion within bundles of the white matter enable diffusion tensor imaging (DTI) that provides information and supports BOLD imaging, and diffusion imaging is routinely performed in the workup of stroke. Perfusion imaging may be performed with or without application of contrast agents, providing information on the perfusion of blood in the brain. Another imaging technique in neuroscience is positron emission tomography, however this technique is expensive, with radiation burden and low temporal and spatial resolution.
Correspondence: *Josef Vymazal, Na Homolce Hospital, Prague, Czech Republic. E-mail: josef_62@icloud.com*
Keywords: MRI, BOLD, Resting state

Break

15:40–16:00

Birch Memorial Lecture

Presenter: Tomas Paus

16:00–17:00

T. PAUS. Population Neuroscience of the Developing Brain.

Population neuroscience endeavors to identify influences shaping the human brain from conception onwards, thus generating knowledge relevant for building and maintaining brain health throughout the life span. This can be achieved by studying large samples of participants drawn from the general population and evaluated with state-of-the-art tools for assessing (a) genes and their regulation; (b) external and internal environments; and (c) brain properties. This foundational knowledge is essential for understanding the variety of personal pathways of physical and mental health from childhood to adulthood. In my talk, I will illustrate this approach by describing our findings covering a number of domains, including prenatal adversity and the brain growth, sex hormones and structural properties of the grey and white matter, as well as income inequality and brain maturation during adolescence.
Correspondence: *Tomas Paus, University of Toronto, Toronto, Canada. E-mail: tpaus@research.baycrest.org*

Closing Ceremony

17:00–18:00

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WITHDRAWN ABSTRACTS

*The following abstracts were **withdrawn** by their authors after they were accepted or were not presented onsite. All these abstracts **were not presented** at the International Neuropsychological Society 2018 Mid-Year Meeting (INS 2018) in Prague:*

WEDNESDAY, JULY 18, 2018

Paper Session 2. Behavioral and compensation strategies: Toward improving cognitive functioning among older adults with and without dementia 14:10–15:40

Strategic Memory Alzheimer's Rehabilitation Training (SMART) Memory Program: Improvement for MCI/VCI Via Systematic Novel Cognitive Exercise (J. DenBoer) – *withdrawn*

Cognitive Leisure Activities are Associated with Better Neurocognitive Functioning in Adults Aging with HIV (P.L. Fazeli, J. Cheatwood, S. Morrison, D.E. Vance) – *withdrawn*

THURSDAY, JULY 19, 2018

Poster Session 1. Cognitive functions (Memory, visual-spatial abilities, executive functions, emotional processing) & Neuropsychiatric disorders across lifespan (substance use, severe mental illness, autism, depression, anxiety, etc.) 8:35–10:25

Intraindividual variability in executive function performance in healthy adults – the relationship with age and overall cognitive ability (D. Buczylowska, F. Petermann) – *withdrawn*

Improvements in Neurobehavioral Outcomes Following Integrated HRV Biofeedback and Psychotherapy Intervention (C. Ginalis, G. Lazarus, E. Emory) – *withdrawn*

Optimizing Fetal Neurodevelopment (C. Ginalis, G. Lazarus, E. Emory) – *withdrawn*

Volatile fatty acids from feces are related to depression (K.A. Hestad, K. Rudi) – *withdrawn*

Cognitive and Health Symtpoms associated with Gulf War Exposures: A Longitudinal Assessment (M. Krengel, A. Maule, M. Yee, C. Zundel, K. Sullivan) – *withdrawn*

Inward versus reward: White matter pathways in extraversion (R. Leshem, C. Piervincenzi, C.A. Mallio, Y. Errante, C.C. Quattrocchi, F. Carducci, T. Dotan Ben-Soussan) – *withdrawn*

Investigating the Relationship Between Face Recognition Ability and False Memories from Misinformation. Detecting Individual Differences (V. Melikopoulos, A. Papaioannou-Spiroulia) – *withdrawn*

Neuropsychological characteristics of flexibility and cognitive inhibition in childhood (K.P. Montes Infante, X.A. Ortiz Jiménez) – *withdrawn*

Pro-inflammatory Cytokines, Childhood Trauma, and Neuropsychological Function in Adolescent Depression (A.T. Peters, X. Ren, K.L. Besette, A.E. West, S.A. Langenecker, G.N. Pandey) – *withdrawn*

The Longitudinal Neurocognitive Effects of Buprenorphine in Adults with Opioid Use Disorder (M. Rivera Mindt, K. Coulehan, F. Arias, C. Cunningham, J. Arnsten) – *withdrawn*

Role of executive functions in behavior and emotional regulation in a sample of Brazilian preschool children (A.G. Seabra, T.P. Mecca, G. Zauza, C.B.R. León, N.M. Dias) – *withdrawn*

A cognitive model towards understanding delusions in schizophrenia (V.D. Sen) – *withdrawn*

The Investigation of The Relationship Between Mothers' Alexithymia and Somatic Complaints and Children's Obsessive-Compulsive Features (H. Ünübol, M.B.Y. Kaya) – *withdrawn*

Paper Session 8. Pediatric TBI 8:45–10:15

Child social and behavioral outcomes following traumatic brain injury: A prospective, longitudinal study (S.E. Scratch, J.S. Hutchison,

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M. Greenham, S. Hearps, T. Demaneuf, C. Delzoppo, M.H. Beauchamp, A. Crichton, A.-M. Guerguerian, K. Boutis, F.E. Babl, V. Anderson) – *withdrawn*

Poster Session 2. Attentional, learning, and language disorders across lifespan (ADHD, learning disorders, aphasias, language development) 10:35–12:25

Neuropsychology into educational training (M.J. Alvarez-Alonso, S. Pradas Montilla) – *withdrawn*

Presence of Developmental disorders – ADHD and SLD in IVF-IUI born children- A clinic based study (V. Baboo Sankar, A.P. Shakir) – *withdrawn*

Numerical cognition in children with cerebral palsy (S.C.F. Feldberg, T.S.G. Cardoso, C.B. Mello, F.H. Santos, O.F.A. Bueno) – *withdrawn*

Recognition and retrieval of 3-digit numbers encoded as labels or quantities: an experimental study (A. Lopez Rolón) – *withdrawn*

Poster Session 3. Acquired brain injury and rehabilitation across lifespan (TBI, cerebrovascular disease, etc.) 14:05–15:55

Predictors of Fatigue following acquired brain injury (T. Aboulafia Brakha, G. Adrian) – *not presented*

Characterization of executive functions in patients with cerebellar infarction in decision-making tasks (A.M. Carrillo-Sulub, G. Orozco Calderón, A. Chirino Pérez, J. Fernández Ruiz, O. Marrufo Meléndez) – *not presented*

Optimism in mTBI rehabilitation: How Depression Affects fMRI Directed Concussion Treatment and Recovery (A.K. Fong, S. Loong, M. Johnson, J. Daines, P. Murray) – *withdrawn*

A working memory intervention for hiv positive children and adolescents (S. Fraser, K. Cockcroft) – *not presented*

Use of Technology in Cognitive Rehabilitation in Mexico and Spain (C.E. Garcia-Guerrero, X. Ortiz, E. Arroyo) – *withdrawn*

Prospective Memory After Stroke: Is PM Impairment Dependent on Measure Used? (C.A. Hogan, P. Cornwell, J. Fleming, D. Shum) – *withdrawn*

Characteristics of on-road driving maneuvers in patients with cognitive dysfunctions: using an event data recorder (E. Ito, H. Tanaka, A. Yoshihara) – *withdrawn*

Low-frequency (1Hz) rTMS over the left angular gyrus combined with visual scanning training in patients with post-stroke visuospatial neglect. A randomized, double-blind, placebo-controlled study (S. Iwański, M. Leśniak, K. Polanowska, J. Bembenek, W. Czepiel, J. Seniów) – *withdrawn*

A South African Model of Neuropsychological Rehabilitation for Adults after Acquired Brain Injury (N. Joosub, P. Basson, G. Kruger) – *not presented*

Does Cognitive Reserve Interact with APOE Genotype in Cognitive Recovery after Traumatic Brain Injury? (C. Padgett, D. Ward, K. Stuart, J. Vickers, M. Summers) – *withdrawn*

Frontal lesion findings on functional MRI in patients with mild to moderate traumatic brain injury (S.E. Rakers, E.J. Liemburg, H.J. van der Horn, J. van der Naalt, J.M. Spikman) – *not presented*

Importance of early detection of cognitive alterations after an ischemic stroke. Case report (A. Segura-Villa, D.S. Tovar-Vital, J. Salvador-Cruz) – *not presented*

Evaluation of a digital game for literacy in elementary school children (C.E. Subenko Olalla, K. Lukasova) – *withdrawn*

Neuropsychological impairment in a patient with left thalamic intraparenchymal hemorrhage (D.S. Tovar-Vital, A. Segura-Villa, J. Salvor Cruz) – *not presented*

FRIDAY, JULY 20, 2018

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Paper Session 13. Neuropsychological challenges faced by children and teens in developing countries
7:40–8:35

Investigating traumatic brain injury severity and behavioural profiles of a group of young offenders in South Africa (J.-R. Ockhuizen, P. Kheraj, P. Erasmus, A. Badul, N. Steenkamp, H. Williams, M. Cohen, L. Schrieff- Elson) – *withdrawn*

Paper Session 14. Bi- and multi-lingualism: Is there a cognitive advantage?
7:40–8:35

First pilot study of Bilingual young adults diagnosed with schizophrenia in response to Cognitive Remediation Treatment (L.R. Sandoval, S. Guimond, S. Kelly, S. Eack, M.S. Keshavan, W.S. Stone) – *withdrawn*

Poster Session 4. From normal aging to dementia (MCI, AD, FTD, DLB, etc.)
8:35–10:25

Sensitivity of Verbal and Nonverbal Memory Tests to Amyloid Deposition (E. Bayram, S.J. Banks) – *withdrawn*

Self-awareness in dementia: from a neurocognitive perspective to a biopsychosocial approach (M. Berlingeri) – *withdrawn*

Associations Between Internalizing Symptoms and Self-Reported Aberrant Driving Behaviors in Older Adults (J.P.K. Bernstein, M. Calamia, A. De Vito) – *withdrawn*

Utility of a Racing Simulator in the Assessment of Driving Capacity in Cognitively Healthy Older Adults (J.P.K. Bernstein, M. Calamia, A. De Vito, D. Weitzner) – *withdrawn*

Normal ageing does not impair the own-name bias on memory for people (S. Brédart) – *withdrawn*

Misuse of classifiers in Alzheimer's disease (H. Furumoto, T. Sakurai, S. Nagase) – *withdrawn*

Pick's disease and FTD. One or many entities? (A. Kertesz) – *withdrawn*

Lack of illness awareness in patients with mild Alzheimer's Disease in consideration of a repressive coping style (S. Verhülsdonk) – *withdrawn*

Paper Session 16. Learning and attentional disorders in children and adults
8:45–10:15

Numerical skills in semi-illiterate adults: evidences of the influence education (R. Moura, P. Freitas, J. Lopes-Silva, G. Alves, V.G. Haase) – *not presented*

Inhibitory control, impulsivity and the modulatory influence of anxiety in children with ADHD (M. Rossignol, J. Trappeniers, C. Bonnier) – *withdrawn*

Poster Session 5. Assessment methods and psychometrics in an increasingly globalized world
10:35–12:25

The Association Between Measures of Intelligence and Creativity – A Threefold Approach (V. Albrecht, E.C. Duggan, C.C. Loaiza, I. Irruita, M.A. Garcia-Barrera) – *withdrawn*

A Normative data for the Montreal Cognitive Assessment in a Lebanese Normative Elderly Population (M. Hayek, P. Fadel, L. Tarabey, F. Abou-Mrad) – *not presented*

Validity and reliability of N-back task as a working memory task (I. Hepdarcan-Sezen, S. Can, S. Dural, H. Cetinkaya) – *withdrawn*

Wisconsin card sorts revisited at 70 years of age: A new look at an old neuropsychological assessment tool (B. Kopp, A. Steinke, M. Bertram, F. Lange) – *withdrawn*

Factor Structure and reliability of the Quality of Life after Brain Injury (QoLIBRI) questionnaire in a Colombian Sample (G. Laseca-Zaballa, I.C. Rojas, L. Alvarán Florez, D. Rivera, L. Olabarrieta-Landa, J.C. Arango-Lasprilla) – *not presented*

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Shifting the culture of neuropsychological assessment towards identifying potential (R. Naidoo) – *withdrawn*

Neuropsychological Functions of IVF-IUI born children (A.P. Shakir, V. Baboo Sankar) – *withdrawn*

Adaptation of a Dot-Probe Task with Eye Tracking: novel bias and variability indices and the problem of low reliability (G.R. Silva, R.G. Batista, M.K. Bujak, D.S. Almeida, C.M. Mello, N.M. Volkmann, C.H. Kristensen) – *withdrawn*

SARA: A standardized paradigm to assess higher-order motor functioning and screen for optic ataxia (A. Smits, E. van Grinsven, C. Dijkerman, J. Kappelle, E. de Haan, M. van Zandvoort) – *withdrawn*

Serial Position Performance on the Rey Auditory Verbal Learning Test in a Large Adult Lifespan Sample (D. Weitzner, M. Calamia) – *withdrawn*

Restellment of Refugees from Syria: A feasibility study for screening for traumatic brain injury and PTSD (H. Williams, O. McCaw, J. Benrhard, K. Appleby, A. Beduschi) – *not presented*

Paper Session 18. Cognition in the context of serious medical Illness 13:00–13:55

The effects of cognitive deficits in renal recipients on participation in daily life (A.L. Ziengs, S.J. Bakker, A.M. Buunk, M.F. Eisenga, A.W. Gomes Neto, J.H. Annema-de Jong, G.J. Navis, J.M. Spikman) – *withdrawn*

Paper Session 19. Applying advanced statistical approaches toward improved diagnostic decision making 13:00–13:55

Detection of mild cognitive impairment: psychometric criteria or cluster analysis? (X.A. Ortiz, F. Gongora, A. Gonzalez) – *withdrawn*

Poster Session 6. Medical and neurologic conditions (movement disorders, MS, Epilepsy, tumors, HIV, diabetes, COPD, kidney disease, etc.) 14:05–15:55)

Neurocognitive Manifestations of Colpocephaly in Adults (P.A. Aduen, J. Fink) – *not presented*

Effects of cancer chemotherapy on self-reported functional status (J. Grigsby) – *withdrawn*

MINDfit for MS: Smartwatch training to improve symptom management for people with multiple sclerosis (H.L. Gullo, J. Fleming, A. Hatton, S. Tweedy, K. Pakenham) – *withdrawn*

Microstructural Changes in White Matter in Parkinson's Disease (L. Ohlhauser, J. Gawryluk) – *withdrawn*

Testing Working-memory and Executive Functions in Patients with Idiopathic Temporal Lobe Epilepsy: A longitudinal study (S.N. Pantelides, F. Constantinidou, S. Papacostas) – *withdrawn*

Unhelpful beliefs about hypoglycaemia and association with cognition in adults with type 1 diabetes (E. Sepúlveda, D. Carvalho, D. Seixas, N. de Zoysa, G. Margiotta, J. Speight, S.A. Amiel, S.G. Vicente) – *withdrawn*

The role of the hippocampus in working memory in patients with mesial temporal lobe epilepsy after corticoamigdalohippocampectomy (I.S.S. Tudesco, L.J. Vaz, R.S. Centeno, O.F.A. Bueno) – *withdrawn*

Paper Session 20. Emotional processing in TBI, FTD, and MCI 14:10–15:40

Aggression in TBI: associations with social information processing (J.M. Spikman, H.J. Westerhof-Evers, J. van der Naalt) – *withdrawn*

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