

## **Final Program**

# **The International Neuropsychological Society, The Polish Neuropsychological Society and The Polish Neuroscience Society Joint Mid-Year Meeting**

**June 30–July 3, 2010**

**Krakow, Poland**

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### **WEDNESDAY, JUNE 30, 2010**

<b>9:00 AM–12:00 PM</b>	<b>CE 1: Neuroimaging in Pediatric Neuropsychology: Structural, Functional, and Neurobehavioral Relationships</b> <i>Medium Hall B</i>
<b>9:00 AM–12:00 PM</b>	<b>CE 2: Brain Plasticity-Based Therapeutics</b> <i>Medium Hall A</i>
<b>12:00–1:00 PM</b>	<b>Wednesday Lunch Break</b>
<b>1:00–4:00 PM</b>	<b>CE 3: Neuropsychological Assessments in Older Adults, Patients with Mild Cognitive Impairment, and Patients in Early Stages of Dementia</b> <i>Medium Hall B</i>
<b>1:00–4:00 PM</b>	<b>CE 4: Brain Basis of Neurodevelopmental Disorders</b> <i>Medium Hall A</i>
<b>4:30–5:00 PM</b>	<b>Opening Ceremony</b> <i>Large Hall A/B</i>
<b>5:00–6:00 PM</b>	<b>Keynote Lecture: Brain Training-Based Therapeutics. Progress and Prospect.</b> <b>Speaker: Michael Merzenich</b> <i>Large Hall A/B</i>
<b>1. MERZENICH, M</b>	Brain Training-Based Therapeutics. Progress and Prospect
<b>6:30–7:30 PM</b>	<b>Welcome Reception</b> <i>Auditorium Maximum level -1</i>

**THURSDAY, JULY 1, 2010****8:30–10:00 AM****Symposium 1: Neural Bases of Implicit Vision****Chair: Carlo Marzi*****Large Hall A***

- |                  |   |
|------------------|---|
| 1. MARZI, CA     | Neural Bases of Implicit vision   |
| 2. LEH, S        | Neuronal Substrates of blindsight in Hemispherectomized subjects  |
| 3. DE GELDER, B  | New Explorations of Residual Visual Abilities for Face and Body Perception Following V1 Lesions   |
| 4. KENTRIDGE, RW | Behavioural and Neural Dissociation between Attention and Awareness: from Blindsight to Normal Observers                                |
| 5. MARZI, CA     | Neural bases of unconscious (blindsight) and conscious residual vision following lesion of the primary visual cortex or optic radiation |

**8:30–10:00 AM****Symposium 2: Advances in Modern****Neuropsychological Assessment****Co-Chairs: Emilia Lojek, Bernice Marcopulos*****Large Hall B***

- |                   |   |
|-------------------|---|
| 1. MARCOPULOS, BA | Advances in Modern Neuropsychological Assessment  |
| 2. HOWIESON, D    | The Evolution of Neuropsychological Assessment  |
| 3. MANLY, J       | Detection of Cognitive Impairment and Change: Lessons from Cultural Neuropsychology                     |
| 4. SCHRETLEN, D   | The Advantages and Disadvantages of “Adjusting.” Test Performance for Demographic Characteristics       |
| 5. LOJEK, E       | Developing Connections between Qualitative and Quantitative Approaches in Neuropsychological Assessment |

**8:30–10:00 AM****Paper Session 1: Neurodevelopmental Issues****Moderator: Agnieszka Maryniak*****Medium Hall A/B***

- |                 |   |
|-----------------|---|
| 1. CSERJESI, R  | Neuropsychological Outcome of Moderate Preterm birth at the Age of 7 Years Old Children                                     |
| 2. WOODWARD, LJ | Neonatal White Matter Abnormalities Predict Global Executive Function Impairment in Children Born Very Preterm              |
| 3. LESNIAK, M   | Eye movement control and attentional processes in Wilson’s disease  |
| 4. LEVAV, M     | Early developmental risk factors and neuropsychological function in preschool children with neurodevelopmental disabilities |
| 5. GAMBIN, MJ   | Response Inhibition in Children with Symptoms of Hyperactivity-Impulsivity and Inattention                                  |

**10:00–10:30 AM****Thursday Morning Coffee Break**

**10:30–11:30 AM**

**Invited Address: Developmental to Child to Pediatric Neuropsychology: Evolution of Practice and Research**  
**Speaker: George W. Hynd**  
*Large Hall A/B*

1. HYND, G

Developmental to Child to Pediatric Neuropsychology: Evolution of Practice and Research

**11:45 AM–1:15 PM**

**Invited Symposium: Luria and Konorski**  
**Chair: Anna Grabowska**  
**Presenters: Charles G. Gross, Bogdan Dreher, Tatiana Akhutina, Elkhonon Goldberg**  
*Large Hall A/B*

1. GOLDBERG, E
2. AKHUTINA, TV
3. DREHER, B
4. GROSS, CC

Novelty, Ambiguity, and the Frontal Lobes  
The Lurian Neuropsychology: Past, Present, Future  
Jerzy Konorski, one of the Great Integrative Neuroscientists of the 20th Century  
Contributions of Jerzy Konorski to Neuroscience

**12:45–2:00 PM**

**Poster Session 1: Aging/Dementia/Memory/Stroke**  
*Exhibition Room A/B*

1. VALLET, G
2. ENNOK, M
3. MACE, A
4. THIVIERGE, S
5. VAHTER, L
6. PAGRETA, K
7. SEGHIERS, A
8. SPAAN, PE
9. ALEGRET, M
- ~~10. ROMERO, B~~

**Dementia (Alzheimers)**  
A Disconnection Syndrome in Alzheimer Disease: Arguments from Sensory-Dependant Memory Models  
Performance Characteristics of Alzheimer's Disease Patients on the Auditory Verbal Learning Test  
Effect of Response Modality in Immediate Serial Recall of Individuals with Dementia of Alzheimer Disease  
Preliminary Data of a 6-Month Block-Randomized Controlled Study on Cognitive Training of Instrumental Activities of Daily Living in Mild-to-Moderate Alzheimer's Disease  
Estonian version of the CERAD test battery - validation and preliminary normative data  
The pseudowords perception as a possible marker of brain damage in Alzheimer's disease and alcohol addicted patients  
~~Outcomes COGNOS Study: Care for People with Cognitive Dysfunction. A National Observational Study in Belgium~~  
Episodic and Semantic Memory Impairments in Preclinical Alzheimer's Disease: Improving Sensitivity and Specificity of Assessment  
Brain SPECT quantification and visuo-perceptual test in the detection of mild cognitive impairment and mild Alzheimer's disease  
~~The Impact of a Short-Term Multicomponent Residential Treatment Programme on Depression and Quality of Life in Persons with Dementia~~

- Dementia (Subcortical, Specific Disorders, MCI, etc.)**
11. SITEK, EJ Neuropsychological Assessment of the Self-awareness of Symptoms in Huntington's Disease (HD), Parkinson's Disease (PD) and Cervical Dystonia (CD)
12. SUAREZ GONZALEZ, A Types, Characteristics and Moment of Occurrence of Visual Hallucinations in Lewy Bodie's Disease
13. SUAREZ GONZALEZ, A Posterior Cortical Atrophy as Onset of Presentation of Lewy Bodie's Disease
14. MIDORIKAWA, A The diagnosis of frontotemporal lobar degeneration (FTLD) may include patients with autism spectrum disorders (ASD)
15. GUGALA-IWANIUK, M Episodic and Semantic Memory Decline and Executive Dysfunctions as Predictors of Mild Cognitive Impairment's Conversion into Dementia
16. MATTEAU, E Could Mattis Dementia Rating Scale Detect Patients with Mild Cognitive Impairment in Idiopathic Parkinson's Disease?: Preliminary Results of a Cross-Sectional Study
17. KAUR, S Semantic Dementia in Singapore: Two case studies
18. GUSTAVSSON, M Mild Cognitive Impairment and Reading in Everyday Life: Exploration of Experienced Difficulties and Associations with Neuropsychological performance
19. GUSTAVSSON, M What Characterizes Patients with Cognitive Complaints but Unimpaired Neuropsychological Test Performance?
20. ESPINOSA, A Cognitive predictors of conversion to dementia in a large sample of patients with amnesic mild Cognitive Impairment
21. GOTHLIN, M Poorer Results on Speed and Attention Tests are Associated with Less Participation in Leisure Activities in Patients with MCI
22. RICO PONS, I Five Case Reports of Posterior Cortical Atrophy
23. RICO PONS, I Changes in brain spect and verbal learning in patients undergoing carotid endarterectomy
24. ECKERSTROM, C Left but not right hippocampal volume is associated with neuropsychological test performance in MCI
25. MIRALBELL, J Prevalence of MCI Neuropsychological Profile in a Healthy Population-based Sample Aged 50-65 Years
26. QUINTANA, M Artificial Neural Networks to Classify Mild Cognitive Impairment and Healthy Controls
- Memory Functions**
27. MATSUI, M Explicit and implicit memory in patients with Alzheimer's disease in early stage
28. CONSTANTINIDOU, F Working Memory and Stimulus Presentation in Reading Disability
29. CLARE, L Appraisal of Memory Functioning and Memory Performance in Healthy Ageing and Early-stage Alzheimer's Disease
30. KUZAKA, A Subjective vs objective estimation of own memory of the patients diagnosed with right and left hemisphere pathology
31. KUZAKA, A Semantic and affective verbal fluency - psychological mechanism
32. ~~DUMBRAVA, A~~ ~~Prospective Memory Deficits in Portable Telephone Users~~
33. ~~DUMBRAVA, A~~ ~~Rumination in Early versus Late Onset Post-Stroke Depression~~
34. GARCIA-SANCHEZ, C Wechsler Memory Scale's Profile, Selective Attention and Psychopathology in Fibromyalgia Syndrome
35. GARCIA-SANCHEZ, C Educational level and Age effects in The Mini Mental State Exam, the Montreal Cognitive Assessment (MoCa) and Mattis Dementia Rating Scale in normal subjects

36. VAKIL, E The Impact of Delay, Interactive Instructions and Exposure Time on the Emergence of Memory Context Effects
37. MOHR, G Episodic Memory as a Prerequisite for Generating Semantic Knowledge
38. BOLOGNANI, S Alternative Stories for Prose Recall Testing in Brazil: Development of 4 New Versions in Portuguese
39. ZAWADZKA, E Short-Term Memory, Memory Abilities in Everyday Life Activities and Mood in Patients with Different Insight into their Cognitive Functioning
- Stroke/Aneurysm/Cardiovascular Disorders**
40. LEVIN, EA Neuropsychological and Psychophysiological Methods in Studying Brain Function in Cardiothoracic Surgery Patients
41. MARYNIAK, A Memory deficits in children and adolescents with cardiac arrhythmia
42. CHEN, M ~~Predicting Everyday Functional Abilities of Stroke Patients with the Loewenstein Occupational Therapy Cognitive Assessment - Geriatric Version~~
43. GRAMSTAD, A Cognitive consequences of mild stroke in an elderly population
44. ROJO, N Music-supported Therapy Enhances Cognitive Recovery after Stroke
45. KRAMSKA, L Cognitive performance in patients treated for cerebral aneurysm
46. SORIANO, JJ Higher Risk of Cognitive Impairment in Executive and Visuosperceptive Functions Related to Deep White Matter Lesions Severity
47. SZOPA, Z ~~Neuropsychological consequences in the functioning of a patient with brain damage as a result of sudden cardiac arrest. Case Study~~
48. WINGEIER, K Imaging the Reorganisation of White Matter after Ischemic Stroke in Childhood
49. POLANOWSKA, K Transcranial Direct Current Stimulation combined with Cognitive Therapy in Stroke Patients
50. SENIOW, J Effect of speech and language training combined with levodopa in post-stroke aphasia treatment: a prospective, randomized, placebo-controlled, double blind study
51. DOMANSKA, L The Inadequate Insight into Memory Abilities in Stroke Patients and their Social Competence from the Perspective of Themselves and their Relatives
52. OTSUKI, M Temporal sequence effect of naming: implication of temporal lesion
- Visuospatial Functions/Neglect/Agnosia**
53. JEHKONEN, M Thrombolysis and visual functioning in right hemisphere stroke during a 6-month follow-up
54. LUUKKAINEN-MARKKULA, R Hemispatial neglect is differentially reflected in re-cancellation, visual memory and motor perseveration tests
55. HAYAKAWA, Y A Preliminary Survey of the Prevalence of Personal Neglect
- Aging**
56. ALLEN, JB Utility of Alternative Measures of Literacy in the Prediction of Intellectual Ability in an Ethnically Diverse Population
57. KESSELS, RP Age Effects on Cerebral Oxygenation during Working Memory Performance: A Functional Near-Infrared Spectroscopy Study
58. IWAHARA, A Are Cognitively Stimulating Activities Really as a Buffer of Cognitive Decline in Aging?
59. BUIZA, C A Brief Scale for the Assessment of Occupational Complexity: a Tool to Study Cognitive Reserve (Pilot Study)

60. BUIZA, C Factorial Structure of Cognitive Functions in a Sample of Spanish Middle-aged and Older Adults
61. BARCZAK, A Detecting cognitive impairments with modified Clock Drawing Test in elderly population. Preliminary report
62. GAWRON, N Neuropsychological Patterns of Cognitive Normal Aging and Theories of Brain Aging
63. RABIN, LA Complaints Associated with Current Cognitive Functioning and Progression to Dementia: The Predictive Value of Patient and Informant Report Items
64. FRISCH, S The Inferior Frontal Junction Area and Executive Functions in Dementia
65. SNOUSSI, M Emotion-cognition interaction in aging

**2:00–3:00 PM**

**Thursday Lunch Break**

**3:00–4:30 PM**

**Symposium 3: Distributed Processing of Auditory Information**

**Chair: Stephanie Clarke**

*Large Hall A*

1. CLARKE, S Distributed Processing of Auditory Information
2. KAISER, J Short-term memory processing of spatial and nonspatial sound features
3. CLARKE, S Temporo-spatial organisation of the auditory What and Where processing streams
4. GRUBE, M Auditory Processing of Time
5. MCGETTIGAN, C Neural systems underlying plasticity and individual differences in auditory speech processing

**3:00–4:30 PM**

**Symposium 4: Theory of Mind: Facets and Mechanisms of Impairment**

**Chair: Anna Rita Giovagnoli**

*Large Hall B*

1. GIOVAGNOLI, A Theory of Mind: Facets and Mechanisms of Impairment
2. ANNA RITA, G Theory of Life in Adult Life
3. CORCORAN, R Theory of mind and paranoid delusions
4. RENIERS, R Theory of mind and empathy
5. BROICHER, S Theory of mind and epilepsy
6. RAGLIO, A Theory of mind, music and music therapy

**3:00–4:30 PM**

**Paper Session 2: Intervention/Rehabilitation**

**Moderator: Maria Pachalska**

*Medium Hall A/B*

1. TATE, R Single-case Experimental Designs and N-of-1 Trials in Rehabilitation Research
2. SARAJUURI, J Correlates of Self-Appraisal with Selected Outcomes of Neuropsychological Rehabilitation: An International Pilot Study

- |    |               |  |
|----|---------------|--|
| 3. | KESSELS, RP   | A Comparison of Trial and Error Learning, Errorless Learning and Learning by Modeling of Everyday Activities in Alzheimer Patients |
| 4. | GUERREIRO, S  | Outcome Evaluation of a Neuropsychological Rehabilitation Program Through a Follow-up Study  |
| 5. | HAMPSTEAD, BM | Neural networks mediating cognitive rehabilitation of memory in patients with mild cognitive impairment                            |
| 6. | TROSTER, AI   | Mild Cognitive Impairment and Neuropsychological Outcome after Subthalamic Deep Brain Stimulation for Parkinson's Disease          |

**4:30–5:00 PM**

**Thursday Afternoon Coffee Break**

**5:00–6:00 PM**

**Presidential Address: Preclinical Detection of Neurodegenerative Disorders**  
**INS President: Stephen Rao**  
*Large Hall A/B*

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|----|--------|--|
| 1. | RAO, S | Preclinical Detection of Neurodegenerative Disorders |
|----|--------|--|

**6:00–7:15 PM**

**Poster Session 2: Intervention/Neuroscience/TBI**  
*Exhibition Room A/B*

- |     |                         |   |
|-----|-------------------------|---|
|     |                         | <b>TBI (Adult)</b>  |
| 1.  | <del>MILLER, LJ</del>   | <del>Neuropsychological Tests and Behavioral Variables as Prognostic Indicators of Vocational Problems Following Traumatic Brain Injury</del> |
| 2.  | MATHIAS, JL             | Impact of Day-of-Injury Alcohol Consumption and General Alcohol use on Outcome after TBI  |
| 3.  | IVERSON, GL             | Poor Effort is Associated with Greater Post-Concussion Symptom Reporting in Military Personnel with Mild Traumatic Brain Injuries             |
| 4.  | SAXTON, M               | The Role of Cognitive and Emotional Empathy in Social Behavior Post Traumatic Brain Injury  |
| 5.  | GIAZKOULIDOU, A         | <del>Invalid MMPI-2 profiles and neuropsychological test performance in traumatic brain injury patients</del>                                 |
| 6.  | <del>DARDAGANI, A</del> | <del>Assesing Motivation for Rehabilitation after Traumatic Brain Injury: The Role of Psychopathology</del>                                   |
|     |                         | <b>TBI (Child)</b>  |
| 7.  | <del>WRIGHT, F</del>    | <del>Symptoms of Posttraumatic Amnesia (PTA) in Children Following Traumatic Orthopaedic Injuries</del>                                       |
| 8.  | ARIAS-ALVAREZ, J        | Neuropsychologic Profile of Two Pediatric Patients with Ample Right Parieto-Occipital Lesions after Brain Tumour Resection                    |
| 9.  | MARIA, P                | Cerebral plasticity in children with post-traumatic aphasia, based on data from functional magnetic resonance (fMRI)                          |
|     |                         | <b>Cognitive Intervention/Rehabilitation</b>  |
| 10. | WALEWSKA, K             | Severe Brain Injuries: Challenges for Contemporary Psychotherapist  |
| 11. | BIENIEK, A              | Complex Treatment of Patients after Toxin or Substance Poisoning  |
| 12. | KOWALSKA, J             | Psychotherapy for Individuals with Specific Dysfunction of Nervous System – Clinician Towards People with Hearing Impairment                  |
| 13. | OPPENHEIM, D            | What Express Drawings Produced by Children Treated for a Brain Tumor  |
| 14. | OPPENHEIM-GLUCKMAN, H   | Psychotherapy of brain-injured patients   |

15. SALAS, G ~~Recovery from Catastrophic Reaction in Brain Injury Survivors. The Use of Others and Mentalizing~~
16. MONTANER, X Malinger Sabadell test (MST). A Pilot study for the development of a brief memory malinger test
17. ROSS, SR ~~A Cluster Analytic Investigation of Litigating Mild Head Injury Using the Personality Assessment Inventory~~
18. PACHECO, A Reading Interventions: a Content Analysis of Specialized Literature
19. PAPROT, AE Neuropsychological consequences of cerebral anoxia following out-of-hospital cardiac arrest and attempt of therapeutic intervention
20. FERNANDEZ DE BOBADILLA, R Neuropsychological Effects of Cognitive Stimulation in a Non-Demented Parkinson's Disease Group
21. PARK, H Domain-specific and Shared Training Effect on Attention and Memory in Acquired Brain Injury Patients
22. PARK, H Computer-assisted Cognitive Rehabilitation for Adults Survivors after Cardiac Arrest
23. DORES, AR Cognitive Rehabilitation of Brain Injured Patients with Dysexecutive Syndrome: The Test of a Prototype of a Virtual Environment
24. SHIBASAKI, M Effectiveness of Cognitive Rehabilitation for Activation Deficit in a Patient with Frontal Lobe Lesions
25. FERSTEN, E The effect of intraoperative monitoring of cognitive function on postoperative functioning of patients who underwent awake brain surgery for tumors located in eloquent areas
- Cognitive Neuroscience**
26. MATSUI, M Self-conscious emotion influences moral conscious: a near-infrared spectroscopy study
27. MATSUI, M Brain activation related to memory organization: a near-infrared spectroscopy
28. JEHKONEN, M Does Age Affect Cognitive Processing Speed in Patients with Obstructive Sleep Apnea Syndrome?
29. BRAMAO, I The influence of color information in diagnostic and non-diagnostic color objects recognition
30. FERRUCCI, R Cerebellum and the Emotional Recognition of Facial Expression: a Study with Cerebellar Transcranial Direct Current Stimulation (ctDCS)
31. MAMELI, F The Fibber Brain: an Insight into Neural Mechanisms of Deception with Brain Stimulation
32. BALA, A Pattern of Cognitive Functioning in Patients with Pituitary Adenoma
33. ORON, A The Effect of Permanent Atrial Fibrillation on Mental Rhythmisation during Subjective Accentuation of Metronome Beats
34. FUMAGALLI, M Gender-Dependent Modulation of Utilitarian Judgment after Ventral Prefrontal Cortex Direct Current Stimulation
35. VAITSSES, VD ~~Visual Memory Performance and Global Field Synchronization in the Electroencephalography: Correlation in Children with Learning Disabilities~~
36. BALCONI, M Mismatching Action-feedback Relationship and Sense of Agency: the Contribution of ERP Modulation (FRN and P3b), Behavior Inhibition/activation Systems (BIS/BAS), and Behavior Identification of Actions (BIF)
37. BALCONI, M Self-report Measures, Facial Response, and Personality Differences (BEES) in Cooperative vs. Non cooperative Situations: Contribution of the Autonomic System to the Sense of Empathy



38. DOMAGALIK, A Default Mode Network in Tasks Involving Bottom-up and Top-down Processes
39. TSURUYA, N Mind-reading Impairment in Parkinson's Disease
40. ~~HSUEH, J~~ ~~Primary somatosensory cortex in perception and localization of noxious stimuli~~
41. WALENTOWSKA, W Face Rotation Influences Subliminal Processing of Emotional Expression
42. WALENTOWSKA, W Attention Modulates Facial Emotion Processing
43. ASANOWICZ, D Hemispheric Asymmetry in the Attentional Bias Toward Emotional Faces. Evidence from Human Electrophysiology
44. ASANOWICZ, D Spatial Attention and Neglect: Effects of Prism Adaptation on Exogenous Orienting and Inhibition of Return
45. PLUCINSKA, K Lesion and Stimulation of the Mesolimbic Motivational Dopamine System Influence Blood NK cell Percentage in Rats Differing in Locomotor Activity
46. PLUTA, A Dissociation between theory of mind and executive functions in patients with brain injury
47. BOLCEKOVA, E The Cerebellar Cognitive Affective Syndrome: Further Evidence from Czech Patients
48. ALMEIDA, I ABI and Brain Reorganization: Neuropsychological and fMRI Evidences - An Exploratory Study
49. WALECKI, P Inhibitory effects of  $\mu$ -opioid receptor agonist on eyeball movements
50. GUT, M SNARC effect is linked to orienting and executive attention, but independent on the hand dominance
- Visuospatial Functions/Neglect/Agnosia**
51. SELLARO, R Dissociation Between Space And Awareness In Unilateral Neglect
52. SOBANSKA, M Double Dissociation between Multiplication and Subtraction in Brain Damaged Patients with Language or Spatial Disorders
53. ANTOSZ, P Does Covert Attention Focus on Spatial Locations or Objects in Space? Comparing the Effects of Leftward and Rightward Prism Adaptation
54. HEBER, I Perception and Attention towards Moving Stimuli in Peri- and Extrapersonal Virtual Space
- Basic Neuroscience / Molecular Biology of Brain Disorders**
55. ~~KUBIAK, M~~ ~~Influence of Ahp Reduction on Epsps in Hippocampal Pyramidal Cells - A Simulation~~
56. CYBULSKA-KLOSOWICZ, A Involvement of Retrosplenial and Anterior Cingulate Cortex in Classical Conditioning
57. CANBAZ, D Characterization of the Transcription Factors Involved in Spastin Gene Expression
58. KORULU, S Understanding the Role of PKC in Neurons and Neurodegeneration
59. YILDIZ, A Regulation of Activation of Mitotic Markers in Neurodegeneration
60. ODAGIRI, M Visual Search Strategy in a Patient with Naturalistic Action Impairments
61. JAKUBOWSKA-DOGRU, E Animal strain, age, gender and task demands: the confounding factors in the research of drug effects on behavior

8:00 PM

**Congress Dinner**  
**(Optional, Pre-registration Required)**  
**Folwark Zalesie**

**FRIDAY, JULY 2, 2010****8:30–10:00 AM****Symposium 5: Time and Cognition: From Behavioral Studies to Brain Imaging****Chair: Elzbieta Szelag*****Large Hall A***

1. SZELAG, E
2. VATAKIS, A
3. BAO, Y
4. BOGORODZKI, P
5. SZELAG, E

Time And Cognition: from Behavioral Studies to Brain Imaging  
 Audiovisual temporal perception and integration: Acquired deficits in audiovisual temporal perception for complex stimuli  
 Evidence for impact of language experience on temporal order discrimination  
 Methodological challenges in functional imaging of the auditory system: temporal information processing aspects  
 Training in temporal information processing ameliorates cognitive function: clinical and fMRI evidences

**8:30–10:00 AM****Symposium 6: Response to Intervention: Implications for Neuropsychology and Education****Chair: Jack Fletcher*****Large Hall B***

1. FLETCHER, JM
2. BARTH, AE
3. VAUGHN, SR
4. DENTON, CA
5. REZAI, R

Response to Intervention: Implications for Neuropsychology and Education  
 Neuropsychological Correlates of Inadequate Response to Intervention  
 Remediation of Middle School Students with Reading Disabilities: Intensity of Intervention  
 The Effects of Intensive Reading Intervention for Children with Inadequate Response to Intervention  
 Brain Activation Profiles of Middle School Students as a Function of Response to Intervention

**8:30–10:00 AM****Paper Session 3: Epilepsy/Seizures****Moderator: Akira Midorikawa*****Medium Hall A/B***

1. NADEBAUM, C
2. GASCOIGNE, M
3. KANTOLA-SORSA, E
4. GROTE, C
5. MEIEROTTO, E

Antiepileptic Drug Use in Pregnancy: Impact on Brain Function of Exposed Australian Children  
 Everyday Memory in Children with Idiopathic Generalised Epilepsy: Behavioural and Cognitive Correlates  
 Epileptic Encephalopathy - How Fatal the Nightly Spikes and Waves?  
 Memory outcome after tailored temporal lobe resection  
 Semantic Memory after Temporal Lobe Surgery in Childhood

**10:00–10:30 AM****Friday Morning Coffee Break**

**10:30–11:30 AM**

**Invited Address: Learning - Induced Brain Plasticity**  
**Speaker: Malgorzata Kossut**  
*Large Hall A/B*

1. KOSSUT, M

Learning - Induced Brain Plasticity

**11:45 AM–1:15 PM**

**Invited Symposium: Translational Issues**  
**Chair: Peter Arnett**  
**Presenters: Carlo A. Marzi, Carlo Semenza**  
*Large Hall A/B*

1. MARZI, CA
2. SEMENZA, C

Conscious-Unconscious Dissociations in Neuropsychology  
 When Clinical Work Drives Research in Cognitive Neuroscience.  
 Examples in the Domains of Language and Math

**12:45–2:00 PM**

**Poster Session 3:**  
**Emotion/Imaging/Neurodevelopmental/**  
**Psychopathology**  
*Exhibition Room A/B*

1. NOONE, M
2. MAZURKIEWICZ, P
3. MAZURKIEWICZ, P
4. CONNAUGHTON, E
5. ROSAEN, A
6. FIKKE, LT
7. WALECKI, P
8. WALECKI, P
9. HWU, H
10. MAKOWSKA, I
11. DENSON, LA
12. MIKOLAJCZYK, M

**Psychopathology (Affective Disorders)**

Effects of Mood and Time on Retrospective Memory

Sadder but more accurate? Are depressives better at predicting their own abilities?

Depressive Realism in Neurobiological Context

**Psychopathology/Neuropsychiatry (Other)**

Person-identity Processing and the Development of Misidentification Delusions

Use of Neuropsychological and Electrophysiological Measures for Acute Treatment and Longitudinal Assessment of Clinical Disorders

Learning is Impaired in Adolescents Engaging in Non-Suicidal Self-Injury (NSSI)

The influence of Deep Brain Stimulation of the left subthalamic nucleus (DBS-STN) on the saccadic refixations

Evaluation of eyeball movements in ADHD and non-ADHD individuals

**Psychopathology/Neuropsychiatry (Schizophrenia)**

An Exploration of Neurocognitive Pattern in Patients with Early Schizophrenia

~~Olfactory Identification and Emotional Processing in Schizophrenia~~

~~In People with Schizophrenia, How Much Variance in Neuropsychological Test Performance is Explained by Intelligence and/or Information Processing Speed?~~

~~Source monitoring deficits in induced hallucinations conditions in schizophrenic patients, correlated with EEG~~

**Behavioral Neurology**

~~Line Bisection Performances in Depressives~~

~~Line Bisection Performances in Apathy versus Depression~~

~~Factor Levels of Psychopathy and Violent Behavior~~

13. DUMBRAVA, A
14. DUMBRAVA, A
15. ROMERO, C

16. CASTRO, S Age and Musical Expertise Affect how we Recognize Emotions in Music
17. IMBIR, KK Mapping of emotion based on homeostatic and transgressive mechanism of formation. An fMRI study
18. SZCZEPANOWSKI, R Internal observer threshold mediates conscious reports of fear
19. RUDZINSKI, MM The Dynamics of Rapid Emotional Changes in Physiological Terms. Comparison of the Mouse Paradigm and the Asymmetry of Alpha Oscillations in Prefrontal Cortex
20. MCDONALD, S Impaired Mimicry to Angry Expressions in People with Severe Traumatic Brain Injury
21. ~~KLIGER, H~~ ~~Three Intergenerational Effects of Trauma: Integrating Narrative and Neuroscience to Understand Adversity and Resilience~~
22. ~~KUNIECKI, M~~ ~~Elements of Color Characteristic of Emotional Visual Stimuli Determining Their Attentional Advantage~~
23. BASGOZE, Z Emotional Conflict Resolution in Healthy and Depressed Populations
24. ~~FORUN YAZZHAN, N~~ ~~Combat Related Nouns and Their Emotional Impressions~~
25. WIECZOREK, A The Basolateral Amygdala as a Part of Neural Circuitry Activated During Learning
26. SENDERECKA, M Event-Related Potentials to Emotional Auditory Stimuli within an Oddball Task
- ADHD/Attentional Functions**
27. SENDERECKA, M Inhibitory Dysfunction in ADHD Children: A Behavioral and ERP Study
28. SENDERECKA, M An ERP Auditory Oddball Study of Attention Deficit Hyperactivity Disorder
29. HALLELAND, H The Color Word Interference Test as a Measure of Set-shifting in Adults with ADHD
30. JADCZAK - SZUMILO, T Language and Communicative Functioning in FAS and ADHD Children
31. MARZECOVA, A The Modulatory Effects of Alerting and Orienting Attentional Networks on Conflict Resolution and Conflict Adaptation
32. GONZALEZ-PEREZ, P Developmental delay in executive functions in Attention-Deficit Hyperactivity Disorder (ADHD)
33. WOZNIAK-PRUS, MJ Executive Functions in Preschool Boys at Risk of ADHD
- Learning Disabilities/Academic Skills**
34. BARTH, AE Language Profiles of Treatment Nonresponders, Treatment Responders, and Typically Developing Students
35. FERNANDEZ, S Atypical Neuropsychological Profile in Adults with Myelomeningocele with Hydrocephalus and Normalized IQ
36. LIPOWSKA, M Visuospatial Deficits of Dyslectic Children
37. INACIO, FC Understanding rapid naming deficits in dyslexia: A response time analysis
38. ~~RISS, RH~~ ~~Effect of Auditory Processing Training on Neural Substrates of Reading Readiness in Dyslexic Readers~~
39. ~~VAHTSES, VD~~ ~~Logical Reasoning, Executive Function and Academic Performance in Children of second year of Elementary School~~
40. CZARNECKI, P Classroom photography of reading development
41. ARAUJO, S The Electroencephalographic Components of Reading in Dyslexia: More than a Phonological Deficit?

42. GARCIA, E **Structural brain abnormalities in adolescent with dyslexia: a Voxel Based Morphometry Study**
43. GARCIA, E **Pattern of neural activation related to phonological processing in adolescents with dyslexia: an fMRI study**
44. TOLEDO PIZA, C **Reading Skills in Dyslexics and Good Readers: An Analysis Based on the Brazilian Reading and Writing Battery - BALE**
45. ZMIJEWSKA, AM **Autism Spectrum Disorders**  
Temperamental Covariants of the Autistic Characteristic of Behaviour
46. ELING, P **Attentional Set Shifting in Autism Spectrum Disorder: Role of Perseveration, Learned Irrelevance, and Novelty processing**
47. KAWA, R **The effects of physical environment characteristics on the behavior of children with autism**
48. NESTER, MJ **Regressive vs Early Onset Autistic Spectrum Disorder in a Saudi Arabian Sample**
49. KONOPKA, K **The significance of context in the reproduction of memorized words in children with autism**
50. ROZGA, A **Impact of Data Reduction Methods on Identifying Atypical Facial EMG Responses to Emotion Displays among High-Functioning Individuals with Autism Spectrum Disorders**
51. PUDLO, M **Adenylosuccinate lyase deficiency (ADSL) - a rare autosomal disorder, a study of a 5 years old girl**
52. CYGAN, H **Asperger Syndrom with associated prosopagnosic deficits**
53. CHOJNICKA, I **Genetics/Genetic Disorders**  
No Association between the Candidate Genes for Autism and Suicide
54. KESSELS, RP **Intelligence, Visuospatial Working Memory and Executive Function Deficits in Women with Turner Syndrome and Their Relation with Psychosocial Variables**
55. CZYZ, AK **Electrophysiology/EEG/ERP**  
Neural and Behavioral Correlates of 'Looking but Not Seeing' Effect
56. STROZAK, P **The Encoding and False Recognition of Common and Abstract Nouns. An Event-Related Potentials (ERP) Study**
57. KLIMAS, KO **Helplessness as the first stage of depression - affective and cognitive deficits caused by informational helplessness training**
58. KHACHIDZE, I **Compare of EEG patterns in Epileptic Children at the background of Antiepileptic Drugs**
59. ONDRUCH, A **Imaging (Functional)**  
Hemispheric Speech Dominance in Children with Focal Brain Lesions - Clinical Neuropsychological and fMRI Assessment
60. KLAASSEN, E **Fatiguing the Brain: The Effect of Induced Fatigue on Brain Function During Working Memory**
61. FINNERTY, C **fMRI Response to Emotional Stimuli: Effects of Nicotine**
62. JABLONOWSKI, S **fMRI Scanned - Capacities and Limitations of Functional Magnetic Resonance Imaging**
63. SWEET, LH **Brain response to a working memory challenge as a function of nicotine use and nicotine dependence**
64. MIYAHARA, M **Verbal Labels Reduce Neuronal Activity for Memorizing Sequential Hand Movements: A Preliminary Finding from an fMRI Study**

65. GARCIA-BARRERA, MA **Imaging (Structural)**  
Small Scale Volumetric Differences in the Prefrontal Cortex of Children with ADHD and Dyslexia. Part 1: Gray Matter Subregional Differences
66. GARCIA-BARRERA, MA Small Scale Volumetric Differences in the Prefrontal Cortex of Children with ADHD and Dyslexia. Part 2: White Matter Subregional Differences
67. DE MELLO, CB Challenges in systematization and integration of neuropsychological and neuroimaging data in brain damaged children and other developmental disorders
68. TALBOT, E **HIV/AIDS/Infectious Disease**  
Health-related Quality of Life (HRQL) of Children and Adolescents following Encephalitis and its Relationship with Everyday Memory and Executive Function
69. BERTENS, D Assessment of Cognition in Relation to Brain Imaging and HIVRNA in HIV-1 Infected Patients: A Pilot Study
70. CLARK, U Combined Effects of HIV and Early Life Stressors on Brain Structure and Neuropsychological Function

**2:00–3:00 PM**

**Friday Lunch Break**

**3:00–4:30 PM**

**Symposium 7: FTD Symposium**

**Chair: Maria Pachalska**

*Large Hall A*

1. MARIA, P FTD Symposium
2. PACHALSKA, M Semantic Dementia: A Case Study
3. HERMAN-SUCHARSKA, I The Problems of Neuroimaging in FTD
4. HARCIAREK, M Differential Diagnosis of Frontotemporal Dementia: a Neuropsychological Update
5. KERTESZ, A The Overlapping Syndromes of Frontotemporal Dementia
6. SITEK, E Frontotemporal Dementia and Parkinsonism Linked to Chromosome 17 - the First Polish Family

**3:00–4:30 PM**

**Symposium 8: Hot and Cold Executive Functions in Eating Disorders: Basic Findings and Treatment Implications**

**Chair: Antonio Verdejo-Garcia**

*Large Hall B*

1. VERDEJO-GARCIA, AJ Hot and cold executive functions in eating disorders: Basic findings and treatment implications
2. TCHANTURIA, K Hot and cold cognition in anorexia nervosa (AN): What we know and what could be translated in treatment?
3. CSERJESI, R Cognition and emotional processing in obesity
4. SERPELL, L Findings from Computerised Study of Perseverative Task Performance under Fasting and Non-Fasting Conditions
5. VERDEJO-GARCIA, A Hot and cold executive functions in adolescents with obesity: brain substrates and prediction of treatment outcomes

**3:00–4:30 PM**

**Paper Session 4: TBI**  
**Moderator: David Andrewes**  
*Medium Hall A/B*

- |    |                |   |
|----|----------------|---|
| 1. | PONSFORD, J    | The Relationship Between ApoE Genetic Status and Injury Severity and Outcome Following Traumatic Brain Injury                           |
| 2. | DOUGLAS, J     | Visual Scanning and Impaired Interpretation of Facial Expression after Severe Traumatic Brain Injury                                    |
| 3. | RABINOWITZ, AR | Assessing Motivation in Baseline Concussion Testing   |
| 4. | PONSFORD, J    | Factors Influencing Outcome Following Mild Traumatic Brain Injury - A Prospective Study   |
| 5. | CHEVIGNARD, MP | The Effect of Age of Injury on Recovery following Severe Traumatic Brain Injury in Children: Preliminary Results of a Prospective Study |
| 6. | KINSELLA, GJ   | Acute Injury Characteristics and Cognitive Consequences following Mild Traumatic Brain Injury in Older Adults                           |

**4:30–5:00 PM**

**Friday Afternoon Coffee Break**

**5:00–6:00 PM**

**Birch Lecture: Cognitive Neuroscience of Dyslexia**  
**Speaker: John Gabrieli**  
*Large Hall A/B*

- |    |             |                                    |
|----|-------------|------------------------------------|
| 1. | GABRIELI, J | Cognitive Neuroscience of Dyslexia |
|----|-------------|------------------------------------|

**6:00–7:15 PM**

**Poster Session 4: Assessment/Cross-Cultural/  
 Epilepsy/Executive/Language/Subcortical**  
*Exhibition Room A/B*

- |     |                       |   |
|-----|-----------------------|---|
|     |                       | <b>Assessment/Psychometrics/Methods (Adult)</b>   |
| 1.  | <del>MACIAS, EH</del> | <del>Cognitive function of Mexican people: we need more tools</del>   |
| 2.  | IVERSON, GL           | Base Rates of Low Index and Subtest Scores on the WAIS-IV/WMS-IV in the Standardization Sample                          |
| 3.  | ENNOK, M              | The Untested Assumptions of Schulte Tables  |
| 4.  | LOJEK, E              | Qualitative Performance of the Ruff Figural Fluency Test. A Normative Study   |
| 5.  | TOMCZYK, D            | Relationship between atmospheric electricity and psychomotor performance  |
|     |                       | <b>Assessment/Psychometrics/Methods (Child)</b>   |
| 6.  | BIECHOWSKA, DH        | Comparative Analysis of Quantitative and Qualitative Verbal Fluency Performance in Children with Neurological Disorders |
| 7.  | CIOCZEK, K            | Cognitive and Emotional Characteristic of Children and Teenagers Suffering from Migraine and Tension-type Headaches     |
| 8.  | DE MELLO, CB          | A Model of Multidisciplinary Program and Neuropsychological Approach to Brain Damaged Children                          |
|     |                       | <b>Cross Cultural</b>   |
| 9.  | <del>LUCAS, M</del>   | <del>Formulating a Novel Training Programme for Neuropsychologists in a Developing Country</del>                        |
| 10. | LORENTZEN, E          | Cross-Cultural Validation of WAIS-III in Mental Retardation   |

11. NIELSEN, T Cross-cultural Neuropsychological Assessment of Elderly Turkish Immigrants - Preliminary Results from a Danish Study
12. LEATHEM, J Methodological and cross cultural barriers in the neuropsychological assessment of refugees
13. ~~MAFUTE, E~~ ~~Neuropsychological Assessment of Spanish/English Bilingual Children: Preliminary Normative Data~~
14. ROMANOWICZ, M On the Need for Normativeness in Neurosciences
15. CHERNER, M Regression-based Norms for the Trail Making Test in Spanish
- Drug/Toxin-Related Disorders (Including Alcoholism)**
16. DECUIR, D Effects of Binge Drinking Patterns on Cognitive Functions in College Students
17. ANDRYSZAK, P Relationship between intensity of pain and cognitive performance in patients with chronic pain during opioid and non-opioid analgesics treatment
18. GORZELANCZYK, EJ Speech intelligibility in patients addicted to psychoactive substances in comparison to healthy controls
19. MICHALAK, M Subliminal priming of motor reaction as a marker of neurological diseases? A comparison study on Parkinson's disease patients, alcohol dependent patients, young and elderly controls
20. GORZELANCZYK, EJ Motor functioning of alcohol and drug dependant patients in comparison to older people
21. SEGALA, L Effects of ADHD on Neurocognitive Impulsivity in Heroin Addicts
22. WALECKI, P Effect of therapeutic dose of methadone at risk behavior in opioid-dependent individuals in methadone substitution therapy
23. WALECKI, P Single dose study of the effect of methadone on psychomotor functions in opioid-addicted individuals on methadone maintenance
- Epilepsy/Seizures**
24. BALA, A Lateralization of Cognitive Functioning in Patients with Right- and Left-Hemispheric Epilepsy
25. BENNETT, E Psychological Intervention With a Child Experiencing Reflex Anoxic Seizures: A Case Report
26. JAVURKOVA, A Relationship between Speech Dominance and Functional Memory Reserve in Temporal Lobe Epilepsy Patients
27. SHAVEL-JESSOP, S Beyond IQ: Cognitive Profiles in Children and Young People with Complex Epilepsy and Intellectual Disability
- Executive Functions/Frontal Lobes**
28. ALVAREZ GUERRA, M Verbal fluency in postmenopausal fibromyalgia patients without depression
29. ~~CHUDERSKI, A~~ ~~Neurobiologically Plausible Computational Model of Proactive and Reactive Modes in Executive Control over Stroop-like Interference~~
30. PLUCK, G Frontal Lobe Function and Childhood Traumatic Events in a Sample of Individuals with Complex Psychosocial Problems
31. KAFADAR, H Wisconsin Card Sorting Test and Raven Standart Progressive Matrices Test: A Latent Variable Analysis
32. FRISCH, S Assessment of Multitasking Deficits in an Everyday Life Task
33. LUNDEQUIST, A Executive dysfunction in young adults born preterm - neuropsychological test results and structural brain correlates
34. BOELEN, D Script Generation in Patients with Executive Impairments
35. IWANSKI, S Attention deficits in Wilson's disease patients



36. LEVAV, M Executive Function Assessment of Children Affected with Posterior Fossa (PF) Tumors in the Chronic Stage
37. OKUNIEWSKA, H The effects of age on Stroop interference in clinical vs healthy groups of children
38. KLYSZEJKO, Z “Does Conflict Monitoring Theory account for the control mechanisms involved in dual tasking?”
39. WOLSKI, P Spatial Attention Affects the Size and Lateral Asymmetry of the Poffenberger Effect
- Language and Speech Functions/Aphasia**
40. KALISZEWSKA, A Right Hemisphere Language Abilities in Patient with Corpus Callosum Total Agenesis - a Case Study
41. PAWELCZYK, AM Communication functioning of a patient with a cancer in the right frontal lobe before and after surgery
42. OGAWA, N Disorder of Phonological Processing in Logopenic Progressive Aphasia
43. SZUPICA-PYRZANOWSKA, M Explaining Agrammatism - Morphology vs. Phonology
44. KISELEV, S ~~Cognitive Abilities in Preschool Children with Problem in Grammar Understanding~~
45. PASTUSZEK-LIPINSKA, BE Melodic Intonation Therapy in Poland
46. PASTUSZEK-LIPINSKA, BE Music Education Affects Speech Processing
47. AMENTA, S ~~Comprehension of Irony in Social Situations: New Evidences from P200 and “Pragmatic Semantic” P600 ERP Effects~~
48. MARZECOVA, A Multilinguals’ Performance on Phonemic and Semantic Fluency: an Interplay of Language and Executive Functioning
49. KLIEMANN, FA ~~Translocation of language areas in patients with left hemisphere tumor and Functional Magnetic Resonance Image~~
50. SZEWCZYK, J The N400 Component Does Not Reflect Post Lexical Access Integration Difficulty - an Event-Related Potential Study in Polish Using Repetition Priming
51. ANZAKI, F Left Superior Temporal Gyrus Injury May Play a Role in Auditory-Verbal Short-term Memory Disturbance
52. RODRIGUEZ SALGADO, D Fluency Measures across the Diurnal Cycle of Testosterone in Healthy Young Men and Activational Effects of Gonadal Hormones
- Motor Function / Motor Disorders / Spinal Cord**
53. NAKAGAWA, Y A new apraxia? -a specific impairment of hand movements when reaching and grasping tools, with normal manipulation after grasping-
54. MARTINEZ-HORTA, S The Neuropsychological Correlates of Apathy in Parkinson’s Disease
55. MARTINEZ-HORTA, S Neurophysiological and Neuropsychological Evidence of Striatal-dependent Over-inhibition in Apathetic Parkinson’s Disease Patients
56. GAWRYS, L Neural Bases of Executive Dysfunction in Parkinson’s Disease
57. KUDLICKA, A Methodological Challenges in Researching Executive Dysfunction in Parkinson’s Disease: Systematic Review
58. HUA, M Theory of Mind in Patients with Parkinson’s Disease
- Multiple Sclerosis/ALS/Demyelinating Disorders**
59. JODAR, M Agraphia as Atypical Onset of Dementia in a Patient with Amyotrophic Lateral Sclerosis
60. VESEY, P An Absence of Hemispheric Disconnection Features Following Corpus Callosum Involvement in a Case of Acute Demyelinating Illness

61. KULISTAK, P Amyotrophic Lateral Sclerosis (ALS) and the Degree of Cognitive Impairment
62. VAN DER HULST, E The Specificity of Cognitive Deficits in Amyotrophic Lateral Sclerosis
63. PINO, M Cortical dementia in Multiple Sclerosis: implication for rehabilitation and caregivers

**7:30–8:00 PM**

**INS Awards and Business Meeting**  
*Large Hall A/B*

**SATURDAY, JULY 3, 2010**

**8:30–10:00 AM**

**Symposium 9: Use of Clinical Neurophysiology in Patients with Psychiatric Diagnosis**  
**Chair: Lukasz Konopka**  
*Large Hall A*

1. KONOPKA, LM Use of Clinical Neurophysiology in Patients with Psychiatric Diagnosis
2. BOB, P EEG Complexity, Dissociation and Schizophrenia
3. PALUS, M Measures of Synchronization and Their Relation to Cognitive Processes and Disorders
4. VOSS, U Modeling Dreaming and Psychosis: EEG Studies of Lucid Dreaming

**8:30–10:00 AM**

**Paper Session 5: Dementia/Stroke/Vascular Disorders**  
**Moderator: Emilia Lojek**  
*Large Hall B*

1. HAYASHI, A Neural bases of Kanji writing impairment in Japanese patients with mild Alzheimer's disease
2. NORDLUND, A Vascular disease, AD-biomarkers and Cognition in MCI - Additive or Synergetic Effects?
3. SCHMAND, B Neuropsychology Beats Neurochemistry in Search for Alzheimer Biomarkers
4. CROSSLEY, M Introducing a Clinical Dual Task to Facilitate Diagnosis in Early Stage Alzheimer's Disease: Modification of an Experimental Paradigm
5. ZAWADZKA, E Relationship between Emotional and Social Competence in Stroke Patients with Different Insight into Cognitive Abilities
6. HAALAND, KY Hand Preference Influences Arm Use After Unilateral Stroke

**8:30–10:00 AM**

**Paper Session 6: Aging/MCI**  
**Moderator: Gordon Chelune**  
*Medium Hall A/B*

1. HATTA, T Age-related difference in hemisphere function: Evidences from the Yakumo-study

2. SANCHEZ-BENAVIDES, G      Executive disturbances in Mild Cognitive Impairment are related to frontal lobe cortical thinning
3. FOSTER, J      Subjective Memory Complainers in the AIBL cohort: Hypervigilance amongst the Worried Well, or Individuals at Increased Risk of Alzheimer's Disease?
4. ~~KONSZTOWICZ, S      ~~Geriatric Rapid Adaptive Cognitive Evaluation (GRACE): Development of a Brief, Adaptive Test to Quantify Cognitive Ability in the Elderly~~~~
5. SPAAN, PE      Cognitive Decline in Normal Ageing and Early Alzheimer's Disease: A Continuous or Discontinuous Transition?
6. MILBERG, W      Metabolic Regulation, Vascular Risk and the Neuropsychology of Aging

**10:00–10:30 AM**

**Saturday Morning Coffee Break**

**10:30–11:30 AM**

**Invited Address: Neuropsychology At Work in MCI and Dementia**

**Speaker: Andreas U. Monsch**  
*Large Hall A*

1. MONSCH, A

Neuropsychology At Work In MCI And Dementia

**11:45 AM–1:15 PM**

**Symposium 10: Cognitive Functions in Psychiatric and Somatic Diseases - Diagnosis and Therapy**

**Chair: Irena Krupka-Matuszczyk**  
*Large Hall A*

1. KRUPKA-MATUSZCZYK, I

Cognitive functions in psychiatric and somatic diseases - diagnosis and therapy

2. KRYSTA, K

The efficacy of selected antipsychotics and thymoleptics in cognitive improvement in schizophrenia and depression

3. KRYSTA, K

The correlation between intensity of anxiety and depression and selected cognitive functions - before and after coronary artery bypass surgery

4. BORKOWSKA, A

Decision Making, working memory and executive functions in schizophrenia and bipolar disorder

5. BORKOWSKA, A

Cognitive functions and mood disorders in patients with chronic hepatitis C before and during antiviral therapy

**11:45 AM–1:15 PM**

**Symposium 11: Contemporary Challenges towards Clinical Neuropsychology - Expanding Research Areas**

**Chair: Danuta Kadzielawa**  
*Large Hall B*

1. KADZIELAWA, D

Contemporary Challenges towards Clinical Neuropsychology - Expanding Research Areas

2. ULATOWSKA, H

Communication in the Aging Brain

3. GONTARCZYK, M

The Proposition of the Neuropsychological Classification of Conscious and Unconscious Processes Disorders

4. STEELE, R

Computer Interaction Design: Contributions to Aphasia Rehabilitation

5. KERTESZ, A
6. JODZIO, K

Primary Progressive Aphasias: Past, Present, and Future  
Executive Function Deficits in Acute Stroke: Evidence from the Wisconsin Card Sorting Test

**11:45 AM–1:15 PM**

**Paper Session 7: Cancer/Tumors/Toxic Exposure**

**Moderator: Janusz Rybakowski**

*Medium Hall A/B*

1. BENNETT, E
2. GEHRING, K
3. SANTINI, B
4. VEARNCOMBE, KJ
5. WOODWARD, LJ

Predicting Parenting Stress in Caregivers of a Child with a Brain Tumour  
The Results of a Randomized Controlled Trial on Cognitive Rehabilitation in Patients with Primary Brain Tumors  
Cognitive Effects of Tumor and Surgical Treatment in Glioma Patients  
The Cognitive Effects of Chemotherapy-induced Menopause in Early Breast Cancer  
Prenatal Methadone Exposure and Infant Brain Tissue Volumes: Does Dose Matter?

**1:30–2:00 PM**

**Closing Ceremony**

*Large Hall A*

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# Abstracts Presented at The International Neuropsychological Society, The Polish Neuropsychological Society and The Polish Neuroscience Society Joint Mid-Year Meeting

June 30–July 3, 2010  
Krakow. Poland

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## WEDNESDAY AFTERNOON, JUNE 30, 2010

### Keynote Lecture: Brain Training-Based Therapeutics. Progress and Prospect.

Speaker: Michael Merzenich

5:00–6:00 p.m.

#### M. MERZENICH. Brain Training-Based Therapeutics. Progress and Prospect.

Studies in behavioral and cognitive neuroscience have led to two major revisions in our understanding of the neurological origins of human ability. First, we now know that the brain is continuously plastic across the human lifetime — that synaptic (connectional) remodeling and other activity-induced physical and chemical alterations underlie the acquisition and refinement of all acquired human skills and abilities. Second,

we now know that by their nature, the complex panoply of neurological processes underlying continuous brain remodeling are inherently reversible. The appreciation that the brain is a) fundamentally, and b) bi-directionally plastic bears important implications for understanding the development and dynamic nature of the abilities that define the operational Self, and for understanding the neurological origins of the behavioral expressions of normal aging and of many classes of neurological and psychiatric ‘disease’. This clarification in understanding our true neurological nature has also contributed to the accelerating development of a new class of cognitive training strategies designed to be deployed as medicine, potentially providing an important new class of prescribable treatments addressing neurological and psychiatric clinical indications. Progress in the development of these practical treatments will be briefly described.

Correspondence: *Michael Merzenich, PhD, UCSF, S28 HSE, UCSF, San Francisco, CA 94143-0732. E-mail: merz@phy.ucsf.edu*

## THURSDAY MORNING, JULY 1, 2010

### Symposium 1: Neural Bases of Implicit Vision

Chair: Carlo Marzi

8:30–10:00 a.m.

#### C.A. MARZI, S. LEH, B. DE GELDER & R.W. KENTRIDGE. Neural Bases of Implicit vision.

**Symposium Description:** The aim of the symposium is to report new evidence on the cerebral areas responsible for visual awareness. As is well known, a number of patients with hemianopia as a result of cortical damage to the striate cortex may show unconscious visually guided behavior for visual stimuli presented to the blind part of the visual field (“blindsight”).

Understanding the neural mechanisms of this peculiar phenomenon may shed light on the general problem of the brain correlates of perceptual awareness. Sandra Leh will

deal with blindsight in hemispherectomy patients studied with brain imaging techniques such as DTI tractography as well as with behavioral testing. Bea de Gelder will discuss affective blindsight, i. e. the residual visual ability of patients with damage to the striate cortex to react reliably to the emotional valence of stimuli presented to their blind visual fields and whose presence and properties they are unable to report. Bob Kentrige will review evidence and arguments about the relationship between attention and awareness and discuss experiments in which findings from blindsight are replicated in normal observers using masking paradigms. Finally, Carlo Marzi will bring and discuss new evidence on the likely neural bases for both blindsight and conscious residual vision in hemianopic patients and implicit perception in healthy subjects.

Correspondence: *Carlo A. Marzi, MD, Neurological & Visual Sciences, University of Verona, S Strada Le Grazie, Verona I-37134, Italy; E-mail: carloalberto.marzi@univr.it*

#### S. LEH. Neuronal Substrates of blindsight in Hemispherectomized subjects.

**Objective:** Blindsight is a visual phenomenon whereby hemianopic patients are able to unconsciously process visual information in their blind visual field. Here, I present my recent behavioural and neuroimaging research results on the neuronal correlate underlying blindsight in hemispherectomized subjects (HS), because spared islands of visual cortex cannot be evoked to explain the presence of visual abilities in the blind field in these subjects. I modified a paradigm in which the simultaneous presentation of an unseen stimulus can alter the mean reaction time to a seen stimulus. I used this Spatial Summation Effect to test the processing abilities of separate visual pathways that may be involved in blindsight, particularly the achromatic properties of collicular cells which receive no input from S-cones. The behavioural results demonstrated that in their blind field, only HS with blindsight respond to achromatic stimuli while none respond to S-cone dependent stimuli, a result in keeping with a collicular involvement in blindsight (Leh et al. E.J.N 2006). I confirmed behavioural results using fMRI (Leh et al. J Cogn Neurosci. 2009) and I utilized an innovative imaging technique, DTI tractography, which enables reconstruction of white matter tracts in vivo, to enhance the understanding of the phenomenon. I showed the presence of projections from the ipsi- and contralesional superior colliculus to primary visual areas, visual association areas, precentral areas/FEF and the internal capsule of the remaining hemisphere in HS with blindsight and an absence of these connections in HS without blindsight, thereby confirming that, at least in these subjects, blindsight is mediated by a collicular pathway (Leh et al. Brain 2006).

Correspondence: *Carlo A. Marzi, MD, Neurological & Visual Sciences, University of Verona, S Strada Le Grazie, Verona I-37134, Italy; E-mail: carloalberto.marzi@univr.it*

#### B. DE GELDER. New Explorations of Residual Visual Abilities for Face and Body Perception Following V1 Lesions.

**Objective:** Following destruction or denervation of the primary visual cortex (area V1, striate cortex) clinical blindness ensues, but

residual visual functions may nevertheless persist. The study of such patients thus provides a unique opportunity to investigate what visual capacities are mediated by the extrastriate pathways that bypass V1. In this talk we present new findings of residual visual abilities. There is evidence for a crucial role of the collicular-extrastriate pathway in non-conscious visuo-motor integration, by showing that in the absence of V1 the superior colliculus (SC) is essential to translate visual signals that cannot be consciously perceived into motor outputs. We found that an achromatic (gray) stimulus presented in the blind field of a patient with unilateral V1 loss, although not consciously seen, can influence his behavioral and pupillary responses to consciously perceived stimuli in the intact field (implicit bilateral summation). Notably, this effect was accompanied by selective activations in the SC and in occipito-temporal extrastriate areas. A second set of studies investigated processing of affective stimuli. Facial and bodily expressions of happiness and fear were presented either to the intact or blind visual field of two rare patients with unilateral destruction of the visual cortex in a simple exposure paradigm. Facial responses were recorded using electromyography and physiological arousal was measured with pupil dilatation. All stimuli triggered emotional reactions that were congruent with the affective valence displayed, irrespectively of whether the stimulus was a face or a body. We conclude discussing DTI analysis of possible pathways sustaining residual vision.

Correspondence: *Carlo A. Marzi, MD, Neurological & Visual Sciences, University of Verona, 8 Strada Le Grazie, Verona I-37134, Italy; E-mail: carloalberto.marzi@univr.it*

#### **R.W. KENTRIDGE. Behavioural and Neural Dissociation between Attention and Awareness: from Blindsight to Normal Observers.**

**Objective:** The notion that processes of visual attention and visual awareness are linked has a long history. Even today many philosophers consider attention and awareness to be obligatorily associated. The phenomenon of blindsight in which visual awareness and visual function dissociate

provides an ideal stage on which to test this assertion. Using modified versions of Posner's spatial cueing paradigm I have shown that a blindsight patient responded more quickly and accurately to targets presented at attended compared to unattended locations. As the patient did not report seeing these targets attention must have been operating without giving rise to awareness. Using the same patient and a slightly modified paradigm Catherine-Tallon Baudry and her colleagues showed that the neural MEG signatures accompanying attention and awareness in this patient also dissociated. More recently my colleagues and I have used a meta-contrast masking paradigm to show that attention can facilitate processing of unseen targets in normal observers as well as blindsight patients. Again Catherine-Tallon Baudry has shown that this behavioural dissociation has corresponding dissociated neural correlates. I will discuss the history of this work, recent criticisms of it, and its relationship to current theories of attention and awareness.

Correspondence: *Carlo A. Marzi, MD, Neurological & Visual Sciences, University of Verona, 8 Strada Le Grazie, Verona I-37134, Italy; E-mail: carloalberto.marzi@univr.it*

#### **C.A. MARZI. Neural bases of unconscious (blindsight) and conscious residual vision following lesion of the primary visual cortex or optic radiation.**

**Objective:** Patients with hemianopia following lesion of the primary visual cortex (V1) or of the optic radiation may show two forms of residual vision. One is unconscious and is known as blindsight, the other is conscious and may appear either spontaneously or by virtue of specific rehabilitation training. As to blindsight I shall provide behavioral and brain-imaging evidence that it is likely to be mediated by the Superior Colliculus and its cortical extrastriate targets. As to conscious residual vision, its neural bases may rely either on spared areas of the ipsilesional hemisphere or on the contralateral hemisphere or on both. I will discuss these possibilities and provide novel behavioral and brain-imaging results.

Correspondence: *Carlo A. Marzi, MD, Neurological & Visual Sciences, University of Verona, 8 Strada Le Grazie, Verona I-37134, Italy; E-mail: carloalberto.marzi@univr.it*

## **Symposium 2: Advances in Modern Neuropsychological Assessment**

**Co-Chairs: Emilia Lojek, Bernice Marcopulos**

**8:30–10:00 a.m.**

#### **E. LOJEK, B.A. MARCOPULOS, D. HOWIESON, J. MANLY, D. SCHRETLEN & E. LOJEK. Advances in Modern Neuropsychological Assessment.**

**Symposium Description:** This symposium will explore current issues in international neuropsychological assessment from several perspectives: evolution of the role of neuropsychological assessment in elucidating brain behavior relationships in light of advances in neuroimaging; consideration of educational, cultural, and linguistic factors in detecting cognitive change, strategies for standardizing tests and developing norms for valid neuropsychological test interpretation, and techniques for adapting foreign tests for use in Poland that incorporate both traditional Lurian methods with modern psychometrics.

Diane Howieson (Department of Neurology, Oregon Health & Science University) will give a talk on: the Evolution of Neuropsychological Assessment, with particular attention to the diagnosis of mild cognitive impairment. Jennifer Manly (Taub Institute for Research on Alzheimer's Disease and the Aging Brain Columbia University Medical Center) will present a talk on: Detection of Cognitive Impairment and Change: Lessons from Cultural Neuropsychology. David J. Schretlen (Departments of Psychiatry & Radiology, Johns Hopkins University School of Medicine) will talk about: The Advantages and Disadvantages of "Adjusting" Test Performance for Demographic Characteristics. Emilia Lojek and Joanna Stanczak (Faculty of Psychology, University of Warsaw, Poland) will present: Developing Connections between Qualitative and Quantitative Approaches in Neuropsychological Assessment. Bernice Marcopulos (University of Virginia, Neuropsychology Laboratory Western State Hospital) will be the Discussant providing a broad perspective on approaches to neuropsychological assessment in the U.S. and Poland.

Correspondence: *Bernice A. Marcopulos, Ph.D., Psychiatry and Neurobehavioral Sciences, University of Virginia, Western State Hospital, Box 2500, Staunton, VA 24402-2500. E-mail: bamSr@virginia.edu*

#### **D. HOWIESON. The Evolution of Neuropsychological Assessment.**

**Objective:** Early on neuropsychologists learned how the brain functions by studying cognitive and behavioral changes associated with focal brain lesions. Since then many changes in the field have occurred and are reflected in successive editions of Lezak's Neuropsychological Assessment. Today, we are learning from new imaging technologies vital information about how the brain functions normally and how brain functions are affected by brain disorders. Nevertheless, neuropsychology retains a unique role in clarify how a malfunctioning brain affects cognition and behavior. Together these different approaches are rapidly expanding our knowledge of brain-behavior relationships. As more is learned, neuropsychologists are improving techniques to diagnosis subtle brain disorders. One contemporary challenge is the diagnosis of mild cognitive impairment (MCI). The diagnosis of this mild alteration of normal function is fraught with difficulties because of normal fluctuations in cognitions in adults, particularly the elderly. Techniques used to establish a diagnosis of MCI will be used to illustrate diagnostic challenges. Correspondence: *Bernice A. Marcopulos, Ph.D., Psychiatry and Neurobehavioral Sciences, University of Virginia, Western State Hospital, Box 2500, Staunton, VA 24402-2500. E-mail: bamSr@virginia.edu*

#### **J. MANLY. Detection of Cognitive Impairment and Change: Lessons from Cultural Neuropsychology.**

**Objective:** Neuropsychologists have dealt with diverse backgrounds of testes in several ways. Empirical study of the influence of cultural, educational, and linguistic background on test performance can lead to improvements in neuropsychological practice, even when in an environment with a relatively heterogeneous population. This presentation will demonstrate that insights into the role of educational quality on cognitive test performance within ethnically diverse cohorts have relevance to interpretation of test scores and change in

scores within a single ethnic and language group. It will be demonstrated that examining cultural and educational factors provides an important test of construct validity for cognitive measures. Explicit measurement of educational experience, which has been found to account for ethnic differences in test performance in the US, can also help to improve detection of true cognitive impairment among older adults of similar cultural background. Furthermore, attention to these variables can improve our understanding of the role of cultural and educational factors on variability and detection of cognitive change. The investigation of specific cognitive processes related to cultural and educational experience such as familiarity with items, effects of timing, emphasis on detail, classification style, and linguistic idiosyncrasies will also shed light on the basic assumptions inherent in all cognitive testing.

Correspondence: *Bernice A. Marcopulos, Ph.D., Psychiatry and Neurobehavioral Sciences, University of Virginia, Western State Hospital, Box 2500, Staunton, VA 24402-2500. E-mail: bamSr@virginia.edu*

#### **D. SCHRETLEN. The Advantages and Disadvantages of "Adjusting" Test Performance for Demographic Characteristics.**

**Objective:** As clinical neuropsychology continues to develop internationally, the field will need to develop an armamentarium of tests designed to assess various domains of cognitive functioning. In the process, test developers will be forced to decide how to norm their instruments. Test norms always require broadly representative standardization samples. However, the sample sizes that are required depend on whether test developers use stratification or regression-based methods to benchmark normal test performance. Test developers also will need to decide which, if any, demographic characteristics to consider. This presentation will elucidate some conceptual and practical aspects of test standardization. I will describe regression-based normative methods, and illustrate how they can improve the diagnostic sensitivity and specificity of cognitive tests. I will also describe circumstances under which raw test performance tends to have better criterion validity than test performance that is "adjusted" for individual differences in age, sex, education, and other characteristics. In this way, test developers can benefit from what others have learned in order to maximize the clinical usefulness of instruments they translate from other languages or develop de novo for neuropsychological assessment in their own countries.

Correspondence: *Bernice A. Marcopulos, Ph.D., Psychiatry and Neurobehavioral Sciences, University of Virginia, Western State Hospital, Box 2500, Staunton, VA 24402-2500. E-mail: bamSr@virginia.edu*

#### **E. LOJEK & J. STANCZAK. Developing Connections between Qualitative and Quantitative Approaches in Neuropsychological Assessment.**

**Objective:** There is still a strong Lurian tradition of qualitative methods of neuropsychological assessment in many countries, including Poland. The important advantage of that approach is concentration on the possible mechanisms of disorders as well as the relationships between preserved and impaired neuropsychological functions in an individual patient. The methods of assessment in the qualitative approach are flexible, depend on client's needs and the professional experience of neuropsychologist. Flexibility, however, leads to the problems with validity and reliability of assessment, thus it is clear that quantitative and fixed diagnostic methods are also necessary. The purpose of this presentation is to show attempts to combine these two approaches in the process of adapting foreign neuropsychological tests into the Polish culture. Three ways of coping with that problem will be described: 1) showing potential, dormant features of adapted tests, 2) making small modifications, 3) applying new methods of data analysis. Discussing these points we will present our normative and clinical studies on strategy scores of the Ruff Figural Fluency Test, modified version of the Right Hemisphere Language Battery, the Polish adaptation of the California Verbal Learning Test and the application of the Item Response Theory for the analysis of collected neuropsychological data. The implications of using the combined qualitative/quantitative approach of assessment for understanding brain-behavior relationships will be discussed.

Correspondence: *Bernice A. Marcopulos, Ph.D., Psychiatry and Neurobehavioral Sciences, University of Virginia, Western State Hospital, Box 2500, Staunton, VA 24402-2500. E-mail: bamSr@virginia.edu*

## **Paper Session 1: Neurodevelopmental Issues**

**Moderator: Agnieszka Maryniak**

**8:30–10:00 a.m.**

#### **R. CSERJÉSI, K.V. BRAECKEL, P. BUTCHER, J. KERSTJENS, S.A. REIJNEVELD, A. BOUMA, R. GEUZE & A. BOS. Neuropsychological Outcome of Moderate Preterm Birth at the Age of 7 Years Old Children.**

**Objective:** Studies of long term neurodevelopmental outcome in children born early preterm (gestational age <32 weeks) without serious neurological complications have shown deficits in various neuropsychological domains. Little is known about the neurocognitive development of children born at 32-36 weeks gestational age (moderately preterm). Moderately preterm children experience fewer perinatal medical complications than children born early preterm. Until recently, their development was considered normal. However, there is growing evidence that the risk for adverse long term neurodevelopmental outcome is considerably higher in this group. The aim of our study was to compare cognitive, motor and behavioral outcomes in a group of children born moderately preterm (n=248) and a group of control children born full-term (n=127) at the age of 7 years.

**Participants and Methods:** Neuropsychological and motor tests were used to assess cognitive and motor functions. Parental questionnaires were employed to evaluate behavioral outcomes.

**Results:** Children born moderately preterm performed more poorly on measures of visuo-spatial ability and attention. Their parents reported significantly more problems in problem-solving flexibility, attention switching and behavior regulation. There were no differences on verbal intelligence, verbal memory and motor skill.

**Conclusions:** These findings, and the role of modifying variables such as gender and gestational age will be discussed. We will also discuss similarities and differences in the cognitive and motor functioning between children born moderately preterm and children born early preterm.

Correspondence: *Renáta Cserjési, University of Groningen, Grote Kruisstraat 2/1., Groningen 9712 TS, Netherlands. E-mail: rcserjesi@hotmail.com*

#### **L.J. WOODWARD, C.A. CLARK, V.E. PRITCHARD, P.J. ANDERSON & T.E. INDER. Neonatal White Matter Abnormalities Predict Global Executive Function Impairment in Children Born Very Preterm.**

**Objective:** Very preterm children are at high risk of global cognitive delay. However, little is known about the specific neurocognitive impairments associated with preterm birth or their neurological mechanisms. This paper describes the executive functioning profile of preschool children born very preterm, and examines relations between cerebral white matter abnormalities on term MRI and children's later executive risk.

**Participants and Methods:** The study sample consisted of a regionally representative cohort of 105 very preterm infants (<33 weeks gestation) born between Dec 1998-2000 and a comparison group of 107 full term infants. At term equivalent, all preterm infants underwent a structural MRI scan that was analyzed qualitatively for the presence and severity of cerebral white matter abnormalities (WMA), including cysts, signal abnormalities, loss of white matter volume, ventriculomegaly and corpus callosal thinning/myelination. At 4 years corrected age, very preterm and full term children were assessed on a battery of executive function measures that assessed planning ability (Tower of Hanoi), selective attention (Visual Search), inhibitory control (Shape School) and cognitive flexibility (Shape School, Flexible Item Selection Task).

**Results:** At age 4 years, very preterm children performed less well than full term children on measures of planning ability (p=.01), cognitive flexibility (p=.04), selective attention (p=.07) and inhibitory control (p=.01). However, these executive impairments were confined to preterm children with earlier mild and moderate-severe white matter abnormalities. Very preterm children without cerebral white matter abnormalities showed no cognitive impairments relative to their full term peers on these detailed neuropsychological measures (p>.20).

**Conclusions:** Findings highlight the importance of neonatal white matter abnormalities in placing preterm children at risk of both global and specific cognitive delay. Cerebral connectivity is important for later intact cognition in this high risk group.

Correspondence: *Lianne J. Woodward, PhD, Psychology, University of Canterbury, PB4800, Ilam, Christchurch 8140, New Zealand. E-mail: lianne.woodward@canterbury.ac.nz*

**M. LESNIAK, S. IWANSKI, J. SENIÓW & A. CZLONKOWSKA. Eye movement control and attentional processes in Wilson's disease.**

**Objective:** Wilson's disease (WD) is a rare genetic disorder of copper metabolism which causes damage to the central nervous system. Lesions are typically observed in basal ganglia (BG), thalamus, prefrontal cortex (PFC) and other structures of frontal-subcortical circuits (FSC) which are involved in control of motor, cognitive, emotional and behavioral functions. The relation of these distinct areas of human behavior is intensively studied.

The aim of the study was to investigate the effect of damage to FSC on oculomotor and attentional processes and their relations.

**Participants and Methods:** We assessed saccadic eye movements (prosaccades and antisaccades) using oculography and attention using ecological psychometric measures (The Test of Everyday Attention, TEA) in 18 WD patients with FSC pathology (revealed in MRI) and 15 healthy subjects. Neurological state was evaluated with Unified Wilson's Disease Rating Scale (UWDRS).

**Results:** While saccadic latencies were similar in WD and control groups (155 ms vs 143 ms), we found significant differences ( $p < 0.025$ ) in antisaccadic error rate (ER – percentage of wrongly directed saccades) in the two groups (45% vs 26%). Moreover, ER in WD group was strongly correlated with those TEA subtests that measure attentional switching ( $\rho = 0.76$ ), selective attention – both visual ( $\rho = 0.62$ ) and auditory ( $\rho = 0.79$ ) but was related neither to motor speed ( $\rho = 0.27$ , ns), nor UWDRS scores ( $\rho = 0.16$ , ns). In contrary, both pro- and antisaccadic latencies were correlated ( $\rho = 0.61$ ) with those subtests that load on speed factor. There also was a positive correlation between saccadic latency and UWDRS ( $\rho = 0.5$ ) meaning that the worse the neurological state is the more time is needed for initiation of movement.

**Conclusions:** The results suggest that simple visuo-motor processes may contribute to the more complex abilities (especially cognitive flexibility and selection) involved in attention. These processes seem to be controlled by the frontal-subcortical circuits affected in Wilson's disease. Correspondence: *Marcin Lesniak, 2nd Dept. of Neurology, Institute of Psychiatry and Neurology, 9 Sobieskiego Str., Warsaw 02-957, Poland. E-mail: lesniak@ipin.edu.pl*

**M. LEVAV & N. ROSENTHAL. Early developmental risk factors and neuropsychological function in preschool children with neurodevelopmental disabilities.**

**Objective:** Neurodevelopmental disabilities are often associated with selective cognitive deficits. Previous studies suggested significant difficulties in the visuo-spatial domain while language functions were found preserved. The objective of this study is to determine whether early developmental risk factors' etiology is a significant predictor of neuropsychological function in preschool age

**Participants and Methods:** 33 preschoolers (3;5 to 7;0 years, 16 males) with neurodevelopmental disabilities underwent neuropsychological assessments twice. Time between assessments ranged from 5 to 12 months. Time I measures: Leiter Brief IQ, Fluid Reasoning (FR) and a Hebrew Naming test. Time II: Brief IQ, Full IQ, Memory screen subtests from Leiter-R and Naming. Statistical comparisons were performed between TI and TII scores and between gestational age ( $GA < 37$  /  $GA \geq 37$  weeks) and birth weight ( $BW < 2.5$ kg /  $BW \geq 2.5$ kg).

**Results:** Brief IQ, Full IQ and FR scores were in the low average range on both assessments and stable over time. Significant difficulties were found in Memory and in Naming ( $M = 72(11)$   $Z < -1.5$ ). Significant differences between TI and II were found only in the Naming test ( $T(20) = -6.6$ ,  $p < .05$ ,  $ES = 0.85$ ). Differences between groups by GA and BW were found in FR and Brief IQ scores at Time II only. Performance of children with  $BW < 2.5$ kg was lower. No significant differences in outcome measures were found related with other etiologies.

**Conclusions:** Contrary to previous studies, children in the current sample showed significant difficulties in Naming and Memory, while IQ and FR scores were in the low average range. These results emphasize the importance of assessing a variety of cognitive functions in addition to IQ. Further research is needed.

Correspondence: *Miriam Levar, PhD, Ped Rehabilitation, Tel Hashomer Medical Center, Ramat Gan, Tel Aviv no zipcode, Israel. E-mail: mlevar@gmail.com*

**M.J. GAMBIN, M. WOZNIAC-PRUS & M. SWIECICKA. Response Inhibition in Children with Symptoms of Hyperactivity-Impulsivity and Inattention.**

**Objective:** The aim of the study was to investigate the relationship between response inhibition and symptoms of inattention and hyperactivity-impulsivity displayed in children at risk for ADHD.

**Participants and Methods:** The stop signal task was employed to investigate inhibitory control in 76 children with symptoms of inattention and/or hyperactivity-impulsivity and 48 normal control subjects. The Rating Scale for Teachers, constructed at the Warsaw University, which measures the intensity of hyperactivity-impulsivity and two aspects of inattention: withdrawal of attention and distractibility-fatigability, was completed for each child.

**Results:** Children at risk for ADHD were divided into three groups using cluster analysis (K-means method) based on the configuration and intensity of inattention and hyperactivity-impulsivity symptoms. One-way ANOVA revealed that response inhibition deficit is found in children with symptoms of inattention alone or both inattention and hyperactivity-impulsivity, but not in children with hyperactive-impulsive symptoms alone. Stepwise linear regression indicated that distractibility-fatigability is the best predictor of the stop signal reaction time.

**Conclusions:** Our results suggest that symptoms of inattention, rather than symptoms of hyperactivity-impulsivity, are associated with the response inhibition impairment.

Correspondence: *Malgorzata J. Gambin, M.Sc., Department of Psychology, University of Warsaw, ul. Stawki 5/7, Warsaw 00-183, Poland. E-mail: mal.gambin@gmail.com*

**Invited Address:  
Developmental to Child to Pediatric  
Neuropsychology: Evolution of Practice and Research**

**Speaker: George W. Hynd**

**10:30–11:30 a.m.**

**G. HYND. Developmental to Child to Pediatric Neuropsychology: Evolution of Practice and Research.**

The International Neuropsychological Society began as a small group of dedicated scholars from a variety of disciplines including neurology, psychology, neurosurgery, and speech-language pathology, among others. Much of the early focus addressed disturbed brain-behavior relations in disorders typically found in adults. However, over the past thirty years there has been increasingly greater focus on the neuropsychological basis of developmental disorders. Even more recently, it appears there may be an evolution of interest and research in a wider variety of pediatric neurological syndromes. This presentation will address whether this is an accurate conclusion and will posit reasons for an increased interest clinically in the scope of pediatric neuropsychology.

Correspondence: *George Hynd, Psychology, College of Charleston, Randolph Hall 210, 66 George Street, Charleston, SC 29424. E-mail: hyndg@cofc.edu*

**Invited Symposium:  
Luria and Konorski**

**Chair: Anna Grabowska**

**Presenters: Charles G. Gross, Bogdan Dreher, Tatiana Akhutina, Elkhonon Goldberg**

**11:45 a.m.–1:15 p.m.**

**E. GOLDBERG. Novelty, Ambiguity, and the Frontal Lobes.**

Continuing the work of his teacher is the most meaningful tribute a student can make. Alexandr Luria seeded my interest in the frontal



lobes, and this interest has persisted through most of my career. Unlike many traditional paradigms used in neuropsychology and cognitive neuroscience research, real-life situations are characterized by high degree of uncertainty and novelty. Evidence is growing that the prefrontal cortex and related structures are central to dealing with such situations. Prefrontal cortex is particularly important in “actor-centered” cognition, where decisions are based on organism’s preference in the absence of clearly defined “correct” choice. We have studied “actor-centered” cognition in normal subjects, as well as in diverse clinical populations. The emphasis on “actor-centered” cognition helped clarify several aspects of the functional organization of the frontal lobes, which eluded the more traditional “veridical” cognitive paradigms. The effects of frontal-lobe dysfunction were also apparent in “actor-centered” cognition even when they eluded the more traditional “veridical” cognitive paradigms. A new generation of cognitive probes based on the “actor-centered” principle may be necessary to more fully elucidate the function and dysfunction of the frontal lobes.

Correspondence: *Elkhonon Goldberg, Ph.D., ABPP-CN, NYU School of Medicine, 315 West 57th Street, Ste 401, New York, NY 10019. E-mail: egneurocog@aol.com*

#### **T.V. AKHUTINA. The Lurian Neuropsychology: Past, Present, Future.**

Alexander Luria is known as a founding father of neuropsychology. The 1st part of the talk will cover the theoretical foundations of neuropsychology, laid by Luria under the influence of his mentor and friend Lev Vygotsky. The principles of general psychology and future neuropsychology elaborated by Vygotsky and Luria include the principle of (1) social origins of higher mental functions and their cultural mediation, and the principles of (2) the system structure and (3) dynamic organization and localization of higher mental functions. We will demonstrate how important it is to observe the principles of system and dynamic structure of higher mental functions which are often ignored in contemporary neuropsychological research when interpreting data obtained. In the 2nd part of the talk, an example of the state of the art neurolinguistic investigation organized in line with Vygotsky’s and Luria’s ideas will be discussed. In accordance with Vygotsky’s understanding of the relation between thought and speech, we will present results of our experiments analyzing picture interpretation in patients with lesions of right or left hemisphere and in children with relative weaknesses of right/left hemisphere functions.

In the 3rd part of the talk, we will discuss the possibility of the individually tailored education based on neuropsychological methods of assessment and scaffolding that promote development of higher mental functions in children. In the contemporary Russian child neuropsychology, such methods are extensively constructed and developed.

Correspondence: *Tatiana V. Akhutina, PhD, Department of Psychology, Moscow State University, Mokhoraja 8–5, Moscow 103009, Russian Federation. E-mail: akhutina@rambler.ru*

#### **B. DREHER. Jerzy Konorski, one of the Great Integrative Neuroscientists of the 20th Century.**

Jerzy Konorski (1903-1973) has spent most of his life in Poland, probably the most turbulent part of not quite peaceful 20th century Europe. In 1928, Konorski and his friend and fellow medical student, Stefan Miller, described a new type of conditioned reflex, the Type II reflex (in contrast to Type I or ‘classical’ Pavlovian reflex).

In 1933 (after a stint in Pavlov’s laboratory in Leningrad) Konorski established laboratory of conditioned reflexes in the Nencki Institute of Experimental Biology in Warsaw. After the 4th partition of Poland (1939), Konorski and his neurophysiologist wife, Liliana Lubinska, found themselves in the part occupied by the Soviet Union and throughout the rest of the 2nd World War conducted neuroscientific research in Soviet Georgia.

In 1945, Konorski and Lubinska, together with two other academic couples, re-established Nencki Institute. In 1948, Konorski has published first of his English monographs. The monograph, ‘dedicated to IP Pavlov and CS Sherrington...’, contained extensive critical review of Pavlov’s theories and a clear set of ‘Cajalian-Sherringtonian’ - like hypotheses. Konorski suggested that during establishment of conditioned reflexes there must be plastic neuronal changes and these changes “would be related to the formation and multiplication of new synaptic junctions...”. (cf. Hebb 1949 for celebrated concept of ‘Hebbian synapses’). In 1967 Konorski published a second English monograph which consisted of brilliant psychoneurological analysis of behavior and cognition and contained formulation of remarkably creative ideas such as the concept of “gnostic units” or physiological mechanisms underlying hallucinations not associated with mental diseases.

Correspondence: *Bogdan Dreher, PhD, DSc, School of Medical Sciences & Bosch Institute, Sydney ‘Node’ of ARC Centre of Excellence in Vision Science, University of Sydney, Anderson Stuart Building, F13, Sydney, NSW NSW 2006, Australia. E-mail: bogdand@anatomy.usyd.edu.au*

#### **C.G. GROSS. Contributions of Jerzy Konorski to Neuroscience.**

Jerzy Konorski made many major strikingly original theoretical and experimental contributions to neuroscience. These include the first formulation of instrumental conditioning, the idea of simultaneous neuronal activation as the basis of neuronal plasticity and the concept of single neurons acting as higher order perceptual and cognitive units. However, many of his contributions and ideas became well known in Western science only after they had been subsequently independently discovered in the West.

Correspondence: *Charles G. Gross, PhD, Department of Psychology, Princeton University, Princeton, NJ. E-mail: cggross@Princeton.EDU*

### **THURSDAY AFTERNOON, JULY 1, 2010**

#### **Poster Session 1: Aging/Dementia/Memory/Stroke**

**12:45–2:00 p.m.**

#### **Dementia (Alzheimers)**

#### **G. VALLET, R. VERSACE & M. SIMARD. A Disconnection Syndrome in Alzheimer Disease: Arguments from Sensory-Dependant Memory Models.**

**Objective:** Memory and its disorders can be easily explained by connectionist memory models defining knowledge as sensory-dependant (Versace et al., 2009). Using this theoretical approach, memories emerge from the activation and integration of the different components of the memory trace. A cerebral disconnection may characterize Alzheimer’s Disease-AD (Delbeuck et al., 2003), which may interfere with a good activation or integration of patients’ memory trace.

Then, this study aims at testing the cross-modal activation in AD to assess the disconnection syndrome.

**Participants and Methods:** Eighteen Healthy Elderly (HE) and 18 AD patients categorized 60 well-known sounds and pictures (bimodal items) in the alive/not alive task. First, 40 sounds were heard, and a visual mask was applied for half of them. Then, the participants categorized 60 pictures: 1/3 was “old” (associated-sound heard before), 1/3 was “old-masked” (associated-sound heard with the visual mask) and 1/3 was “new” (no associated-sound heard before).

**Results:** The ANOVAs on the latencies showed an interaction between the group and kind of items in the test phase. The HE presented a significant difference between the old and new items -indicating the priming effect- and between the old and old-masked items, but showed no difference between the old-masked and new items. The mask in the study phase has therefore interfered with the automatic activation of the visual components associated with the prime, without any effect in the study phase. On the contrary, no effect was observed in the AD group.

**Conclusions:** The priming effect observed in the HE demonstrates that they have sensory-motor knowledge as do young people (Vallet et al., in press). The mask effect shows the perceptual nature of this priming. The AD patients didn't show any priming effect, whereas perceptual priming should be preserved (Fleischman et al., 2006). These results illustrate the disconnection syndrome in AD and support a sensory-dependent approach of memory.

Correspondence: *Guillaume Vallet, MPs, School of Psychology, Laval University, 2325 rue des Bibliothèques, Pavillon Félix-Antoine Savard, Québec City, QC G1V 0A6, Canada. E-mail: guillaume.vallet.1@ulaval.ca*

**M. ENNOK, K. EPLER & ÜLLA. LINNAMÄGI. Performance Characteristics of Alzheimer's Disease Patients on the Auditory Verbal Learning Test.**

**Objective:** In addition to lower scores in memory tests, the Alzheimer's disease (AD) patients show various distinctive qualitative features in their test performance. Previous studies have shown a strong recency effect in list learning but patients also make more intrusion errors and give more false positive answers in recognition. The aim of this study is to assess these qualitative features in the performance of AD patients in the Estonian version of Auditory Verbal Learning Test (AVLT).

**Participants and Methods:** The AVLT was administered to 24 mild to moderate AD patients (MMSE 24-18) and 19 demographically matched healthy controls (MMSE >26). AVLT includes two 15-item word lists (A presented for five learning trials and B for one learning trial) for immediate and delayed recall. Recognition trial includes words from both lists and 20 distractors with task to identify all of the words presented (from lists A and B and new words).

**Results:** AD patients had lower scores in all learning trials, their performance in the immediate and delayed recall of list A was very poor. There were no differences in the number of intrusion and contamination errors. Recognition was better in the control group. Control subjects had better recall in both list A and list B. AD patients made more false positive mistakes than controls in list A recognition but not in list B recognition. Both groups were good in recognizing new words but AD patients were liable to recognize presented words as new words.

**Conclusions:** AD patients showed a strong recency effect, they had very poor performance in learning and recognition trials. Patients had a conservative response strategy in recognition as they failed to recognize learned words from the lists and considered most words to be new words.

Correspondence: *Margus Ennok, MSc, Department of Neurology and Neurosurgery, University of Tartu, L. Puusepa 8, Tartu 51014, Estonia. E-mail: margus.ennok@ut.ee*

**A. MACÉ & N. CAZA. Effect of Response Modality in Immediate Serial Recall of Individuals with Dementia of Alzheimer Disease.**

**Objective:** Verbal span reduction is consistently observed in individuals with early dementia of the Alzheimer type (DAT). These patients also present with language processing deficits, including difficulty activating phonological representations from semantics (Astell & Harley, 1998). Recent evidence has linked the patients' span reduction to their language processing deficits (Caza & Belleville, 2008), supporting the psycholinguistic view of short-term memory (STM). Based on this account, performance should be affected by the nature of the STM task. In immediate serial recall (ISR), phonological representations must be activated for output when a verbal response is required contrary to picture pointing. The goal of this study was to explore the effect of response modality in ISR of DAT patients. We hypothesized that pointed recall could enhance the patients' performance relative to verbal recall because in the former response modality there is no need to access phonological representations from semantics.

**Participants and Methods:** Twenty individuals with DAT and 20 healthy controls completed a language battery (De Pratz et al., 2001) and ISR of the same word lists in two recall modalities (picture pointing, repetition).

**Results:** When only correct memory for items was considered, results showed better performance with pointed than with verbal recall in both groups. However, this advantage was smaller in patients than in controls, possibly due to their semantic deficits. When both item and order memory were considered, no difference was observed between response modalities in controls but patients were more impaired with pointed than verbal recall.

**Conclusions:** These results are discussed in light of current STM models.

Correspondence: *Anne-Laure Macé, master, Centre de recherche de l'Institut de gériatrie de Montréal, 4565 chemin Queen Mary, Montréal, QC H3W 1W4, Canada. E-mail: anne-laure.mace@umontreal.ca*

**S. THIVIERGE, M. SIMARD, G. VALLET & ÉRIC. GRANDMAISON. Preliminary Data of a 6-Month Block-Randomized Controlled Study on Cognitive Training of Instrumental Activities of Daily Living in Mild-to-Moderate Alzheimer's Disease.**

**Objective:** Previous studies on cognitive training (CT) in Alzheimer's disease (AD) were principally aimed at making patients learn items not related to functional needs. However, AD patients also experience difficulties with instrumental activities of daily living (IADL). Difficulties present in early AD are heterogeneous (Bier et al., 2006), and the literature suggests that the benefits obtained following a CT intervention do not transfer to untrained tasks (Davis et al., 2001). It is thus important to train relevant activities in each AD patient. Some authors had already reported some efficacy of learning methods in individualized CT programs for AD, but these efficacy data were based only on case studies (Thivierge et al., 2008). The goal of the present study is to assess the efficacy of a CT individualized program using the errorless learning (EL) and spaced retrieval (SR) techniques to re-learn forgotten IADL in mild-to-moderate AD using a block-randomized cross-over controlled study design.

**Participants and Methods:** We present the preliminary results of 10 participants having completed their participation in the first part of the study. After screening and baseline evaluations, the experimental participants received a CT to relearn how to realize IADLs. The experimental and control groups were then reassessed at post-treatment.

**Results:** The performance on the trained task of the experimental group showed a significant amelioration compared to the control group following 4 weeks of CT ( $t = 2.37$ ;  $p = 0.045$ ). There was also a trend of improvement 4 weeks post-treatment compared to baseline in the experimental group ( $t = 1.70$ ;  $p = 0.082$ ).

**Conclusions:** These preliminary data show promising results for the training of IADL in AD. The well-controlled methodology supports the validity and reliability of the results obtained.

Correspondence: *Stéphanie Thivierge, School of psychology, Laval University, 2325 rue des Bibliothèques, Québec, QC G1V0A6, Canada. E-mail: stephanie.thivierge.1@ulaval.ca*

**L. VAHTER, M. ENNOK, K. ROHULAID, T. SAARUP & K. GROSS-PAJU. Estonian version of the CERAD test battery – validation and preliminary normative data.**

**Objective:** Consortium to Establish a Registry for Alzheimer's Disease (CERAD) has developed brief but sensitive test battery to detect Alzheimer's disease (AD) as early as possible. The aim of the study is to adapt the CERAD test battery into Estonian language and provide optimal cut-off scores for subtests.

**Participants and Methods:** This is part of an ongoing normative study of CERAD test battery in Estonia. Preliminary sample includes 38 healthy elderly controls without complaints about memory problems and known neurological and psychiatric medical history (22 F, 16 M). Age M, SD, years (71.89, 7.53); education M, SD, years (12.78, 3.26); and 6 persons with confirmed diagnosis AD (4 F, 2 M); age M, SD, years (79.17, 6.43); education M, SD, years (12.50, 3.62). All subjects were tested with the Estonian version of CERAD test battery, in addition the Short Orientation-Memory-Concentration test was administered to the control group. The test results for both groups were compared with Mann-Whitney U test.

**Results:** According to the preliminary results healthy controls performed significantly better in all CERAD subtests except the constructional praxis. Demographic variables had only minor effect on test scores in control group. Age had an effect on Word list learning trial 1 and Word list recall and recognition %, sex had an effect on verbal fluency with women performing better. No significant effects of education on the CERAD test scores were detected.

**Conclusions:** CERAD test battery is sensitive tool when detecting early changes in testing subjects with cognitive complaints suggestive of AD. More data is needed to provide the normative data and optimal cut-off scores to differentiate the healthy persons from subjects with probable AD.

Correspondence: *Lüna Vahter, PhD, West-Tallinn Central Hospital, Paldiski rd 68, Tallinn 10617, Estonia. E-mail: lüna.vahter@keskhaigla.ee*

**E.J. GORZELANCZYK, K. PAGRETA, K. WŁODARCZYK, Z. RYTLEWSKI, A. WICHER, M. ZIOLKOWSKI & A. SEK. The pseudowords perception as a possible marker of brain damage in Alzheimer's disease and alcohol addicted patients.**

**Objective:** Pathological changes in the brain associated with Alzheimer's disease and in alcohol dependent subjects can be measured at neuropsychological and neurophysiological levels.

This study was undertaken to see if a pseudowords test can be marker of specific disorders (Alzheimer's disease or alcohol dependent patients).

**Participants and Methods:** In this study we compared results of pseudowords (meaningless words) speech intelligibility (expressiveness) of 12 subjects with Alzheimer's disease, 27 subjects with alcohol dependence and 24 healthy subjects. All patients have been tested with the same set of 150 pseudowords.

**Results:** Presented data revealed, that patients with Alzheimer's disease had statistically significant higher number of pseudowords reproduction errors than alcohol addicted and healthy subjects.

According to this data patients with Alzheimer's disease were statistically significantly more likely to give incorrect meaning to pseudowords than healthy subjects and alcohol dependent patients.

There were found differences between healthy subjects and alcohol dependent patients on perception of used pseudowords, but alcohol addicted patients weren't giving incorrect meaning to pseudowords.

**Conclusions:** Preliminary data suggest, that pseudowords intelligibility could be used as a marker of Alzheimer's disease.

Correspondence: *Edward J. Gorzelanczyk, dr hab., Laboratory of Neuropsychology and Psychophysiology, Institute of Psychology, Kazimierz Wielki University, Staffa 1, Bydgoszcz, 85-867, Poland. E-mail: medsystem@medsystem.com.pl*

**T. METS, A. ALBERT, P. DE DEYN, J. DE LEPELEIRE, A. IVANOIU, P. PALS, M. VANDEWOUDE, M. VENTURA & A. SEGHERS. Outcomes COGNOS Study. Care for People with Cognitive Dysfunction. A National Observational Study in Belgium.**

**Objective:** The COGNOS study aims at documenting the diagnostic, therapeutic and care management of patients diagnosed with Alzheimer's disease (AD) in specialized care setting. It focuses on the content and implementation of 'the care plan', which is requested for the reimbursement procedure for cholinesterase inhibitors (CI) in Belgium.

**Participants and Methods:** COGNOS is a study in community dwelling patients newly diagnosed with AD. Data collection for physicians consisted of the completion of an electronic CRF at baseline and one at the follow-up visit. Data collection for patients consisted of the completion of a paper questionnaire at baseline and at follow-up.

A total of 85 investigators enrolled 796 patients of whom 439 completed the questionnaire. Of 452 patients at the follow-up visit, 243 completed the second questionnaire.

**Results:** Age in geriatric care was higher than in neurological care. At follow-up, 13.7% of initially enrolled patients were institutionalized. The main reason for first consultation was cognitive problems in geriatric care (81.6%) as well as in neurological care (88.8%). However in geriatric care, functional (10.9%) and behavioral (31.6%) problems were twice as common as in neurological care. Eleven percent of patients presented with an MMSE score <14, 33.3% in the range of 15-20, 50.9% in 21-26 and 4.8% >26. Overall scores of cognitive tests remained the same at follow-up. The time period between first consultation and actual diagnosis of AD was 24 days (median). Seventy percent of patients received CI after AD diagnosis. Perception of life was significantly higher at follow-up. Help with ADL and professional help were judged significantly better at follow-up.

**Conclusions:** The COGNOS study demonstrates that measures taken by the governmental institution to provide reimbursement for specific medication (for example requesting a "specific and individualized care plan") can lead to better, holistic care of a patient.

Correspondence: *An-Katrien Seghers, Pfizer, Pleinlaan 17, Brussels 1000, Belgium. E-mail: An-Katrien.seghers@pfizer.com*

**P.E. SPAAN & B.A. SCHMAND. Episodic and Semantic Memory Impairments in Preclinical Alzheimer's Disease: Improving Sensitivity and Specificity of Assessment.**

**Objective:** We investigated the predictive value of various episodic and semantic memory tests in preclinical or early Alzheimer's Disease (AD). The main questions were which type of episodic memory tests differentiated best from normal ageing, and whether semantic memory tests significantly improved the differentiation. In addition, we examined whether these tests differed regarding sensitivity and specificity of classification.

**Participants and Methods:** 43 AD and 37 amnesic Mild Cognitive Impairment patients (of whom 21 had converted to AD at 1.3-year-follow-up; MMSE: M=24.8, SD=2.5), and 80 matched non-demented controls (MMSE: M=28.9, SD=1.0) were administered a broad computerized battery, reflecting episodic memory (free and cued recall; recognition), and semantic memory (fluency; naming accuracy and naming latencies). Tests were constructed to measure specific memory components as purely as possible by minimizing the impact of short-term memory or executive control processes.

**Results:** Stepwise logistic regression analyses showed that a paired-associate recognition test (requiring efficient semantic encoding of word pairs to reject semantically related foils) and a 10-word list-learning test (involving free recall of semantically unrelated words) were, respectively, most specific (96%) and most sensitive (91%) to AD development. Prediction was improved by a paired-associate learning test requiring cued recall of semantically related words and a subordinate semantic fluency test (AUC=.99,  $d^2=3.3$ ).

**Conclusions:** A combination of episodic and semantic memory components best predicts AD. The incorporation of intermediately semantically associated words in a paired-associate learning paradigm seems crucial for sufficient sensitivity. The search for memory measures that best predict AD benefits from joining knowledge from clinical neuropsychological practice and experimental memory techniques.

Correspondence: *Pauline E. Spaan, PhD, Psychonomics/Clinical Neuropsychology, University of Amsterdam, Roetersstraat 15, Amsterdam 1018 WB, Netherlands. E-mail: P.E.J.Spaan@uva.nl*

**M. ALEGRET, G. CUBERAS, I. ROCA, M. BOADA, G. VINYES-JUNQUE, A. ESPINOSA, S. VALERO, I. HERNANDEZ, P. MARTINEZ-LAGE, M. ROSENDE-ROCA, A. MAULEON & L. TARRAGA. Brain SPECT quantification and visuo-perceptual test in the detection of mild cognitive impairment and mild Alzheimer's disease.**

**Objective:** To describe the brain SPECT disturbances in patients with mild Alzheimer's disease (AD) and mild cognitive impairment (MCI) compared to a normal database using the NeuroGam quantification software; and to study the relationship between visuo-perceptual deficits, as measured by the 15-Objects Test (15-OT), and brain SPECT abnormalities.

**Participants and Methods:** Forty-two mild AD patients, 42 MCI subjects and 42 healthy elderly controls underwent a 99mTc-ethyl SPECT and were administered the 15-OT. They also received a comprehensive neurobehavioral evaluation as part of their diagnostic work-up. NeuroGam software was used to quantify the brain perfusion abnormalities. Brodmann areas were regrouped in right and left frontal, temporal, parietal and occipital lobes.

**Results:** 15-OT performance was progressively lower from EC to MCI and AD patients. NeuroGam SPECT analyses found impaired perfusion in 19% of controls, 35.7% MCI and 47.6% AD in the frontal lobe; 9.5% controls, 26.2% MCI and 49.5% AD in the temporal lobe; 14.3% controls, 47.6% MCI and 57.1% AD in the parietal lobe; and 4.8% controls, 14.3% MCI and 29.6% AD in the occipital lobe. Performance on the 15-OT significantly correlated ( $p \leq 0.01$ ) with perfusion in right temporal, parietal and occipital lobes.

**Conclusions:** The MCI and AD patients showed hypoperfusion mainly in temporal and parietal lobes, and their performance on the 15-OT was impaired. Moreover, the 15-OT was found related to right temporal-parietal-occipital hypoperfusion. This study supports the finding that the SPECT quantification and the 15-OT, when added in the clinical practice, may be a useful tool to detect AD in its so-called pre-dementia MCI stages.

Correspondence: *Montse Alegret, PhD, FUNDACIO ACE, Marques de Sentmenat, 35-37, Barcelona 08014, Spain. E-mail: malegret@fundacioace.com*

### B. ROMERO. The Impact of a Short-Term Multicomponent Residential Treatment Programme on Depression and Quality of Life in Persons with Dementia.

**Objective:** To support long-term well-being of people with dementia intervention programme for patients and family caregivers is needed. We tested the hypothesis that a short-term residential treatment programme would benefit depression and quality of life of people with dementia.

**Participants and Methods:** An ongoing controlled trial with post-treatment 3 months follow up design recruited 160 people with dementia. The outcome measures are change in depression and quality of life. The multicomponent programme was designed to prepare patients with dementia and caregivers for life with a progressive disease. The programme include: (1) medical treatment and intensive rehabilitation for patients, based on the concept of Geriatric Maintenance Therapy, and (2) an intervention programme for caregivers.

**Results:** Results of the ongoing study can be shown in Mai 2010. We predicted that at follow up the intervention group had significantly improved relative to the control group on Geriatric Depression Scale (GDS), and on Quality of Life scale (EQ-5D: patient self-rating and proxy-rating of patient; QOL-AD).

**Conclusions:** The long-term improvement of depression and quality of life can be seen as beneficial for patients. Quality of life is used to characterize the impact of diseases but the construct and/or particular measures are also discussed as useless in dementia research.

The study was funded by the Federal ministry of health (BMG-LTDe-menz\_04\_61).

Correspondence: *Barbara Romero, Alzheimer Therapiezentrum, Neurologische Klinik Bad Aibling, Kolbermoorerstr. 72, Bad Aibling 83043, Germany. E-mail: romero@t-online.de*

### Dementia (Subcortical, Specific Disorders, MCI, etc.)

#### E.J. SITEK, W. SOLTAN, D. WIECZOREK, M. SCHINWELSKI, P. ROBOWSKI, K. GUZINSKA, W. KRYSKA & J. SLAWEK. Neuropsychological Assessment of the Self-awareness of Symptoms in Huntington's Disease (HD), Parkinson's Disease (PD) and Cervical Dystonia (CD).

**Objective:** The study aimed at assessing self-awareness of motor, cognitive, executive and daily disability in HD, PD and in CD and its correlates (cognitive control, memory, mood, premorbid coping strategies, proprioception). Self-awareness was assessed by comparing patient's and caregiver's ratings and by correlating them with objective results.

**Participants and Methods:** Eighty-nine patients scoring at least 20 in Mini-Mental State Examination (MMSE) participated in the study (23 with HD, 25 PD with dyskinesias-PDdys, 21 PD without dyskinesias-PDndys patients and 20 with CD).

Neurological examination comprised of Unified Huntington's Disease Rating Scale (UHDRS) for HD, Unified Parkinson's Disease Rating Scale (UPDRS) part II-IV for PD and Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS) for CD. Questionnaires filled in by the patient and his/her caregiver included: Memory Self-Rating Scale, Dysexecutive Questionnaire, Self-Assessment Parkinson's Disease Disability Scale, scale based on a series of 15 films demonstrating different motor symptoms (5 UHDRS, 5 UPDRS and 5 from TWSTRS). Neuropsychological assessment comprised of MMSE, verbal learning, cognitive control, mood and proprioception trials. Premorbid coping strategies were measured by a caregiver- modification of Ways of Coping Questionnaire.

**Results:** HD patients overestimated their dysfunctions. PDdys patients both underestimated and overestimated certain aspects of motor symptoms and dysfunction in daily activities. PDndys and CD patients demonstrated better self-awareness of symptoms. Cognitive control impairment, premorbid avoidance coping, strategies and duration of the disease were related to the deficient self-awareness.

**Conclusions:** Deficits in the self-awareness of symptoms are more generalised in HD than in PD, regardless of the cognitive status.

Correspondence: *Emilia J. Sitek, MA, Neurology; St. Adalbert Hospital, Al. Jana Pawla II 50, Gdansk 80-462, Poland. E-mail: emsitek@gmail.com*

#### A. SUAREZ GONZALEZ, E. GIL NECIGA, E. FRANCO MACIAS & E. ARROYO ANLLO. Types, Characteristics and Moment of Occurrence of Visual Hallucinations in Lewy Bodie's Disease.

**Objective:** Visual hallucinations (VH) are a core feature in Lewy bodie disease's (LBD) clinical diagnosis. Their frequency and early occurrence in the course of the illness are extensively reported. However there is a lack of research in the analysis of different aspects relating to this issue. As well as research into comparing VH in LBD and AD.

Differences between VH types, their characteristics or moment of occurrence can contribute to improving the accuracy and early detection of clinical diagnosis.

The objective is to assess the types, characteristics and moment of occurrence of VH in a LBD and comparison with an AD group.

**Participants and Methods:** Prospective and descriptive research. 83 patients with probable LBD (McKeith et al., 2005) and 82 with probable AD (NINCDS-ADRDA, McKhann et al., 1984) were selected. NPI was used to obtain patient's assessment concerning the presence of VH and a test of our own for the specific domains.

**Results:** LBD suffered significantly more VH than AD. No differences were found in level of insight, type of VH or moment of occurrence. Patients with LBD presented illusions more common than AD.

**Conclusions:** Type of image visualized, level of distress, level of insight or moment of occurrence are not useful to distinguish VH between LBD and AD. Neither illusion's presence.

Correspondence: *Aida Suarez Gonzalez, PhD, Neurology; Hospital Virgen del Rocío, Avda. Manuel Siurot, s/n, Seville 41013, Spain. E-mail: asuago@hotmail.com*

#### A. SUAREZ GONZALEZ, E. GIL NECIGA & E. FRANCO MACIAS. Posterior Cortical Atrophy as Onset of Presentation of Lewy Bodie's Disease.

**Objective:** Posterior cortical atrophy (PCA) is a common form of presentation of Alzheimer's disease (AD), and it is characterized by predominant impairment of visuo-perceptual and visuo-spatial abilities with a pattern of posterior bilateral atrophy. Although visual hallucinations (VH) are not common in AD, they have been reported to occur in up to 25% of PCA patients. As reported recently, these VH are often associated with parkinsonism. Both parkinsonism and VH are core features of Lewy bodies disease's (LBD) diagnosis.

The objective is to describe clinical features of a patient meeting criteria for PCA later evolved into LBD.

**Participants and Methods:** We report a 74 year old man who had memory complaints, spatial disorientation and apraxia and was diagnosed as PCA (Tang-Wai et al., 2004). Four years later he developed VH.

**Results:** A new neuropsychological assessment showed a large decline on visuo-spatial and visuo-perceptual abilities. New neurological examination showed clear parkinsonism. On MR studies, bilateral atrophy mainly involving parietal and occipital cortex was found. SPECT FP-CIT (DAT-scan) revealed low uptake of the right striatum. A reduction in cardiac innervation was seen on cardiac scintigraphy with I-131 MIBG. The patient satisfied criteria for probable LBD (McKeith et al., 2005)

**Conclusions:** There are clinical differences between patients who meet criteria for CPA with VH and those who do not have VH. CPA as an onset of LBD's presentation is not typical and poorly studied. A better understanding of the disease clinical features could help to improve the diagnosis accuracy of the disease.

Correspondence: *Aida Suarez Gonzalez, PhD, Neurology; Hospital Virgen del Rocío, Avda. Manuel Siurot, s/n, Seville 41013, Spain. E-mail: asuago@hotmail.com*

#### A. MIDORIKAWA & M. KAWAMURA. The diagnosis of frontotemporal lobar degeneration (FTLD) may include patients with autism spectrum disorders (ASD).

**Objective:** Recent studies have shown that the remediation of maladaptive behaviours in a person with pervasive developmental disorder (PDD) or autism spectrum disorder (ASD) is necessary not only in childhood, but also in adulthood. These observations imply that such developmental disorders are life-long problems. However, few studies have examined elderly people with these diagnoses. On another front, the

maladaptive behaviours of senile persons are considered to be the result of frontotemporal lobar degeneration (FTLD). In this study, we present three elderly persons who developed maladaptive behaviours in old age, and we examined the possibilities of FTLD and senile PDD/ASD.

**Participants and Methods:** Case 1 was a 76-year-old man who had worked as an office worker for over 40 years after graduating from college. When he was 70 years old, he developed obsessive-compulsive disorder and memory problems. Case 2 was a 83-year-old woman who had been a homemaker since graduating from high school. When she was 80 years old, she developed maladaptive behaviour such as chasing after her favourite medical doctor. Case 3 was a 72-year-old man who owned a medium-sized company. When he was 70 years old, he showed excessive maniac behaviour that involved collecting paper. We evaluated these subjects using the diagnostic criteria for FTLD and administered the Autistic-Spectrum Quotient (AQ), Japanese version (Wakabayashi et al., 2004) to their caregivers retrospectively.

**Results:** The patients met the criteria of FTLD and all patients had higher AQ score than normal controls.

**Conclusions:** It is possible that senile persons who show FTLD-like maladaptive behaviour include people with PDD/ASD.

Correspondence: Akira Midorikawa, Ph.D., Department of Psychology, Chuo University, 742-1, Higashi-nakano, Hachioji, Tokyo 192-0393, Japan. E-mail: green@tamacc.chuo-u.ac.jp

**M. GUGALA-IWANIUK, E. LOJEK, W. LIPCZYNSKA-LOJKOWSKA, A. BOCHYNSKA, B. SAWICKA, H. SIENKIEWICZ-JAROSZ & D. RYGLEWICZ. Episodic and Semantic Memory Decline and Executive Dysfunctions as Predictors of Mild Cognitive Impairment's Conversion into Dementia.**

**Objective:** Mild Cognitive Impairment (MCI) is a transitional state between normal cognitive aging and dementia and it's a risk factor of dementia. In objective neuropsychological assessment patients present deficits of memory and some other cognitive domains (e.g. attention, executive functions). The aim of the following study was to characterize cognitive functions of patients with MCI and to examine which neuropsychological features are the best predictors of dementia.

**Participants and Methods:** 50 patients with MCI and 33 control healthy subjects took part in the study. Wide range of cognitive abilities were examined using the battery of neuropsychological tests including: The California Verbal Learning Test, The Trial Making Test, The Ruff Figural Fluency Test, The Verbal Concept Attainment Test, The Controlled Oral Word Association Test and The Boston Naming Test. The assessment was made twice, in time of approximately 24 months.

**Results:** Results confirmed hypothesis of lower level of functioning of patients with MCI comparing to control group in majority of cognitive dimensions. After two years there was a significant progression of neuropsychological deficits in MCI group. The best predictors of progress of the disease were short-term and long-term episodic memory, verbal fluency and executive aspects of memory processes, e.g. the number of intrusions in stage of recalling information. The California Verbal Learning Test and The Controlled Oral Word Association Test were the best methods in predicting MCI's conversion into dementia.

**Conclusions:** Our findings suggest that executive dysfunctions, as much as semantic and episodic memory deficits are the early predictors of dementia.

Correspondence: Magdalena Gugala-Iwaniuk, 1st Neurological Department, The Institute of Psychiatry and Neurology, Sobieskiego 9, Warsaw 02-957, Poland. E-mail: mgugala@ipin.edu.pl

**E. MATTEAU, N. DUPRE, M. LANGLOIS & M. SIMARD. Could Mattis Dementia Rating Scale Detect Patients with Mild Cognitive Impairment in Idiopathic Parkinson's Disease?: Preliminary Results of a Cross-Sectional Study.**

**Objective:** This study aimed at determining the utility of the Mattis Dementia Rating Scale (MDRS-2) to differentiate between healthy controls (HC), patients with Parkinson's disease and Mild Cognitive Impairment (PD-MCI) and patients with PD and dementia (PD-D).

**Participants and Methods:** Twenty-four healthy controls (HC), 16 PD-MCI and 14 PD-D underwent comprehensive neuropsychological

evaluations. MCI had to present a deficit on at least 1/5 cognitive domains and no functional impairment. PD-D met the criteria of the Movement Disorder Society Task Force (2007). Age- and education-corrected scaled scores (MDRS-2 Total) and age-corrected scaled scores (each MDRS-2 subscale) were compared between groups.

**Results:** Non-memory-single domain was the most prevalent PD-MCI subtype. Age differed significantly between HC and PD-D patients (HC= 64.7 ± 6.3; PD-D= 72.9 ± 10.1). A MANOVA showed that the three groups differed significantly on MDRS-2 Total and on the MDRS-2 subscales. PD-D performed significantly worse than the other groups on all subtests (all post hoc= p<.05). PD-MCI scored significantly lower than HC on the MDRS-2 Total (HC= 11.5 ± 1.6; PD-MCI= 9.0 ± 2.1; p=.003), Initiation/Perseveration (HC= 10.3 ± 1.3; PD-MCI= 8.9 ± 2.0; p=.044) and Memory subscales (HC= 11.8 ± 1.8; PD-MCI= 9.8 ± 2.8; p=.025). A ROC curve analysis assessed the accuracy of the MDRS-2 to detect MCI in PD. Keeping the sensitivity / specificity optimal, the best cutoff was established at 138/144 (sensitivity= 69%, specificity = 80%, LR= 3.82).

**Conclusions:** These findings suggest that MDRS-2 is useful to identify PD patients with MCI and dementia.

Correspondence: Evelyne Matteau, M.Ps., Laval University, 2325 rue des Bibliothèques, local 1116, Quebec, QC G1V 0A6, Canada. E-mail: evelyne.matteau.1@ulaval.ca

**S. KAUR, C. DONG, S. COLLINSON & C. CHEN. Semantic Dementia in Singapore: Two case studies.**

**Objective:** There is little understanding about the presentation of frontotemporal dementia in Asia. We thus present two cases of semantic dementia from Singapore.

**Participants and Methods:** Participants were assessed at baseline and six months. Neuropsychological assessment included a battery previously validated for use in Singapore, PALPA spoken word/picture matching, picture sorting, a locally developed version of the Famous Faces test, the NPI and FBI. Patients also had baseline MR imaging.

**Results:** Both patients presented with impaired semantic functioning. T.B.N presented with significant appetite change, disinhibition and aberrant motor behavior. At 6 months, she was completely mute. O.H.A was euphoric and disinhibited at 6 months. Both patients had marked left temporal atrophy.

**Conclusions:** We conclude that distinctions between subtypes of frontotemporal dementia in Singapore are indistinct.

Correspondence: Sonya Kaur, BA (Hons), National University Health System, 5 Lower Kent Ridge Road, Singapore 119074, Singapore. E-mail: sonya.kaur21@gmail.com

**M. GUSTAVSSON, B. JOHANSSON & A. WALLIN. Mild Cognitive Impairment and Reading in Everyday Life: Exploration of Experienced Difficulties and Associations with Neuropsychological performance.**

**Objective:** Mild cognitive impairment (MCI) is a potential transitional state between cognitive health and dementia. MCI may interfere with complex but not basic activities of daily living. However, many complex everyday activities are important to retain high quality of life. In this study we focused on reading and problems related to reading among persons identified with MCI.

**Participants and Methods:** 148 MCI cases (men: 44%, M age 65.5±7.9) at an outpatient Memory Clinic and 50 healthy controls (men: 38%, M age 69.6 ±7.4) completed a questionnaire about cognitive functioning and everyday activities – 5 items were about reading. A subgroup (N=64; men: 44%, M age 65.4 ±7.6) of the cases was tested with a battery of 20 neuropsychological tests.

**Results:** MCI cases reported more difficulties in “remembering what they had read” (p=.000); “concentrating while reading” (p=.003); and “getting into the story of a book” (p=.002). There was a non-significant tendency for reporting lower frequency of reading (p=.057). The MCI cases did not experience words or letters “floating together” more than controls. Difficulties remembering what they had read was related to lower performance in Rey Figure recall I, II, and TMT B. Problems in concentration was related to higher performance in RAVLT recall II and Rey Figure Copy. Difficulties getting into the story was related to lower performance in a phrase repetition test.

**Conclusions:** MCI patients read as frequently as healthy controls, but experience more difficulties. Associations between problems related to reading and neuropsychological test performance were in this study inconsistent, and limited to a few tests.

Correspondence: *Marie Gustavsson, Clinical psychologist, Inst of neuroscience and physiology, Wallingsgatan 6, plan 4b, Mölndal 43141, Sweden. E-mail: marie.gustavsson@neuro.gu.se*

#### M. GUSTAVSSON & A. WALLIN. What Characterizes Patients with Cognitive Complaints but Unimpaired Neuropsychological Test Performance?

**Objective:** Our aim was to explore what characterizes patients seeking medical care for self-experienced cognitive decline but having no impairment in neuropsychological tests. Our hypothesis was that these patients would have a higher level of education and/or more affective symptoms. Tests may fail in confirming cognitive decline in the case of high premorbid function. Subjective cognitive impairment was in some studies associated with affective symptoms.

**Participants and Methods:** 494 patients (44% men; M(age)=64.3±7.8) seeking help at an outpatient memory clinic and 81 healthy controls (40% men; M(age)=65.2±6.3) were examined with a neuropsychological test battery consisting of 20 tests reflecting various cognitive domains. Patients also underwent neurological and psychiatric investigations and determination of cerebrospinal fluid markers reflecting neurodegeneration.

**Results:** Thirty-five of the patients (34% men; M(age)=64.8±8.5) had unimpaired test results (cutoff: T value 40). They had more education years (13.6±3.7) than impaired patients (11.5±3.6;  $p=.002$ ). However, they did not have more affective symptoms, and age and sex distribution was similar in the groups. Unimpaired patients had different levels of total-tau (unimp:311.7ng/L±142.7; imp:456.3ng/L ±307.9;  $p<.000$ ) and amyloid beta 42 (unimp:668.8ng/L ±170.5; imp:582.1ng/L ±222.5;  $p=.007$ ) than impaired patients, but did not differ from controls (t-tau:340.7ng/L ±157.4; a-beta:721.8ng/L ±238.5).

**Conclusions:** Unimpaired patients being more educated suggests that persons with high premorbid function may notice cognitive decline prior to outcome in objective markers. However, less signs of neuropathology suggest that self-reported cognitive decline may be caused by factors other than objective cognitive decline. Longitudinal studies are required to elucidate the clinical outcome of subjective cognitive impairment.

Correspondence: *Marie Gustavsson, Clinical psychologist, Inst of neuroscience and physiology, Wallingsgatan 6, plan 4b, Mölndal 43141, Sweden. E-mail: marie.gustavsson@neuro.gu.se*

#### A. ESPINOSA, P. MARTINEZ-LAGE, M. BOADA, M. ALEGRET, S. VALERO, G. VINYES-JUNQUE, I. HERNANDEZ, M. ROSENDE-ROCA, A. MAULEON & L. TARRAGA. Cognitive predictors of conversion to dementia in a large sample of patients with amnesic mild Cognitive Impairment.

**Objective:** To examine the hypothesis that storage deficits as opposed to retrieval patterns identify patients with amnesic mild cognitive impairment (MCI) at risk of dementia; and to detect specific cognitive predictors of conversion to dementia.

**Participants and Methods:** From January 2006 to December 2008, 230 probable amnesic MCI patients received a comprehensive neuropsychological battery including: temporal orientation, forwards and backwards digit span (WAIS-III), Word List Learning (WMS-III), 15-item Boston Naming test, Poppelreuter, complete praxis Automatic Inhibition (SKT), Similarities (WAIS-III), phonetic and semantic verbal fluency and Clock test. All patients had at least one follow-up visit.

**Results:** After a mean follow-up of 14.22 months 41.7% of patients developed dementia, including 59.4% of patients with storage deficits and 40.6% of patients with retrieval deficits. At baseline, patients who converted to dementia showed statistically significant poorer performances than non converters on all the cognitive tests described above, except for the Forwards Span Digit Span and the SKT. The Logistic Regression Analysis (including the neuropsychological tests) showed that the verbal retention and recognition on the WMS-III, similarities of WAIS-III and temporal orientation ( $\chi^2=64.7$ ;  $p<.0005$ ) were related to conversion to dementia.

**Conclusions:** Memory loss due to a storage deficit with impairments in other cognitive areas may characterize MCI patients at the highest risk of dementia. However, retrieval deficits should not be overlooked. Although patients that converted to dementia showed a global cognitive impairment, only episodic memory and reasoning predicted conversion to dementia.

Correspondence: *Ana Espinosa, Fundació ACE, C/Marques de Sentmenat, 35-37, Barcelona 08014, Spain. E-mail: aespinosa@fundacioace.com*

#### M. GÖTHLIN, M. GUSTAVSSON, A. NORDLUND & A. WALLIN. Poorer Results on Speed and Attention Tests are Associated with Less Participation in Leisure Activities in Patients with MCI.

**Objective:** It has been suggested that an active lifestyle might protect against mild cognitive impairment (MCI) and dementia. In this study we investigated whether engagement in physical and social activities differed between healthy controls and MCI patients, and whether the levels of activities were associated with the results on neuropsychological tests of various cognitive domains.

**Participants and Methods:** 148 consecutive MCI cases (M/F 65/83, age 65.5 ± 7.9) at an outpatient memory clinic and 50 healthy controls (M/F 19/31, age 69.6 ± 7.4) were examined with a questionnaire on cognitive functions and activities. Five of the questions dealt with physical and social activities. A subgroup of the MCI patients (N=62, M/F 27/35, age 65.4 ± 7.6) was tested with a cognitive test battery consisting of 20 tests.

**Results:** MCI patients reported having spent time with friends ( $p=.009$ ), having attended a movie, theater, sporting event or similar ( $p=.016$ ), walking for at least 15 minutes at a time ( $p=.016$ ), and engaging in any leisure activity ( $p=.009$ ) less often during the past month than controls.

Engaging more often in any leisure activity was associated with higher performance on TMT A and B ( $p=.035$ ,  $p=.029$ ). No other significant associations were found.

**Conclusions:** Patients lived a less active life than controls. If this is a result of or a contributing factor to their cognitive difficulties remains unclear. No significant associations were found between measures of activity and specific cognitive domains except for tests of speed/attention. MCI patients with speed/attention deficits may be less inclined to engage in leisure activities.

Correspondence: *Mattias Göthlin, Institute of Neuroscience and Physiology, University of Gothenburg, Wallingsgatan 6, Mölndal 43131, Sweden. E-mail: mattias.gothlin@neuro.gu.se*

#### I. RICO PONS, M. JUNCADELLA, N. BUSQUETS, V. VIÑAS, L. MORENO & R. RENÉ. Five Case Reports of Posterior Cortical Atrophy.

**Objective:** To describe the neuropsychological profiles of 5 cases diagnosed of PCA.

**Participants and Methods:** Patients were recruited from The Unit of Dementia Diagnostic and Treatment in the University Hospital of Bellvitge. The PCA subjects were defined by the presence of visuo-perceptive or visuo-spatial deficits as their most prominent and severely affected cognitive domain at neuropsychological assessment.

**Results:** All PCA subjects reported an insidious onset of symptoms with deficits that included frequently apperceptive agnosia, and visuo-spatial impairment that compromised constructive abilities. The majority of patients also presented gestural and ideomotor praxis deficits, presence of alexia and agraphia, with preservation of language domain and less involvement of memory and executive functions. One subject presented a Gerstmann syndrome profile with alexia, agraphia and acalculia, left-right confusion, and imaginability visual deficit, especially with numbers. Cerebral perfusion spectra showed more frequently a parietotemporal hypoperfusion at the right cerebral hemisphere preferentially, and a more discrete left-side temporoparietal hypoperfusion. One subject showed an occipitoparietal hypoperfusion in PET images.

**Conclusions:** Two subjects showed visuo-perceptive and visuo-spatial deficits that would involve ventral and dorsal visual pathways evidencing a greater degree of pathology, and two patients developed a greater visuo-perceptive impairment that would involve more prominently dorsal pathway (occipitotemporal), while the last subject presented common deficits to Gerstmann syndrome suggesting a greater parietal lobe damage.

Correspondence: *Imma Rico Pons, Graduate, Neurology, Idibell Foundation, Feixa LLarga s/n, Hospitalet de Llobregat 08907, Spain. E-mail: immaripo@gmail.com*

**I. RICO PONS, M. FONT, A. CARVAJAL, J. MORA, M. JUNCADELLA & J. KRUPINSKI. Changes in brain spect and verbal learning in patients undergoing carotid endarterectomy.**

**Objective:** Carotid endarterectomy (CEA) has proved to be effective in prevention of stroke. The benefits in cognitive function are not well known and continue to generate controversy. CEA could improve cognition by the improvement of regional cerebral blood flow (rCBF). The objective of this study is to examine brain perfusion changes and cognition after the intervention.

**Participants and Methods:** We performed a cerebral 99m Tc-HMPAO SPECT and neuropsychological assessment in asymptomatic patients prior to CEA and 3 to 6 months later. Patients with recent stroke, postoperative complications or a score <24 on Mini-Mental State Examination were excluded. A voxel-by-voxel analysis was performed using SPM5 on paired SPECT images. The SPM maps were obtained using a cluster and voxel level threshold of  $p < 0.05$  corrected by FDR. ROI analyses were applied in cerebral lobes and subcortical structures regions using WFU-Pickatlas toolbox software for SPM version. The effects of CEA on cognitive function were analysed using a Paired sample T-test.

**Results:** The sample was composed by 34 patients. Statistically significant rCBF differences were found applying ROI analyses in ipsilateral subcortical areas that showed increased rCBF in caudate, pallidus, putamen, hippocampus, parahippocampal gyrus and thalamus regions only in patients undergoing CEA for left-sided carotid stenosis ( $p < 0.05$ ). There was a significant decline in one measure of RAVLT called proactive interference and two tendencies in delayed and total verbal learning in patients undergoing left CEA.

**Conclusions:** Despite an improvement in rCBF in subcortical structures in our serie, there is a significant discrete decline in verbal learning after CEA. Other mechanisms of failed brain autoregulation undetected by SPECT may explain worse cognitive performance in the group of asymptomatic patients.

Correspondence: *Imma Rico Pons, Graduate, Neurology, Idibell Foundation, Feixa LLarga s/n, Hospitalet de Llobregat 08907, Spain. E-mail: immaripo@gmail.com*

**C. ECKERSTRÖM, S. ROLSTAD, E. OLSSON, H. MALMGREN, ÅKE. EDMAN & A. WALLIN. Left but not right hippocampal volume is associated with neuropsychological test performance in MCI.**

**Objective:** The term mild cognitive impairment (MCI) describes a state where the cognitive functions are more impaired than what would be expected from aging alone, but not so impaired as to fulfill the criteria for dementia. The hippocampus is vital for a number of cognitive functions, including the formation of memories. Hippocampal atrophy is often seen in MCI and dementia. The aim of this study was to examine association between hippocampal volume and performance on a comprehensive battery of neuropsychological tests in MCI patients.

**Participants and Methods:** The Gothenburg MCI study is a clinically based longitudinal study with biannual clinical assessments. The participants in this substudy ( $N=42$ ) were patients with MCI at baseline and converting to dementia at the two-year follow-up ( $N=21$ ) and stable MCI patients ( $N=21$ ) from the Gothenburg MCI study. Hippocampal volumetry was performed manually, based on data from the 0.5 T MRI investigations at baseline. Patients were examined with 15 neuropsychological tests in the cognitive domains speed/attention, memory and learning, visuospatial function, language, and executive function.

**Results:** Right hippocampal volume only correlated with one test ( $p = .03$ ), whereas left hippocampal volume correlated with 6 tests ( $p$ -value range = .001 - .03), most notably in the memory and visuospatial domains. Age and years of education did not correlate with either left or right hippocampal volume.

**Conclusions:** Left hippocampal volume is associated with memory and visuospatial performance in MCI.

Correspondence: *Carl Eckerström, Inst of neuroscience and physiology, Wallingsgatan 6, plan 4b, Mölndal 431 41, Sweden. E-mail: carl.eckerstrom@neuro.gu.se*

**J. MIRALBELL, J. SORIANO, E. LÓPEZ-CANCIO, J. ARENILLAS, M. BARRIOS, C. CYNTHIA, M. ALZAMORA, G. PERA, P. TORÁN, A. DÁVALOS & M. MATARÓ. Prevalence of MCI Neuropsychological Profile in a Healthy Population-based Sample Aged 50-65 Years.**

**Objective:** Clinical subtypes of Mild Cognitive Impairment (MCI) may be associated with different patterns of anatomical dysfunction and different neuropathologic features. While amnesic MCI (a-MCI) may have a degenerative etiology, non-amnesic MCI (na-MCI) seems to be associated to cardiovascular disease, especially when frontal lobe functions are impaired. Because causes of cardiovascular disease are treatable, combining the clinical syndrome with putative aetiologies can be useful in determining effective prevention strategies. The aims of our study were to assess the prevalence of people with a neuropsychological profile of a-MCI and na-MCI.

**Participants and Methods:** Participants were a population-based sample of 60 stroke- and dementia-free adults aged 50-65 years from the Barcelona-ASIA Neuropsychology study. None of them had memory complaints. They were examined with a detailed neuropsychological battery. The performance on the cognitive tests was used to diagnose neuropsychological profile of MCI according to standard criteria (Petersen et al., 1999; Lopez et al., 2003). Prevalence of amnesic, non-amnesic single or multiple neuropsychological MCI profiles was calculated.

**Results:** The prevalence of people with a neuropsychological profile of MCI was 8.4%. Of them, 5% were classified as a-MCI and 3.4% a na-MCI.

**Conclusions:** In a healthy population-based sample aged 50-65 years old, 8.4% of the people showed cognitive impairment in one or more cognitive domains. Using the current normative data and MCI "neuropsychological" criteria and taking into account that normal individuals show abnormal test performance, these results suggest that neuropsychological testing can detect subtle changes on cognitive function, even before subjective memory complaints appear.

Correspondence: *Júlia Miralbell, Phd student, Psychiatry and Clinical Psychobiology, University of Barcelona, Pg Vall d'Hebron 171, Barcelona 08035, Spain. E-mail: juliamiralbell@gmail.com*

**M. QUINTANA, J. GUÀRDIA, G. SÁNCHEZ-BENAVIDES, S. DE SOLA, R. MANERO, G. CUCURELLA & J. PEÑA-CASANOVA. Artificial Neural Networks to Classify Mild Cognitive Impairment and Healthy Controls.**

**Objective:** Mild cognitive impairment (MCI) is a state between normal cognition and dementia, with deficits not owing to age, education or medical disease. Several studies have demonstrated that this entity is associated with an increased risk of developing dementia, usually Alzheimer's disease. On the other hand, artificial neural networks (ANNs) are interesting computational tools which can provide valuable support to clinical decision making, classification and the prediction of cognitive functioning. The aim of this study was to examine the utility of artificial neural networks in the classification of mild cognitive impairment and study the relevant variables in MCI diagnosis.

**Participants and Methods:** The sample consisted of 346 healthy controls and 79 MCI diagnosed patients. The brief version of the Barcelona Test (a-BT) was administered to all participants. Software Easy NN-Plus was used to simulate a Multilayer Perceptron with 12 input neurons (a selection of subtest of a-BT, age and years of education), four hidden neurons and one output neuron, the diagnosis.

**Results:** ANNs correctly classified 98.33% of MCI patients (average error 0.02). Working and episodic memory cognitive measures, plus sociodemographic variables of age and years of education showed up as the most significant and sensitive variables for patient classification.

**Conclusions:** Our results indicate that ANNs have an excellent capacity to discriminate MCI patients from healthy controls. ANNs can be a useful tool for the analysis of neuropsychological profiles related with clinical syndromes and therefore can make valuable contributions to the clinical diagnosis of mild cognitive impairment.

Correspondence: *Maria Quintana, PhD, Neuropsychopharmacology, IMIM-Hospital del Mar, Biomedical Research Park, Building Dr. Aiguader Street 88, Barcelona 08003, Spain. E-mail: mquintana@imim.es*

## Memory Functions

**M. MATSUI, Y. HA-NYU, M. SUZUKI, T. MATSUOKA, S. TAKASHIMA & K. TANAKA. Explicit and implicit memory in patients with Alzheimer's disease in early stage.**

**Objective:** The purpose of this study was to examine both explicit memory using the Japanese Verbal Learning Test (JvLT) and implicit memory using verbal/visual tasks in patients with early stage Alzheimer's disease (AD). We predicted AD patients would have shown impairment in each explicit memory aspect including list learning, delayed recall and recognition, and severity of dementia would have been related to degree of memory impairment, while AD patients would have shown priming effects.

**Participants and Methods:** Twenty AD patients (mean age: 70.6±9.2 years; premorbid IQ: 96.8±13.2) and 23 healthy older adults (mean age: 74.0±6.0 years; premorbid IQ: 97.8±13.1) were administered short version of JvLT for measure of explicit memory and word/picture fragment completion tasks for measures of implicit memory. Severity of dementia in patients was evaluated using the Clinical Dementia Rating (CDR).

**Results:** The results showed delayed recall and total learning of AD patients were worse than those of healthy older adults and AD patients produced more false alarm and intrusion errors, while priming effects in verbal/visual tasks were shown in both groups. Furthermore, AD patients with higher CDR value revealed lower memory performance.

**Conclusions:** These findings suggest that AD patients in early stage have apparently impairment of explicit memory, but not implicit memory. In addition, degree of memory impairment in even early stage of AD may be related to severity of dementia. AD patients in early stage might have preserved implicit memory.

Correspondence: *Mie Matsui, Ph.D., Psychology, University of Toyama, 2630 Sugitani, Toyama 930-0194, Japan. E-mail: mmatsui@las.u-toyama.ac.jp*

**F. CONSTANTINIDOU & C. EVRIPIDOU. Working Memory and Stimulus Presentation in Reading Disability.**

**Objective:** Children with learning disabilities often experience difficulties in working memory. Studies in adults indicate that visual presentation enhances memory and learning. Stimulus presentation preferences have not been explored in children with reading disabilities (RD). This study investigated the effects of presentation modality on verbal learning performance of children with RD and in typically developing (TD) children.

**Participants and Methods:** Subjects: 20 children diagnosed with RD (mean age= 11.5 years, SD=.44) were matched with 20 TD children (mean age=11.53, SD= .5) on variables such age, SES, non-verbal intelligence, and education.

**Procedures:** Verbal memory measures included the Auditory Verbal Learning Test, Digits forward/backwards; non verbal memory tasks included design reproduction and spatial span (forward/backwards). Experimental tasks followed a multi-learning paradigm incorporating three modalities: Auditory, Visual, and simultaneous Auditory & Visual.

**Results:** Mixed MANOVA demonstrated that RD subjects learned significantly fewer words than their TD cohorts across the three modalities ( $p=.0001$ ) with a slower rate of learning across trials ( $p=.004$ ). Both groups improved during the repeated learning trials ( $p=.0001$ ), and learned more items during the visual presentation ( $p=.0001$ ) compared to the auditory presentation alone. Children with RD demonstrated a significant retroactive interference (RI) effect for both the short delay and long delay conditions. However, there was improved performance under the visual presentations.

**Conclusions:** 1. The visual (pictorial) presentation (with or without the simultaneous presentation of names) facilitates verbal learning in school age with or without RD. 2. RD interferes with information encoding during verbal learning. 3. Implications for education will be presented.

Correspondence: *Fofi Constantinidou, Ph.D., 75 Kallipoleos, University of Cyprus, 1678, Nicosia 1678, Cyprus. E-mail: fofic@ucy.ac.cy*

**L. CLARE, C.J. WHITAKER & S.M. NELIS. Appraisal of Memory Functioning and Memory Performance in Healthy Ageing and Early-stage Alzheimer's Disease.**

**Objective:** Few studies of memory awareness have compared people with dementia and healthy older controls and there are no standard-

ised methods for assessing degree of awareness in people with dementia. This study aimed to compare memory evaluations in healthy older people and people with early-stage Alzheimer's disease (AD) and develop standardised individual and dyadic methods for classifying degree of memory awareness in AD participants.

**Participants and Methods:** This was a cross-sectional study evaluating awareness of memory functioning and performance in healthy older people ( $n = 236$ ) and couples ( $n = 104$ ), and people with AD ( $n = 80$ ), and exploring comparative accuracy of ratings within control dyads. Percentile-based norms for individuals and couples were derived from the control data.

**Results:** Controls were reasonably accurate in rating their own memory functioning and performance, and control couples showed good comparative accuracy. Approximately two-thirds of AD participants significantly overestimated their level of either functioning or performance relative to normative data from the control group; however, different types of measure elicited different profiles of memory awareness.

**Conclusions:** Comparison with normative data confirms that significant overestimation of memory functioning or performance is a frequent feature in early-stage AD. Comparing indices of memory awareness in people with dementia to normative data provides a basis for identifying and comparing sub-groups of people with dementia who have different levels of awareness.

Correspondence: *Linda Clare, School of Psychology, Bangor University, School of Psychology, Bangor University, Bangor, Gwynedd LL57 2AS, United Kingdom. E-mail: l.clare@bangor.ac.uk*

**A. KUZAKA, E. SZEPIETOWSKA & B. GAWDA. Subjective vs objective estimation of own memory of the patients diagnosed with right and left hemisphere pathology.**

**Objective:** Aim of the study is a comparison of the self-awareness of the own memory of the patients with the right hemisphere pathology to the left hemisphere pathology patients. We assess: subjective estimations of general memory capacities, subjective estimations of the level of the word list reconstruction (JOL), objective results made when recalling, similarity (adequacy) of the objective and subjective measures of people with the right versus the left hemisphere dysfunction, as well as relations between these two measures.

**Participants and Methods:** In the research took part 25 neurologically healthy people and 23 people after the ischemic stroke of the right ( $N=13$ ) or the left ( $N=10$ ) hemisphere. The Giovagnoli Memory Effectiveness Assessment Questionnaire, Yesavage Geriatric Depression Scale, assignments of learning 10 words (6 trials) proceeded by judgment of learning (JOL), tests of semantic fluency (Animals and Parts of body), test of letter fluency (letters "K", "F") were conducted.

**Results:** The groups did not differ significantly in the general assessment of their memory, assessing the level of recalling, the level of reconstructions. There were the significant differences in verbal fluency; patients with right hemisphere pathology enumerated fewer words in the category called Animals.

**Conclusions:** The similarity between predictions (JOL) and performance of all participants was shown. We may assume that the symptoms of anosognosia, frequent for the patients with the right hemisphere dysfunctions, does not affect on all aspects of the cognitive processes. The achieved data is being analyzed with reference to the unawareness and metamemory phenomena.

Correspondence: *Ewa Szepietowska, dr hab., Psychology Department, University Maria Curie-Skłodowska, Plac Litewski 5, Lublin 20-080, Poland. E-mail: goszepiet@poczta.onet.pl*

**E. SZEPIETOWSKA, B. GAWDA & A. KUZAKA. Semantic and affective verbal fluency – psychological mechanism.**

**Objective:** The aim of the study is the analysis of determinants of semantic and affective fluency of adult people. We intend to describe the psychological mechanism of verbal fluency. Literature suggests the verbal fluency involves several cognitive and emotional processes. The described investigation was undertaken in Poland using Polish language. It is important to show how the results could be applied to the Polish culture.

**Participants and Methods:** A sample group of 120 adults people (age: 18-70) without clinical pathology was examined. All participants have performed the tasks measured semantic and affective verbal fluency. We



assess verbal fluency in terms of number of words correctly enumerated according to criterion, number of errors (repetitions, incorrect words, etc.) and number of semantic clusters (connections between at least 2 words; related to type of task). Methods: Structured Clinical Interview, Beck Depression Inventory, The Young Mania Rating Scale, STAI Spielberger, WAIS-R Verbal IQ tests.

**Results:** We took into consideration several explaining variables such as age, sex, verbal intelligence as well as affective states i.e. anxiety, depression and elevated mood. The multiple regression analysis has been done to show how the variables explain semantic verbal fluency and affective verbal fluency.

The results showed the differences between the mechanism of affective verbal fluency and semantic one.

**Conclusions:** The model of psychological determinants of semantic and affective fluency was presented. We conclude that these results could be used in the normalization of diagnostic tests based on verbal fluency.

Correspondence: *Ewa Szepietowska, dr hab., Psychology Department, University Maria Curie-Skłodowska, Plac Litewski 5, Lublin 20-080, Poland. E-mail: goszepiet@poczta.onet.pl*

#### A. DUMBRAVA, C. BALUT, M. TATU & M. TOBA. Prospective Memory Deficits in Portable Telephone Users.

**Objective:** The portable (mobile) telephone is probably one of the most widespread prosthetic gadget nowadays. However, except for controversial epidemiological data concerning the risk of its associated brain pathology, very little is known about the behavioral correlates of its use.

**Participants and Methods:** The present study examines the performance on several prospective memory tasks (both event- and time-related) in two groups of 37 heavy (almost exclusively) and 31 never users of the portable phone, groups being equivalent in respect to the usual psycho-demographic parameters.

**Results:** A significant reduction in all (and especially in the time-related) prospective memory performances in heavy users as compared with never users of the portable phone has been noticed. A follow-up after a couple of years of 23 of the subjects in the originally never users group who inevitably changed sides showed a tendency toward the deficit initially noticed in the contrasting group of heavy users of the portable telephone.

The influence of some possible independent variables (such as the level of professional and familial duties or the extension of the social network) which might be different in the two groups (which can, however, be also uncertainly interpreted) has not been ruled out and could be targeted in future studies.

**Conclusions:** These data suggest the possibility that the availability and constant use of such a remembering prosthesis as a portable telephone may prevent people from practicing their prospective memory abilities, resulting in a kind of learned non-use deficit of this cognitive function.

Correspondence: *Andrei Dumbrava, IBCV, Copou Bvd, Iasi 6600, Romania. E-mail: rodumb@yahoo.com*

#### A. DUMBRAVA, C. BALUT, M. TATU & M. TOBA. Rumination in Early versus Late Onset Post-Stroke Depression.

**Objective:** Rumination and worry are constant characteristics of depression but they have never (by our knowledge) been checked in depression following stroke.

**Participants and Methods:** Alongside a qualitative analysis of their content, we used different adapted measures of rumination (the Response Style Questionnaire [Nolen-Hoeksema, Morrow, 1991], the Rumination on Sadness Scale [Conway et al., 2000]) and worry (Penn State Worry Questionnaire [Meyer et al., 1990], Tallis, Eysenck, Mathews, 1992) to equivalent (in respect to most relevant psycho-demographic and clinical parameters) groups of non-aphasic post-stroke subjects: non-depressives (n=83), early onset (during the first three months after the stroke) (n=42) and late onset (beyond the sixth month post-stroke) (n=31) depressives [all diagnosis being based on adapted DSM-IV criteria].

**Results:** The level of ruminative thinking proved to be high at the early post-stroke evaluation in all groups of subjects but decreased significantly only in non-depressives and early onset depressives at subsequent

every six months follow-ups. A similar but variably statistically significant evolution has been noticed for the level of worry. The qualitative analysis showed that both rumination and worry were concerned with the present and future, making them more difficult to differentiate in this population based on this temporal orientation aspect.

**Conclusions:** Such data support the distinction between the early and late onset post-stroke depression, suggesting a less reactive causality of the former.

Correspondence: *Andrei Dumbrava, IBCV, Copou Bvd, Iasi 6600, Romania. E-mail: rodumb@yahoo.com*

#### C. GARCÍA-SANCHEZ, S. MARTÍNEZ-HORTA, C. DIAZ, C. GELI & J. KULISEVSKY. Wechsler Memory Scale's Profile, Selective Attention and Psychopathology in Fibromyalgia Syndrome.

**Objective:** Due to common complaints of cognitive decline related to amnesia referred by Fibromyalgia Syndrome (FMS) patients, the objective of our study was to assess their mnemonic and attention-related performance profile as well as their correlation with personality and psychopathological features.

**Participants and Methods:** Thirty demographically and clinically matched women with a mean age of  $51.58 \pm 9.01$  (29-62) fulfilling diagnostic criteria for FMS and referring amnesic complaints, were recruited from the rheumatology unit of Sant Pau's Hospital in Barcelona, Spain. Memory profile was assessed by the Wechsler memory Scale-III, selective attention and concentration was assessed by the D-2 Test and personality and psychopathological profile was assessed by the MMPI-II.

**Results:** With a range over all the subscores between 92.15 and 100.96, no significant amnesic impairment was detected by the WMS-III.

Commission and omission errors on D2 showed a low, but non pathological scoring on percentiles  $33.33 \pm 24.2$  and  $32.07 \pm 29.3$  respectively. MMPI-II revealed high scores on a pathological range for Hypochondria ( $87.58 \pm 7.53$ ), Hysteria ( $80.67 \pm 9.39$ ) and Depression ( $76.25 \pm 12.8$ ). A significant positive correlation was found between Hypochondria and visual memory ( $\rho = 0.774$ ;  $p = 0.009$ ). No other significant correlation linking attention, memory and MMPI-II scores was found.

**Conclusions:** FMS patients referring subjective complaints about cognitive impairment obtained a neuropsychological profile over normality as was evidenced by the administered assessment.

Attention and memory complains in FMS may be due to a symptom exacerbation related to the obtained psychopathological profile rather than to a specific neuropsychological impairment.

Correspondence: *Sàil Martínez-Horta, Neurology, Sant Pau's Hospital, Sant Antoni Maria Claret, 167, Barcelona 08025, Spain. E-mail: smartinezho@santpau.cat*

#### C. GARCIA-SANCHEZ, A. ESTÉVEZ-GONZÁLEZ, B. PASCUAL-SEDANO, A. GIRONELL, J. PAGONABARRAGA-MORA, S. MARTINEZ-HORTA & J. KULISEVSKY. Educational level and Age effects in The Mini Mental State Exam, the Montreal Cognitive Assessment (MoCa) and Mattis Dementia Rating Scale in normal subjects.

**Objective:** The Mini-mental state examination (MMSE) and The Mattis Dementia Rating Scale (DRS) are widely used tools for screening dementia in adults while The Montreal Cognitive Assessment (MoCa) is a brief tool developed specifically to detect mild cognitive impairment. Educational level and age are important variables that influence in the performance of neuropsychological tests and specially in the performance of screening dementia tool.

Our objective is to analyze the influence of both age and educational level in the performance of MMSE, DRS and MoCa.

**Participants and Methods:** One hundred and one subjects without memory complaints were evaluated with MMSE, DRS and MoCa tests. The subjects were 41 male and 60 female; mean age: 61 years; age range (50-88 years), educational level: mean is 11 years and cultural level range (2-18 years).

**Results:** Score on the MMSE were: mean  $28.93 \pm 4.51$ ; the MoCa score were  $26.44 \pm 2.97$  and DRS score were  $138.05 \pm 6.074$ . In all tests the age had a negative correlation with the performance and the educational level had a positive correlation. The most sensitive test to age were DRS ( $r = -0.561$ ) ( $p < 0.05$ ) and less sensitive were MMSE ( $r = -0.442$ ) ( $p < 0.05$ ) and the most sensitive to educational level were MMSE ( $r = 0.431$ ) ( $p < 0.05$ ) and less sensitive were MoCa ( $r = 0.353$ ) ( $p < 0.05$ ).

**Conclusions:** All screening tests showed correlation between higher educational level of the subjects and better performance and older age and worse performance. The most sensitive screening tests to educational level were MMSE and less sensitive MoCa. The most sensitive to age variable were DRS and less sensitive to age were MMSE.

Correspondence: *Carmen Garcia-Sanchez, Neurologia, Hospital de Sant Pau, Sant Antonio M Claret, 167, Barcelona 08025, Spain. E-mail: cgarcias@santpau.cat*

**A. BLOCH & E. VAKIL. The Impact of Delay, Interactive Instructions and Exposure Time on the Emergence of Memory Context Effects.**

**Objective:** Context effects on recognition memory reflect the influence of a number of cognitive factors. In a series of experiments, we examined the influence of delay, interactive instructions, and exposure time on the emergence of context effect in a face recognition task.

**Participants and Methods:** Twenty five individuals participated in the baseline condition and 25 in the "Intentional Delay" condition. Stimuli consisted of 120 colored full faces photographs of adults, 60 males and 60 females. These stimuli were randomly paired to form 36 study pairs and an additional 48 faces supplemented them to form the various test pair combinations. In each pair one face was the "target" to be remembered and the other the "context" to be ignored.

**Results:** Short delays and a combination of interactive encoding and longer exposure time yielded context effects. Dissociations between direct memory for targets, direct memory for contextual stimuli and context effects were found across experiments, supporting the independence of these memory measures.

**Conclusions:** Context effects following short delays reflect additive familiarity, while those observed in the condition of interactive encoding combined with longer exposure time reflect target-context binding.

Correspondence: *Eli Vakil, PhD, Psychology, Bar Ilan University, Bar Ilan University Ramat Gan, Ramat Gan 52900, Israel. E-mail: vakile@mail.biu.ac.il*

**G. MOHR, J. ASCHOFF & C. RAVEL. Episodic Memory as a Prerequisite for Generating Semantic Knowledge.**

**Objective:** Data of a single case study with a patient suffering developmental amnesia is presented. The aim of the study was to demonstrate that semantic memory depends on episodic processes whenever response competition plays a role.

**Participants and Methods:** The patient C.P. suffered a perinatal hypoxic brain damage leading to reduced hippocampal size bilaterally. Functionally, episodic recall scores are consistently at floor level. Recognition performance is also considerably impaired whenever familiarity processes generate misleading signals. Four experiments were run, in which C.P. had to learn word pairs in a multi-trial learning paradigm. The words of the study pairs were either unrelated or semantically related. For half of the words of the unrelated pairs a semantically related word was within the list.

**Results:** Cued recall consistently showed selective performance for semantically related pairs and floor level performance for unrelated pairs. Confabulation-rates were extremely high for unrelated pairs, when semantically related partners were within the list. Confabulatory responses proved to be extremely stable with not a single correction over the many study-test trials. Recognition performance confirmed the recall data. C.P. was not able to reliably recognize unrelated word pairs when the elements of these pairs had semantically related items within the list.

**Conclusions:** Implications for theories about the relation between semantic and episodic memory processes are discussed.

Correspondence: *Gilbert Mohr, University of Saarbrücken, Im Flürchen 66, Saarbrücken 66133, Germany. E-mail: gilbert.mohr@npp-sb.de*

**S. BOLOGNANI, S. POMPEIA, P. RZEZAK & O.F. BUENO. Alternative Stories for Prose Recall Testing in Brazil: Development of 4 New Versions in Portuguese.**

**Objective:** Patients with neuropsychological deficits frequently need to be retested in order to measure possible cognitive changes after a progressing disease, surgery, or rehabilitation programs. The ability to recall auditory-verbal information is extremely important in terms of real life functioning and one of the most used tasks to measure this is the Logical Memory (LM) subtest from the Wechsler Memory Scale. Our aim is to present the development of four new stories, i.e. 2 new pairs.

**Participants and Methods:** Each pair of stories was developed by matching several aspects to the original pair, Anna and Robert. The aspects matched for each story within the pairs were: number of ideas, of words and themes, narrative structure, semantic contents and emotional tone. The new paragraphs were tested in healthy subjects in order to assess their psychometric properties.

**Results:** Immediate recall of all new versions were shown to be statistically equivalent regarding inter-rater reliability. Performance using all new stories was also similar to that employing the original pair, both individually and in combination.

**Conclusions:** The presented versions showed good agreement to the original LM task indicating that the method used for constructing the new stories was adequate and can be employed in languages which have only one LM pair.

Correspondence: *Silvia Bolognani, UNIFESP, Alameda Santos 545 ap 102, Sao Paulo 01419-000, Brazil. E-mail: silvia\_bolognani@yahoo.com*

**E. ZAWADZKA & L. DOMANSKA. Short-Term Memory, Memory Abilities in Everyday Life Activities and Mood in Patients with Different Insight into their Cognitive Functioning.**

**Objective:** The aim of the study of patients with different insight into cognitive functioning was estimation of relationship between their short-term memory skills and memory abilities in everyday life functioning. The attempt was also undertaken to analyse relationship between memory abilities and the patients' mood.

**Participants and Methods:** On the basis of specially developed examinations procedure stroke patients were assigned to one of two groups: (1) subjects with inadequate and (2) with adequate insight into their own cognitive abilities. Short-term memory was assessed with Ray Auditory Verbal Learning Test. Whereas mood and memory abilities in everyday life functioning were evaluated by means of Kwestionariusz Samooceny BEx (Owczarek, et al., 1996) which was administered in self-report version and the observational version (filled out by a relative).

**Results:** Significant differences between two examined groups were found in the RAVLT. In both groups significant correlations were obtained between: (a) the results of short-term memory examination and the subjective assessment of everyday life memory abilities, (b) the subjective valuation of everyday life memory abilities and mood. In the group with inadequate insight significant correlations between relatives' assessment of everyday life memory abilities and mood was confirmed.

**Conclusions:** Mood seems to be related to everyday life memory abilities in stroke patients especially in subjects with inadequate insight into cognitive functioning.

Correspondence: *Ewa Zawadzka, dr, Zaklad Psychologii Klinicznej i Neuropsychologii, Instytut Psychologii UMCS, Pl. Litewski 5, Lublin 20-080, Poland. E-mail: zawadzka.ewa@poczta.umcs.lublin.pl*

**Stroke/Aneurysm/Cardiovascular Disorders**

**V.G. POSTNOV, E.A. LEVIN, A.M. KARASKOV, V.N. LOMIVOROTOV, V.L. ZELMAN, T.V. TRETYAKOVA & A.G. VASYATKINA. Neuropsychological and Psychophysiological Methods in Studying Brain Function in Cardiothoracic Surgery Patients.**

**Objective:** Ischemic brain dysfunction is one of complications of cardiovascular diseases as well as of cardiothoracic surgery with artificial circulation using to treat most severe of these diseases. The aim of the study was to compare results of neuropsychological, psychophysiological and neurological methods used for assessing hypoxic brain dysfunction in cardiothoracic surgery patients.

**Participants and Methods:** 30 patients were examined before and 10-14 days after cardiothoracic surgery. Neuropsychological tests were taken from classic Luria battery and included tests for speech productivity, visual-constructive activity etc. Psychophysiological assessment included reaction time tests with various cognitive loads, face emotionality recognition task and recording of EEG and cognitive evoked potentials. Standard neurological examination was also performed. Comparisons were made for pre- and postsurgery results and between patients, undergoing surgery for the first and second time. Non-parametric Kruskal-Wallis ANOVA and Spearman's rank correlation were used for statistical analysis.

**Results:** Differences between pre- and postsurgical results were moderate with latter being in general better than former. It could be associated with improvement of haemodynamics after surgery, and/or with reduction of emotional stress. Patients undergoing primary and repeated surgery also differed in several tests, particularly those assessing neurodynamical components. Importantly, results of corresponding psychophysiological, neuropsychological and neurological examinations were highly correlated with each other.

**Conclusions:** Our results allow proposing that psychophysiological methods of patients' examination could be a significant addition to traditional neuropsychological and neurological methods. Also, due to high sensitivity of psychophysiological tests and lack of effect of learning, they could be used for repeated examinations for control of neurorehabilitation process.

Correspondence: *Egeriy A. Levin, PhD in biology; Novosibirsk State Research Institute of Circulation Pathology, Rechkunovskaya str., 15, Novosibirsk 630055, Russian Federation. E-mail: e.a.levin@gmail.com*

**A. MARYNIAK, A. BIELAWSKA, K. BIEGANOWSKA, M. MISZCZAK-KNECHT, L. SZUMOWSKI & F. WALCZAK. Memory deficits in children and adolescents with cardiac arrhythmia.**

**Objective:** Paroxysmal tachycardia in the form of atrio-ventricular nodal tachycardia (AVNRT) or atrio-ventricular tachycardia (AVRT) is the most common form of supraventricular arrhythmia during childhood. Tachycardia in children is characterized by a high heart rate (even 250-300 beats/minute) and is associated with transient ischemia of the central nervous system and serious stress. The aim of this study was to perform a neuropsychological evaluation of selected cognitive functions, especially memory, in children and adolescents with paroxysmal supraventricular tachycardia.

**Participants and Methods:** 133 patients (71 female, 62 male), aged 11-18, with AVRT or AVNRT, were examined. Patients having other diseases potentially affecting cognitive development were not included in the study. Standardized tests (Auditory-Verbal Learning Test, Benton Visual Retention Test, Digit Span, Rey's Complex Figure) were employed. Results were interpreted by comparison to age-related norms.

**Results:** 42% of the subjects revealed significant impairment of the memory functions (at least two test scores indicating pathology). 39.7% of the patients obtained the lowest scores in the visual memory test (compared to 10% in the whole population) and only 9.9% achieved results above the average. Predictor of the cognitive malfunctioning was the early onset of the paroxysms of tachycardia, particularly if it occurred in the first year of life ( $\chi^2/\text{Pearson}=5,70, p=0,01$ ).

**Conclusions:** Paroxysmal tachycardia occurring in childhood affects cognitive development, mainly by impairing memory functions. Is the memory deficit associated with recurring anoxia, dysfunction of hippocampus due to stress or maybe there is a different mechanism – the question needs further study.

Correspondence: *Agnieszka Maryniak, Children's Memorial Health Institute, Al.Dzieci Polskich 20, Warsaw 01-179, Poland. E-mail: a.maryniak@chello.pl*

**M. CHEN & P. TSAI. Predicting Everyday Functional Abilities of Stroke Patients with the Loewenstein Occupational Therapy Cognitive Assessment-Geriatric Version.**

**Objective:** The Loewenstein Occupational Therapy Cognitive Assessment-geriatric version (LOTCA-G) is a valid instrument for cognitive impairments in stroke patients. However, it is unclear how well the LOTCA-G correlates with patients' daily functional abilities. The purpose of this study was to assess the ecological validity of the LOTCA-G in patients with stroke.

**Participants and Methods:** A total of 42 patients with stroke were administered the LOTCA-G and a series of functional assessments, including Functional Independence Measure (FIM), Frenchay Activities Index (FAI), and Cognitive Failures Questionnaire (CFQ).

**Results:** Analysis of correlation coefficient revealed that the LOTCA-G had moderate positive relationships with the FIM total, motor and cognitive scores ( $r = .51$  to  $.61$ ), and the FAI ( $r = .57$ ), but had no any statistic significant relationship with the CFQ. Linear regression found that LOTCA-G total scores explained 27.4% and 29.1% of the total variance in the FIM and the FAI. Further analysis showed that the visual motor and memory subscores were the predictors of the FIM, while the thinking operation subscore was the single predictor of the FAI.

**Conclusions:** These findings indicated that the visual motor and memory subscales were significantly associated with basic functional abilities, and the thinking operation subscale was significantly associated with complex instrumental activities of daily living and social functions. This study provides evidence for the ecological validity of the LOTCA-G in stroke patients and it is possible to predict everyday functional abilities in stroke patients from their performance on certain LOTCA-G subscores.

Correspondence: *Mei-Ching Chen, Occupational Therapy, National Cheng Kung University, No.1, University Road, Tainan City 701, Taiwan (R.O.C.), Tainan 70101, Taiwan. E-mail: mr20021103@gmail.com*

**A. GRAMSTAD, H. NÆSS & D. AARSLAND. Cognitive consequences of mild stroke in an elderly population.**

**Objective:** Stroke in the elderly can lead to cognitive deficits, but little is known about severity and profile of such deficits in mild stroke. If hemispheric deficit is mild, we hypothesized that tests of verbal learning and memory and reading speed would be more sensitive than the Mini Mental Status examination (MMS), and that delayed recall and response inhibition would be relatively intact, indicating sparing of medial brain structures.

**Participants and Methods:** Fifty consecutive patients above 60 years old (32 males, 18 females, mean age 70.2 years) with a diagnosis of mild stroke (MRS $\leq$ 2, day 7) performed tests of global cognition (MMSE), verbal learning and memory (Hopkins Verbal Learning Test-Revised; HVLTR) and reading speed and inhibition (Stroop test) 6-24 months after the stroke. Results were compared to published age-matched norms, and differences were tested for significance with t-test for independent measures.

**Results:** Significant deficits were found in learning and recall on the HVLTR, but not in percent retained words in delayed recall. On Stroop test, significant deficits were found in reading speed, but not specifically in color-word interference. Significant deficits on MMSE were found only in patients aged 60-64.

**Conclusions:** Our main hypotheses were supported. Elderly patients with mild stroke show mild cognitive deficits, manifested in reduced verbal learning and mental speed. MMSE was not sensitive in detecting these deficits. No specific deficits in delayed recall or color-word interference were detected. The findings suggest that patients with mild stroke develop mild brain dysfunction, but no specific dysfunction of medial brain structures. Correspondence: *Arne Gramstad, PhD, Neurology, Haukeland University Hospital, Dept. of Neurology, Haukeland University Hospital, Faculty of Psychology, Bergen 5021, Norway. E-mail: arne.gramstad@helsebergen.no*

**N. ROJO, J. AMENGUAL, M. JUNCADELLA, F. RUBIO, T. MÜNTE & A. RODRIGUEZ-FORNELLS. Music-supported Therapy Enhances Cognitive Recovery after Stroke.**

**Objective:** Playing a music instrument requires motor skills as well as other cognitive abilities such as attention and memory. Recent studies have reported benefit effects of music processing on different clinical conditions, such as aphasia, dementia, autism, depression, multiple sclerosis, visual neglect or hemiparesis (Särkämö et al., 2008; Schneider et al., 2006). Thus, music therapy seems to have positive effects on different psychological, physiological and cognitive processes.

**Participants and Methods:** A longitudinal trial using Musical-supported therapy (MST) in chronic stroke patients has been carried out (N = 16) with mild to moderate motor deficit after stroke (mean 2.5 years after stroke). Patients received intense MST (Schneider et al., 2007; Altenmüller et al., 2009) of the paretic upper extremity (30 min each day, 4-weeks) and were evaluated before and after MST using standard neuropsychological and cognitive tasks (verbal memory, verbal learning, short-term memory, executive functions and other cognitive processes) as well as mood and quality of life questionnaires.

**Results:** Preliminary results have shown a tendency to improve after the therapy in the domain of attention (e.g., TMT and choice reaction Time), faster auditory verbal learning and amelioration on depressed mood symptoms (assessed using the Beck depression inventory).

**Conclusions:** The present results suggest that MST not only have positive benefits on motor rehabilitation (Schneider et al., 2006) but also can enhance cognitive recovery and mood. This behavioral pattern of positive effects due to music learning is convergent with previous studies about the effect of music listening on cognitive functions (Särkämö et al., 2008).

Correspondence: *Nuria Rojo, Psicología Básica, University of BCN, Feixa Llarga s/n., L'Hospitalet (Barcelona) 08907, Spain. E-mail: nrojofit7@hotmail.com*

### L. KRAMSKA, J. HRADIL & M. PREISS. Cognitive performance in patients treated for cerebral aneurysm.

**Objective:** To assess neuropsychological outcome and surgical/or endovascular treatment in patients with cerebral aneurysm.

**Participants and Methods:** Since 2003 to 2008 – 168 patients with diagnosed cerebral aneurysm were treated at Neurosurgery, Regional Hospital Liberec. Of these 168 patients, 68 were able to undergo neuropsychological assessment minimal one year after intervention. Standardized psychological tests were used to assess cognitive functions. One treatment protocol was used by one neurosurgical team.

**Results:** Average Full-Scale IQ was 93.8 (SD=13.4), Verbal IQ was 94.0 (SD=13.9) and Performance IQ was 94.5 (SD=12.9). Currently measured Verbal, Performance and Full-Scale IQ were statistically significant lowered against norm. We found most parameter values below the average. Only 2 subtests (Similarities and Block design) gently exceed population average. Substandard values were especially in subtests Information (semantic memory) and Digit span (short - term and working memory).

**Conclusions:** WAIS- R does not need to be optimal method for evaluation cognitive deficit in neuropsychological practice. It is appropriate to involve complex neuropsychological tests, especially method focused on premorbid intelligence. We work on standardisation of the Czech version of the NART. This study was supported by GAČR 406/07/1444

Correspondence: *Lenka Kramska, Dr., Neurology, Na Homolce Hospital, Roentgenova 2, Prague 5 15030, Czech Republic. E-mail: lenka.kramska@seznam.cz*

### J.J. SORIANO, J. MIRALBELL, E. LÓPEZ-CANCIO, N. BARGALLÓ, J.F. ARENILLAS, M. BARRIOS, C. CÁCERES, P. TORAN, M. ALZAMORA, G. PERA, A. DÁVALOS & M. MATARÓ. Higher Risk of Cognitive Impairment in Executive and Visuo-perceptive Functions Related to Deep White Matter Lesions Severity.

**Objective:** Cerebral white matter lesions (CWML) are commonly seen on magnetic resonance imaging (MRI) of neurologically healthy elderly people. These abnormalities have been associated with cognitive dysfunction and a higher risk of dementia, especially in adults with extensive CWML burden. We sought to determine the relative risk of cognitive impairment related to deep white matter lesions severity in a healthy middle-aged sample.

**Participants and Methods:** Participants were a population-based sample of 132 stroke- and dementia-free adults aged 50-65 years from the Barcelona-ASIA (ASymptomatic Intracranial Atherosclerosis) Neuropsychology Study. The severity of CWML was analysed using the Fazekas scale. Raw cognitive data were normalized to z-scores, taking as a reference the mean and the standard deviation of the whole sample. Individual z-scores < -1.33 were considered to be impaired. We used binary logistic regression to evaluate the relationship between deep white matter lesions severity and cognitive impairment, after adjusting for age, sex, years of education and estimated intelligence.

**Results:** Seventeen participants (17.2%) presented moderate deep white matter lesions, 62 (62.6%) showed mild lesions and 20 (20.2%) were free of lesions. Compared to absence and mild lesions, moderate deep white matter lesions were associated with cognitive impairment in WCST number of errors (OR = 5.35; 95% CI 1.08-26.41), semantic verbal fluency (OR = 6.68; 95% CI 1.33-33.67), Visual Reproduction copy (OR = 8.44; 95% CI 1.73-41.27) and Visual Reproduction discrimination (OR = 3.80; 95% CI 1.14-12.66).

**Conclusions:** These results suggest a higher risk of cognitive impairment in executive and visuo-perceptive functions in healthy middle-aged individuals with moderate deep white matter lesions.

Correspondence: *Juan J. Soriano, Psychiatry and Clinical Psychology, Universitat de Barcelona, Passeig de la Vall d'Hebron, 171, Barcelona 08035, Spain. E-mail: juan.jose.soriano@ub.edu*

### Z. SZOPA. Neuropsychological consequences in the functioning of a patient with brain damage as a result of sudden cardiac arrest. Case Study.

**Objective:** The poster is an attempt to analyze neuropsychological disorders in 32 year old patient with brain damage, which has suffered as

a result of sudden cardiac arrest. Human brain consumes about 20% oxygen received by the systemic circulation. Nervous system has little energy stocks with both a very high rate of oxygen consumption and metabolic processes. Proper blood supply of brain is the basis for correct the human mental processes. All changes of homeostasis of the body, associated with impaired local or general blood circulation, very quickly reflected in the functioning of nerve cells. Irreversible necrosis of nerve tissue create in an area without circulation within 3 - 4 minutes.

**Participants and Methods:** Uses a series (32 years old thirteen months) of observations and neuropsychological tests.

**Results:** The poster shows which areas of the brain have been damaged and what is result changes his functioning of cognitive, emotional and social. In comparison to life before the accident there are differences in many spheres of life. There was a significant decrease in fresh memory capacity, impairment of transfer of attention, the problem with the construction of complex sentences.

**Conclusions:** The sensitivity of different parts of the brain is not the same. Temporary stopping blood circulation often lead to cardiovascular extensive vascular brain damage, especially within the cerebral cortex, which is very sensitive to the status of the sudden stopping of blood flow. As soon as it comes to reticular formation, hippocampus, frontal lobe and occipital brain, striatum, cerebellum. At the latest changes appears in the brainstem - after about 30 minutes. As a result of prolonged hypoxia changes become more generalized and lost their selectivity.

Correspondence: *Zuzanna Szopa, master, WZ Grójec, ul. Malczewskiego 44/49, Warszawa 02-612, Poland. E-mail: zuzanna.szopa@wp.pl*

### K. WINGEIER, C. KIEFER, T. HEINKS-MALDONADO, M. EL-KOUSSY, C. STUKER, G. SCHROTH, W. PERRIG & M. STEINLIN. Imaging the Reorganisation of White Matter after Ischemic Stroke in Childhood.

**Objective:** The maturing brain has a remarkable flexibility to recover after stroke. However, literature is still lacking details as to what extent lesions in specific areas impact other brain regions. Moreover, the time lapse of structural changes and its influence on developing cognitive functions are largely unknown. As white matter growth is essential for cognitive development, the aim of this study is to keep objective records of individual reorganisation processes taking place during sensitive periods after ischemic stroke in childhood.

**Participants and Methods:** Three children underwent diffusion tensor imaging (DTI) three times within one year post-stroke. The examinations on a TIM-Trio 3.0T scanner took place one month, three months and one year after the arterial ischemic stroke occurred. Generalized fractional anisotropy as well as apparent diffusion coefficient maps were calculated. Furthermore an extensive neuropsychological battery assessing a broad range of cognitive functions have been applied one month after injury and one year post-stroke.

**Results:** The comparison of intra-individual data of the different time slots showed axonal changes over time. Structural reorganization processes have been detected near the lesions as well as in remote areas. Furthermore, neuropsychological functions have been improved over time. However, no significant changes of full IQ scores has been observed between the first assessment and the one year follow-up testing.

**Conclusions:** DTI provides an unique insight into the dimensions of neuroplasticity after stroke. Its non-invasive character allows an individual analysis of alterations of white matter tracts over time. In the future, this method may help clinicians evaluate therapeutic interventions. Correspondence: *Kevin Wingeier, MSc, Department of Pediatric Neurology and Neuropsychology, University Children's Hospital, Postfach, Bern 3010, Switzerland. E-mail: kevin.wingeier@insel.ch*

### K. POLANOWSKA. Transcranial Direct Current Stimulation combined with Cognitive Therapy in Stroke Patients.

**Objective:** Diseases of the central nervous system are usually connected with pathological cortical activity changes, some of which might be maladaptive and affect recovery. After strokes there are often bihemispheric alterations in brain activity, generally manifested by hypoactivity of the damaged hemisphere and hyperactivity of the unaffected one. Transcranial direct current stimulation (tDCS), which delivers weak polarizing direct currents (1-2 mA) to the cortex via two electrodes placed on the scalp, is a technique aimed to modulate cortical excitability. The nature of such modulations is current polarity-specific with anodal stim-

ulation increasing cortical excitability and spontaneous activity, and cathodal reducing them. tDCS-induced modifications of brain activity evolve during stimulation and may remain for over an hour after tDCS. It has been demonstrated, in animal experiments and healthy subjects studies, that brain activation changes are associated with perceptual, cognitive and behavioural consequences, which makes tDCS an attractive tool for neurorehabilitation, especially stroke patients. Recent pilot clinical studies are encouraging. In most paradigms tested, excitability-enhancing anodal tDCS (anode is placed over cortical target, reference electrode – cathode is above the contralateral supraorbital area or in non-cephalic region) proved beneficial to learning and memory processes, attention, and linguistic abilities. In this context, additional enhancing cortical excitability appears a promising approach to improve cognitive functions. The best functional outcome would be expected after coupling neuromodulatory treatment with specific training of impaired function. Combination of these two strategies should optimize processes of learning involved in standard rehabilitation therapies, leading to more pronounced and longer-lasting functional gains.

Correspondence: *Katarzyna Polanowska, 2nd Department of Neurology, Institute of Psychiatry and Neurology, 9 Sobieskiego Str., Warsaw 02-957, Poland. E-mail: kpolanow@ipin.edu.pl*

**J. SENIÓW, M. LITWIN, T. LITWIN, M. LESNIAK & A. CZLONKOWSKA. Effect of speech and language training combined with levodopa in post-stroke aphasia treatment: a prospective, randomized, placebo-controlled, double blind study.**

**Objective:** The effectiveness of conventional speech and language therapy in post-stroke aphasia patients is still not satisfying and poorly documented. Spontaneous recovery occurs in the first few months after stroke due to lesion-induced neuroplasticity. Only randomized clinical trials can confirm any relationship between specific language training or other types of applied therapy and functional improvement.

Few studies confirm that pharmacological treatments support post-stroke recovery. The purpose of this study was to determine whether the combination of levodopa with language therapy improves functional outcomes.

**Participants and Methods:** Twenty patients received levodopa before each language therapy session, and an additional 19 received a placebo. Language training was provided during a 3-week period. The efficacy variables were changes from baseline in Boston Diagnostic Aphasia Examination (BDAA) scores.

**Results:** Patients receiving levodopa experienced greater language improvement in verbal fluency and repetition, compared to patients receiving placebo. Improvement was particularly distinct in patients with frontal lesions.

**Conclusions:** Supplementing language therapy with levodopa may improve recovery only from motor aphasia.

Correspondence: *Joanna Seniów, Institute of Psychiatry and Neurology, 9 Sobieskiego Str., Warsaw 02-957, Poland. E-mail: seniowj@ipin.edu.pl*

**L. DOMANSKA & E. ZAWADZKA. The Inadequate Insight into Memory Abilities in Stroke Patients and their Social Competence from the Perspective of Themselves and their Relatives.**

**Objective:** The limitations of insight into one's own deficits following brain damage are usually described in cases of cognitive disorders but they may be manifested in different forms of clinical problems. The goal of the study was to evaluate the degree of consensus of stroke patients' and their relatives' opinions on social competence in the group of subjects with inadequate insight into memory abilities.

**Participants and Methods:** On the basis of memory examination and patients' valuation of their own memory abilities patients were included into two groups: with inadequate (Ia) and adequate (A) insight into their memory abilities. The criterion of patient classification to the Ia group was overestimation of memory abilities. In subjective valuation task patients had to anticipate how many elements they would memorize from the given list. Actual memory abilities were evaluated by means of Rey Auditory Verbal Learning Test. The group A was formed by patients whose opinions corresponded with their results obtained in RAVLT. Social competence was assessed with modified version of KKS (Matczak, 2001). Two forms of it were used: the subjective (self-report) form and the observational form (filled out by a relative).

**Results:** Significant differences between the Ia and A groups were confirmed in some aspects of social competence evaluated by relatives. The significant correlations were found between patients' and relatives' valuation of social competence in the group of patients with inadequate insight into their memory abilities. In the group of patients with adequate insight into their memory abilities the significant difference was recognized between patients' and relatives' valuation of some aspects of social competence.

**Conclusions:** The dissociation between abilities of insight into one's own cognitive and social functioning may be used during therapeutic work with patients showing symptoms of anosognosia.

Correspondence: *Lucja Domanska, dr, Zakl[@#322#]ad Psychologii Klinicznej i Neuropsychologii, Instytut Psychologii UMCS, pl. Litewski 5, Lublin 20-080, Poland. E-mail: lucja.domanska@chello.pl*

**M. OTSUKI, Y. NAKAGAWA, H. UESUGI, M. YOSHINO, A. OGATA, T. AOKI & J. MURATA. Temporal sequence effect of naming: implication of temporal lesion.**

**Objective:** Aphasic patients often show fluctuation in their language reaction in the tasks such as comprehension and naming, however, it remains uncertain with what condition and how it occurs. In this study we investigated fluctuation in naming ability with quantitative method.

**Participants and Methods:** Patients and methods: 10 right handed aphasic patients due to cerebrovascular disease with sole circumscribed lesion. 5 patients had lesion in the left temporal lobe, and the other 5 patients had lesion in the left parietal lobe or in the left frontal lobe. The patients underwent the naming task of 60 line drawings which is devised to change category the drawings every 3 cards. The scores were added up every first drawing of each category as the first temporal sequence words (TSW), every second drawing as the second TSW, every third drawing as the third TSW.

**Results:** The patients with left temporal lobe lesion showed significant better naming ability in the first TSW. The other patients showed no significant difference among the first, second and third TSW.

**Conclusions:** We speculated that the naming ability could be brought into full play at the first sequence of the task for the patients with the lesion in the temporal lobe.

Correspondence: *Mika Otsuki, MD, PhD, School of Psychological Science, Health Sciences University of Hokkaido, 2-5 Ainosato, Kita-ku, Sapporo 002-8072, Japan. E-mail: miotsuki@hoku-iryu-u.ac.jp*

**Visuospatial Functions/Neglect/Agnosia**

**M. LAIHOSALO, J.E. KETTUNEN, A. KOIVISTO, P. DASTIDAR, J. OLLIKAINEN & M. JEKONEN. Thrombolysis and visual functioning in right hemisphere stroke during a 6-month follow-up.**

**Objective:** This study examines the association between thrombolysis and visual functioning in right hemisphere (RH) infarct patients during a 6-month follow-up.

**Participants and Methods:** Forty-two consecutive patients with first RH infarct were matched for age, education and stroke severity on admission to a hospital emergency department (baseline NIHSS; National Institute of Health Stroke Scale) and compared according to whether (T+) or not (T-) they received thrombolysis. Neurological (NIHSS, Barthel Index; BI) and neuropsychological examinations were conducted at the acute phase and at 6 months after onset. Assessment of visual functioning covered visuoconstruction (Block Design; WAIS-R), visual search and reasoning (Picture Completion; WAIS-R), visual attention (conventional subtests of the Behavioural Inattention Test; BITC) and visual memory (Visual Reproduction; WMS-R).

**Results:** At the acute phase T- patients had more severe strokes ( $p = 0.012$ ) and poorer visuoconstructive abilities ( $p = 0.008$ ) than T+ patients. At 6 months T+ patients had less difficulties in visual attention (BITC) ( $p = 0.003$ ) than T- patients. Recovery patterns in stroke severity ( $p = 0.006$ ) and visuoconstruction ( $p = 0.017$ ) differed between the groups, indicating that the T- group showed better recovery. Therefore the group differences observed at the acute phase disappeared. Interestingly, a significant group difference in visual attention was only found at 6 months.

**Conclusions:** Our results suggest that thrombolytic treatment has a favourable effect on visual functioning and on stroke severity at the acute phase of stroke. At 6 months post-stroke, however, the positive effect of thrombolysis is only seen in visual attention.

Correspondence: *Mari Laihosalo, University of Tampere, University of Tampere Department of psychology, Tampere 33014, Finland. E-mail: laihomar@hotmail.com*

**R. LUUKKAINEN-MARKKULA, I.M. TARKKA, K. PITKÄNEN, J. SIVENIUS & H. HÄMÄLÄINEN. Hemispatial neglect is differentially reflected in re-cancellation, visual memory and motor perseveration tests.**

**Objective:** Hemispatial neglect is a syndrome often encountered after right hemisphere cerebrovascular stroke. Cancellation tests are commonly used to assess hemispatial neglect and some 30% of patients also display re-cancellation of targets in these tests. However, not all patients with neglect display re-cancellation behaviour. We examined whether re-cancellation behaviour was associated with visual memory and executive motor perseveration in patients with hemispatial neglect.

**Participants and Methods:** We examined 18 subacute and chronic right hemisphere neglect patients with a clinical test battery including the conventional tests of the BIT, the visual reproduction of the WMS-R, the Rey figure, the Corsi block test and a letter alteration fluency test.

**Results:** Re-cancellation behaviour was observed in 33% of our patients with line cancellation being the most sensitive test to capture re-cancellations. Patients with re-cancellation behaviour reproduced significantly less items from the figures of the WMS-R immediately after looking and their copy of the Rey figure was significantly poorer than in patients without re-cancellations. Right-sided perseverations in the alternating letters task were associated with poor copying of figures as well as with the severity of neglect. This suggests that perseveration in the alternating letters seems to reflect a re-mapping type of deficit in maintaining stability of objects while drawing rather than an executive motor inertia in neglect patients.

**Conclusions:** We found some clinical indicators for both re-cancellation behaviour and re-mapping deficit in patients with hemispatial neglect. Re-cancellation was associated with defective immediate visual memory performance and poor copying whereas right-sided perseverations in the letter alternation test reflected the re-mapping type of deficit in hemispatial neglect.

Correspondence: *Riitta Luukkainen-Markkula, MA, Rehabilitation, Brain Research and Rehabilitation Center Neuron, Korttejoiki, Kuopio 71130, Finland. E-mail: riitta.luukkainen-markkula@neuron.fi*

**Y. HAYAKAWA, K. TANJI, N. SAITO & K. SUZUKI. A Preliminary Survey of the Prevalence of Personal Neglect.**

**Objective:** Among multiple dissociable subtypes of unilateral neglect, the presence of neglect for the personal space (personal neglect) tends to be overlooked with routine examination.

The aim of this study is to survey the prevalence of personal neglect among unilateral neglect patients using two tests for personal neglect.

**Participants and Methods:** We examined twelve stroke patients with left unilateral neglect, diagnosed according to the questionnaire for neglect behavior (Ishiai, 1999). Two examinations were used for evaluation of personal neglect. 1) Modified fluff test, in which we asked the patients to remove 15 small pieces of vinyl tape attached to their body (modified from the fluff test; Ortigue et al. 2006). 2) Face wiping test (modified from the razor or powder and comb test; Beschin et al. 1997). Those examinations were performed at the chronic stage,  $84 \pm 46$  days after the onset.

**Results:** In the modified fluff test, seven patients left one to nine pieces of tape on the left side of the body. In the wiping test, three patients could not fully wipe the left side of the face. All the patients who failed the wiping test also failed the modified fluff test.

**Conclusions:** The present survey revealed personal neglect in more than half of the 12 neglect patients. The discrepancy in sensitivity between the two tests warrants the use of multiple tests for the proper diagnosis of personal neglect.

Correspondence: *Yuko Hayakawa, post-dr., Clinical neuroscience, Yamagata University, 2-2-2, Iida-nishi, Yamagata 9909585, Japan. E-mail: h.yuko@med.id.yamagata-u.ac.jp*

## Aging

**J.B. ALLEN. Utility of Alternative Measures of Literacy in the Prediction of Intellectual Ability in an Ethnically Diverse Population.**

**Objective:** Years of education has been shown to be a significant predictor of neuropsychological test performance, regardless of race or eth-

nicity (Lezak, M., 1995). However, there has been increasing concern that there is value in using norms that correct for the quality of education as well as the quantity of educational attainment alone. The current study assessed multiple aspects of education quality on several reading measures as well as subjective report of educational experience in a sample of older White and African American individuals.

**Participants and Methods:** The study included 82 participants (46 African Americans individuals; 36 White individuals) with a mean age of 71.5 years. Overall the sample included 22 males and 60 females with mean of 13.2 years of formal education and no history of dementia or other known neurological disease. Participants were interviewed individually as a way of gathering subjective ratings of educational quality and background. Each participant also received a battery of cognitive and literacy tests in an attempt to better predict current intellectual functioning.

**Results:** Significant findings emerged from regression analysis suggesting that unique aspects of literacy testing (PIAT-Reading; WRAT-4, Sentence Comprehension) may improve methods of predicting premorbid ability. Indeed, the PIAT-Reading subtest correlated more highly ( $r=.99$ ,  $p<.001$ ) than other more frequently used measures of reading recognition.

**Conclusions:** A number of novel measures of reading/literacy appear to have predictive potential in the improving the estimation of premorbid ability. Regression models including subjective education quality will be discussed for clinical utility as well.

Correspondence: *Jeffery B. Allen, Ph.D., SOPP, Wright State University, 3640 Colonel Glenn Highway, Dayton, OH 45435-0001. E-mail: jeffery.allen@wright.edu*

**A. VERMEIJ, A.H. VAN BEEK, M.G. OLDE RIKKERT, J.A. CLAASSEN & R.P. KESSELS. Age Effects on Cerebral Oxygenation during Working Memory Performance: A Functional Near-Infrared Spectroscopy Study.**

**Objective:** Aging is accompanied by a decline in working memory performance. Evidence exists that compensatory neural activity is apparent in older adults during working memory tasks, but the underlying neurocognitive mechanisms are unclear. Functional Near-Infrared Spectroscopy (fNIRS), a noninvasive neuroimaging technique, may provide a way to elucidate the neurophysiological mechanisms of compensation. This study examined brain activation by using fNIRS in young and older adults during working memory performance.

**Participants and Methods:** 18 healthy young (21-32 years) and 18 older adults (64-81 years, MMSE=29.2±0.9) performed a verbal 0- and 2-back task. Oxygenated ( $O_2Hb$ ) and deoxygenated hemoglobin (HHb) changes, as indices of brain activation, were registered by two fNIRS channels located over left and right dorsolateral prefrontal cortex.

**Results:** High working memory load led to declined accuracy in comparison to the control condition in older adults, while the young had the same level of accuracy in both conditions. fNIRS results demonstrated an increased concentration of  $O_2Hb$  during the 2-back condition in both groups ( $p<.001$ ) and a decrease of HHb in older adults ( $p=.009$ ). After the beginning of the 2-back task, a significant increase in brain activation and its maximum level were reached earlier in older adults than in young adults ( $p=.009$ ).

**Conclusions:** Older adults showed a stronger recruitment of prefrontal areas during working memory performance in comparison to young adults, suggesting an attempt to compensate for age-related decline. Also, our study indicates that age effects on the time course of hemodynamic processes must be taken into account in the interpretation of neuroimaging studies that rely on blood oxygen levels, such as fMRI.

Correspondence: *Roy P. Kessels, PhD, Department of Medical Psychology, Radboud University Nijmegen Medical Centre, PO Box 9101, Nijmegen 6500 HB, Netherlands. E-mail: r.kessels@mps.umcn.nl*

**A. IWAHARA, T. HATTA, E. ITO & N. NAGAHARA. Are Cognitively Stimulating Activities Really as a Buffer of Cognitive Decline in Aging?**

**Objective:** The aim of this study was to investigate the relationship between cognitive stimulating experience and cognitive function of the aged people. There is epidemiological evidence that a lifestyle characterized by engagement in leisure activities of intellectual and social nature associate with slower cognitive decline in healthy elderly. Especially, cognitive stimulating experiences are thought to contribute cognitive reserve. However, this hypothesis has not been investigated systematically in Japan.

**Participants and Methods:** We assessed current engaging conditions to cognitive activities and cognitive functions for 302 healthy aged (40–89 years old) community dwellers. The cognitive functions were measured by means of logical memory test (test for assess episodic memory), Money road test (test for assess visuospatial ability), Stroop test (test for assess executive function), D-CAT (test for assess attention) and verbal fluency test (test for the assessment of verbal ability).

**Results:** The results showed that current cognitive activity of the aged contribute to slower decline of episodic memory. However, there is no interaction between cognitive activities and other cognitive functions except for episodic memory.

**Conclusions:** The results indicated that cognitively stimulating activities don't play a role in a buffer of cognitive decline in aging. Based on these findings, the relationship between cognitive reserve and self-efficacy will be discussed.

Correspondence: *Akihiko Iwahara, Ph.D., School of Health and Nursing Science, Wakayama Medical University, 1-2-4, Sumiyoshi, Sumiyoshi-ku, Osaka 5580045, Japan. E-mail: iwahara@wakayama-med.ac.jp*

### C. BUIZA, B. MORALES, U. DIAZ, A. GARCIA, C. SOBRINO & J. YANGUAS. A Brief Scale for the Assessment of Occupational Complexity: a Tool to Study Cognitive Reserve (Pilot Study).

**Objective:** Cognitive reserve has been described as the capacity of the brain to better tolerate the effects of neuropathological damage associated with dementia without showing clinical symptoms (Stern, 2002). Occupational complexity, defined as the amount of cognitive resources people use to develop their jobs, is one of the factors more often studied to explain cognitive reserve. Nevertheless, there are very few accurate tools to measure occupational complexity. Hence, our goal was to develop a scale for the measurement of the occupational complexity, as a previous step for the further investigation of the relationships between both factors, cognitive reserve and occupational complexity. In this abstract, the first results obtained in the validation process of the scale are presented.

**Participants and Methods:** The creation of the scale was based on the occupational tasks defined by an organizational model of person-job adjustment (Sarrionandia, 2006). The occupational complexity scale has 10 items with three alternative responses. Initially, we constructed a preliminary 60-item scale, that was finally reduced to a selection of the most representative 10 items, in order to facilitate its inclusion in a broader assessment protocol that was used with a sample of 100 community-dwelling elderly people from Northern Spain ranging from 50 to 90 years of age (average = 71.08, sd = 6.792).

**Results:** After a factorial analysis, three factors have been identified in the scale: intellectual component, physical component and social component.

**Conclusions:** Due to its shortness and the amount of information than can be gathered in a short amount of time, we present this occupational complexity scale as a suitable tool to be used for the measurement of occupational complexity in relation to cognitive reserve. Further studies related with the psychometric properties of the scale are pending, and planned for a near future.

Correspondence: *Mari F. Gonzalez, Fundación Instituto Gerontológico Matia - INGEMA, Camino de los Pinos, nº 27, San Sebastian 20018, Spain. E-mail: mari.gonzalez@ingema.es*

### C. BUIZA, D. FACAL, M.F. GONZALEZ, P. LLAVERO, A. NAVARRO & E. URDANETA. Factorial Structure of Cognitive Functions in a Sample of Spanish Middle-aged and Older Adults.

**Objective:** Relationships between cognitive measures containing executive function, processing speed, memory span, verbal memory and language tasks were examined in elderly people.

**Participants and Methods:** A wide range of data were collected in a sample of adults (n=101) ranging from 50 to 90 years old, including a phonological fluency task, the Trail Making Test form A, the WAIS-III Digit-Symbol Substitution subtest and two measures of incidental memory from the Digit-Symbol pairs, a direct digit span task, a Spanish version of the Auditory Verbal Learning Test (AVLT) and a Spanish version of the WAIS-III Vocabulary subtest.

Bivariate correlations and exploratory factor analysis (EFA) were conducted using SPSS 13.0 for Windows. Confirmatory factor analysis (CFA) was conducted using Lisrel 8.80.

**Results:** EFA showed a three-factor solution (Attention, Verbal memory and Executive function). Attention included Trail Making Test form A latency, Digit-Symbol test scores (including both incidental memory measures (matching and free recall)). Verbal memory included three measures of the AVLT's Spanish version (immediate recall after 1 and 5 presentations of the 15-words list, and delayed recall). Executive function included direct digit span, phonological fluency and vocabulary scores.

To test the previously identified three-factor structure, a CFA analysis was carried out, which showed an adequate adjustment.

**Conclusions:** Relations between language tasks and processing resources are discussed. In our model, WAIS-III Vocabulary subtest is related with executive measures. According to Bowles and Salthouse (2008), different vocabulary test formats have the same age trends after accounting for differential relations to other cognitive variables, primarily reasoning. It is therefore needed to take into account multiple vocabulary tests formats (i.e. multiple-option choice tasks) in order to accurately measure verbal knowledge and reasoning capabilities in the elderly.

Correspondence: *Mari F. Gonzalez, Fundación Instituto Gerontológico Matia - INGEMA, Camino de los Pinos, nº 27, San Sebastian 20018, Spain. E-mail: mari.gonzalez@ingema.es*

### A. BARCZAK & M. MANDECKA. Detecting cognitive impairments with modified Clock Drawing Test in elderly population. Preliminary report.

**Objective:** Clock Drawing Test (CDT) is a popular screening tool for cognitive impairments in elderly people. On requirements of Pol Senior Project, tree-parts clock completing test was used. It evaluates visuospatial and planning abilities, as well as abstractive thinking.

**Participants and Methods:** The original version was modified. In the first attempt Manos and Wu's scoring was implemented, reducing total correct points to 8 (lack of clock's hands). In the later two trials, only length and position of both hands were assessed. Total possible points' sum was between 0 and 16. Qualitative estimate has been changed into enumerated, converted level of disturbance. The distribution was as follows: 16–14 pts-no impairments (level 4), 13–10-possible impairment (level 3), 9–5-credible impairment (level 2), and 4–0-certain impairment (level 1). Because of large number of first clock's incompleting sheets, it was decided to assess all parts separately, and correlate levels of disturbances with MMSE scores.

**Results:** Results of CDT was obtained from 1777 persons, aged 54 - 100 (males and females), mean age was 75,57 (sd 10, 93). Mean converted level of disturbance was 2,86 (sd 1,12), and 25,18 (sd. 4,65) for MMSE, respectively. Both measures revealed the presence of possible cognitive impairments in population. Ratios of correlations of individual parts of CDT and level of disturbances with MMSE scores was 0,502 for the first clock, 0,536 for second one, 0,506 for third part, 0,576 for total amount, and 0,563 for level of disturbances. Correlations between MMSE and CDT scores were moderate, but statistically significant.

**Conclusions:** Defining levels of cognitive disturbance, based on suggested criteria seems to be useful in screening estimation of cognitive functioning in elderly people. Implementing selection and separate analysis of uncompleted due to formal reason results might be helpful in more exact CDT analysis. Further research are essential.

Correspondence: *Anna Barczak, Neurodegenerative Dept., CSK MSWiA Hospital, Woloska 137, Warsaw 02-507, Poland. E-mail: ankabarczak@gmail.com*

### N. GAWRON. Neuropsychological Patterns of Cognitive Normal Aging and Theories of Brain Aging.

**Objective:** The study aimed at determining if normal aging is characterized by most apparent cognitive pattern typical for: a) subcortical frontal lobe dysfunction, b) mild Alzheimer's disease or c) decline of right hemisphere functions.

**Participants and Methods:** The study was run on five groups: 20 normal young elderly (YE), 30 normal old elderly (OE), 14 mild SIVD, 14 early AD, and 15 RHD patients. OE were significantly older than other groups and had better general cognitive status than AD and RHD groups. Groups did not differ in education and depression. Neuropsychological testing concerned verbal memory and learning, working memory, attention, visuospatial function, executive function, verbal reasoning. Factor analysis was run on the all sample standardized scores and then hierarchical cluster analysis was performed on factor scores, giving a five-cluster solution.

**Results:** Clusters did not differ in age, education and depression. 13,3% of OE were assigned to a no cognitive deficits cluster (YE - 55,6% of the cluster, OE - 22,2%, SIVD - 16,7%, RHD - 5,6%), 40 % to a low psychomotor speed cluster (OE - 50%, AD - 20,8%, SIVD - 16,7%, RHD - 8,3%, YE - 4,2%), 33,3% to a low attention cluster (OE - 31%, either YE, SIVD and RHD - 18,8 %, AD - 12,5%), and 13,3% to a low executive function cluster (RHD - 40%, OE - 26,7%, YE - 20 %, either SIVD and AD - 6,7 %).

**Conclusions:** The classification of normal cognitive aging seems functional rather than brain injury-based. Existing theories of brain aging are not fully applicable to explain it.

Correspondence: *Natalia Gawron, Faculty of Psychology, Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: ngawron@gmail.com*

**L.A. RABIN, A.J. SAYKIN, M.J. BROWN, H.A. WISHART, L.A. FLASHMAN, N. PARE, J.J. ENGLERT & R.B. SANTULLI. Complaints Associated with Current Cognitive Functioning and Progression to Dementia: The Predictive Value of Patient and Informant Report Items.**

**Objective:** Subjective cognitive complaints are an important criterion in most diagnostic conceptualizations of amnesic mild cognitive impairment (MCI), and specific complaints may differentiate concerns associated with normal aging from those associated with incipient dementia. We previously introduced a cognitive complaints index (CCI; Saykin et al., 2006), calculated as the percentage of items endorsed across seven self- and/or informant report questionnaires, and demonstrated its association with degree of gray matter loss in MCI and neuropsychologically intact elders with significant cognitive complaints who may constitute a pre-MCI stage. Our current objective was to reduce the number of CCI items and determine which complaints were most predictive of five important outcomes: baseline diagnosis, hippocampal volume, CVLT-II scores (long and short delay free recall trials), and diagnostic conversion over a follow-up period.

**Participants and Methods:** Participants were 110 euthymic older adults with varying degrees of cognitive impairment and/or complaints enrolled in a longitudinal memory and aging study. Reliability analysis revealed strong internal consistency (Cronbach's alpha > .84) for our original scales.

**Results:** We standardized participants' scores on individual items and calculated effect size estimates for each item using linear regression or ANCOVA, controlling for age, gender, and education. For both our informant and self-report measures, we selected 20 items with significant effect size estimates ( $p < .05$ ) on two or more criterion variables. Our new measures demonstrated strong internal consistency (Cronbach's alpha = .93 and .86, respectively), and significantly predicted all of the outcome variables.

**Conclusions:** We present the content domains of these new scales and outline plans to validate this brief, non-invasive assessment that may prove to be a useful predictor of future cognitive decline.

Correspondence: *Laura A. Rabin, Ph.D., Psychology, Brooklyn College, 2900 Bedford Avenue, Brooklyn, NY 11210. E-mail: lrabin@brooklyn.cuny.edu*

**S. FRISCH, B. VOGT, G. BECKER, H. BARTHEL, K. MÜLLER, A. VILLRINGER, O. SABRI & M.L. SCHROETER. The Inferior Frontal Junction Area and Executive Functions in Dementia.**

**Objective:** Although impairments of executive functions are common in different types of neurodegenerative disorders, their neural correlates are still unclear. We assessed executive deficits with different neuropsychological measures and correlated them with reductions in brain glucose utilization as measured by [<sup>18</sup>F]fluorodeoxyglucose positron emission tomography (FDG-PET).

**Participants and Methods:** Besides the Stroop test and a semantic fluency test, we also applied the Zoo Map test, the Action Program and the Key Search task of the Behavioral Assessment of the Dysexecutive Syndrome (BADS), a test battery which is supposed to be a more valid predictor of everyday life executive deficits. Brain glucose utilization was measured by [<sup>18</sup>F]fluorodeoxyglucose positron emission tomography and analyzed voxelwise using statistical parametric mapping in a sample of 54 subjects suffering mainly from Alzheimer's disease (AD) and frontotemporal lobar degeneration (FTLD). Subjects with other dementia syndromes, mild cognitive impairment and subjective memory complaints (but without measurable deficits) were included in addition.

**Results:** As expected, AD and FTLD subjects performed worse on executive tests compared to subjects with subjective memory complaints. Interestingly, we identified one region in which glucose utilization was consistently correlated with performance in all neuropsychological tests: the inferior frontal junction (IFJ) area.

**Conclusions:** As has been shown in previous neuroimaging studies in healthy participants, IFJ area is involved in executive processes of cognitive control (Brass et al., 2005, Derfuss et al., 2005). Our results support the view that IFJ area is crucial for executive functions. Furthermore, this is the first study which demonstrates the relevance of this area for executive deficits in developing dementia.

Correspondence: *Stefan Frisch, PhD, Cognitive Neurology, University Clinic Leipzig, Liebigstrasse 16, Leipzig 04103, Germany. E-mail: frisch@cbs.mpg.de*

**M. SNOUSSI, M. REBAÏ & H. CHARVIN. Emotion-cognition interaction in aging.**

**Objective:** Cognitive decline with age is more evaluated than emotional and cognitive-emotional ones. Therefore, emotion disturbs cognitive processing of old adults (Wurm et al., 2004). For our part, we evaluate the incidence of emotion on inhibition capacity with age on the Stroop task, comparing young and old adults in Standard and Emotional Stroop. In previous behavioral data (Snoussi et al., 2009), we exposed a relative increase of errors in Standard (SS) and Emotional (ES) Stroop conjointly but no differences in reaction time (RT), for both young and old subjects. In fact, we observed inhibition capacity decrease with age but no emotional impact. Nevertheless, is RT sufficient to explore and expose processing of emotion-inhibition interaction? What about brain activity?

**Participants and Methods:** We compare 15 young (7 men; 20-30 yrs) and 15 old (7 women; 65-85 yrs) adults in Standard (inhibition) and Emotional (inhibition + emotion) Stroop, using visual Event-Related Potentials (DELTAMED), analyzing amplitude, latency and phase duration variation at prefrontal (PF1-PF2), temporal (P7-P8) and occipito-temporal (XO1-XO2) levels.

**Results:** The ERP data revealed that when inhibition load is low or absent, old subjects show a superior activity at prefrontal and temporal levels in SS comparatively to ES, when young subjects show ES superiority. However, with inhibition load increase, old adults present a superior activity in ES, when young ones present no differences between SS and ES.

**Conclusions:** The results of our task indicate the influence of emotion on inhibition capacity augments with age at cortical level but not behavioral one.

Correspondence: *Molka Snoussi, Phd student, Psychology, Rouen University, Rue Lavoisier, Mont saint aignan 76821, France. E-mail: molkaemail@yahoo.fr*

**Symposium 3:  
Distributed Processing of Auditory Information**

**Chair: Stephanie Clarke**

**3:00-4:30 p.m.**

**S. CLARKE, J. KAISER, M. GRUBE & C. MCGETTIGAN. Distributed Processing of Auditory Information.**

**Symposium Description:** The human auditory cortex processes a wide range of auditory information. Past work has demonstrated that information relevant to sound recognition and to sound localisation are processed in partially segregated pathways, referred to as What and Where streams. Recent data from EEG, MEG, fMRI, TMS and neuropsychological studies suggest that coding of specific auditory features relies on specialised distributed networks within these pathways, rather than on single, specialised regions. We will highlight the characteristics and discuss the advantages of these networks:

-The coding within specialised networks is rapid and specific. As soon as 70 ms post-stimulus onset, distinct temporo-spatial patterns of activation reflect behaviourally relevant stages of processing, such as discrimination of sound object categories or the grouping of spatially distributed features belonging to the same object.



-The maintenance of auditory information in short-term memory relies on oscillatory activations within parieto-occipital networks for spatial and prefrontal for non-spatial aspects for auditory information, suggesting that short-term memory-relevant coding involves distinct networks outside the early-stage auditory areas.

- Distributed processing underlies the analysis of time and time events in audition. Neuropsychological and TMS data suggest that distinct networks are involved in the duration-based timing of single intervals and the relative timing of intervals within rhythmic sequences.

- The coding within specialised networks is plastic and modulated by learning. While intelligible speech activates distinct networks within the left temporal and parietal cortices, learning to understand degraded speech increases the involvement of parts of these networks and recruits additional prefrontal networks.

Correspondence: *Stephanie Clarke, Dr. med., Service de Neuropsychologie et de Neurorehabilitation, CHUV, Bugnon 46, Lausanne CH 1011, Switzerland. E-mail: Stephanie.Clarke@chuv.ch*

### J. KAISER. Short-term memory processing of spatial and nonspatial sound features.

**Objective:** Dual processing streams have been proposed for the processing of spatial versus nonspatial auditory information, involving posterior temporo-parietal and anterior temporal/inferior frontal cortical regions, respectively. In earlier magnetoencephalography (MEG) studies assessing both event-related fields and induced oscillatory activity during passive mismatch paradigms, we have demonstrated sequential processing along these putative processing streams. More recently we have investigated the retention of spatial and nonspatial sound information in short-term memory (STM).

**Participants and Methods:** The present MEG study was designed to identify the topography and time courses of stimulus-specific components of oscillatory activity during auditory STM. Sample sounds were characterized by both a variable interaural time delay and a variable central frequency. In separate task blocks, either stimulus lateralization or frequency was task-relevant.

**Results:** Statistical probability mapping of oscillatory activity during the retention phase revealed parieto-occipital GBA components distinguishing between medial and lateral sounds in the spatial memory task. In contrast, lower- and higher-frequency stimuli were associated with frontal GBA in the frequency task. Memory for lateralization versus frequency selectively enhanced oscillatory activity for these posterior versus frontal components. The posterior topography of components representing spatial features would be consistent with space processing regions possibly involving visual imagery. In contrast, the frontal activations could reflect the involvement of the putative auditory ventral stream.

**Conclusions:** In summary, these findings suggest that short-term memory-relevant sound features are processed in distinct regions outside early auditory cortex.

Correspondence: *Stephanie Clarke, Dr. med., Service de Neuropsychologie et de Neurorehabilitation, CHUV, Bugnon 46, Lausanne CH 1011, Switzerland. E-mail: Stephanie.Clarke@chuv.ch*

### S. CLARKE. Temporo-spatial organisation of the auditory What and Where processing streams.

**Objective:** Evidence from human and non-human primate studies supports a dual-pathway model of audition, with partially segregated cortical networks for sound recognition and sound localisation, referred to as the What and Where streams. In normal subjects, these two networks involve, respectively, the temporal and parietal convexities.

**Participants and Methods:** Recent electrophysiological studies demonstrated a rapid and specific processing within each stream.

**Results:** As rapidly as 70 ms poststimulus onset different sound categories engage distinct neural populations within the right What stream (living vs non-living; Murray et al., 2006). This step is followed, at 150-215 ms, by a differential neural activity within the left What stream to already heard objects (Murray et al. 2008). The relatively fine discrimination between human vs animal vocalizations engages different neural populations at about the same time within the right What stream (De Lucia et al. in preparation). At a later stage, sounds cueing responsive actions recruit, in addition to the parieto-temporal cortices, premotor and prefrontal regions (at 310-

360 ms; De Lucia et al. 2009). Within the Where stream, behaviourally relevant spatial processing, such as echo suppression, is associated with differential neural activity as rapidly as 70 ms post-stimulus onset (Tardif et al. 2006; Spierer et al. 2008; 2009). Learning induced changes in neural coding of spatial positions engage distinct neural networks at a later stage, 195-250 ms (Spierer et al. 2007).

**Conclusions:** Thus, the current evidence suggests that within each auditory stream distinct temporo-spatial patterns of neural activity reflect behaviourally relevant stages of processing.

Correspondence: *Stephanie Clarke, Dr. med., Service de Neuropsychologie et de Neurorehabilitation, CHUV, Bugnon 46, Lausanne CH 1011, Switzerland. E-mail: Stephanie.Clarke@chuv.ch*

### M. GRUBE, F.E. COOPER, K. ALTER & T.D. GRIFFITHS. Auditory Processing of Time.

**Objective:** The processing of time and timed events is essential in auditory perception but our understanding of the processing of time in the brain is limited. We propose the existence of two types of perceptual subsecond timing functions: the absolute or duration-based timing of single intervals and the relative timing of intervals within rhythmic sequences with a regular beat. We hypothesize the two types to be differentially relevant to speech and music perception and present a comprehensive approach using a number of methodologies investigating this functional dissociation.

**Participants and Methods:** Neuropsychological data from patients with cerebellar degeneration support the hypothesized dissociation by showing a selective impairment in the absolute, duration-based timing of single intervals contrasted by a preservation of relative, beat-based timing. This dissociation was further corroborated by evidence from the use of repetitive transcranial magnetic theta-burst stimulation (TBS) that interferes acutely with the underlying processes.

**Results:** The processing of rhythmic sequences with a regular beat was investigated using electro-encephalography (EEG) and showed significant differences in the evoked potentials (ERPs) that support cortical processes of temporal expectation of events based on a strongly metrical beat. The question of auditory temporal processing and its relation to language development was addressed in a behavioural study in a large unselected group of school children (n=234) age 11: the data support a critical role of auditory sequence processing.

**Conclusions:** The data are consistent with a timing network in the brain and the differential involvement of its components (including cortical areas, cerebellum and basal ganglia) in the different types of timing.

Correspondence: *Stephanie Clarke, Dr. med., Service de Neuropsychologie et de Neurorehabilitation, CHUV, Bugnon 46, Lausanne CH 1011, Switzerland. E-mail: Stephanie.Clarke@chuv.ch*

### C. MCGETTIGAN. Neural systems underlying plasticity and individual differences in auditory speech processing.

**Objective:** We continuously meet people who talk in different ways, in different auditory environments, meaning that auditory speech perception needs to be plastic. I will describe an fMRI study on the perceptual learning of degraded speech (Eisner, McGettigan, Faulkner, Rosen & Scott, in press, Journal of Neuroscience).

**Participants and Methods:** In the scanner, participants received training on a set of noise-vocoded sentences, half of which were potentially intelligible (Learnable) while the other half were rendered unintelligible through spectral inversion (Inverted). Regular test blocks on the Learnable sentences were included to establish the time-course of the behavioural improvement in sentence comprehension for each participant.

**Results:** We identified basic intelligibility responses (Learnable – Inverted) in left STS and IFG, while two sites in left parietal cortex (angular gyrus and supramarginal gyrus) showed changes in signal that tracked the behavioural improvements over time. Further individual differences analyses revealed two overlapping sites in left IFG where activation correlated significantly with the amount of learning in the speech task and post-hoc performance on a battery of working memory tasks. A correlational analysis of connectivity between the four regions of interest indicated a role for connections between left IFG and angular gyrus in the use of top-down information to support learning.

**Conclusions:** Distinct neural systems underly the plasticity and individual differences in auditory speech processing.

Correspondence: *Stephanie Clarke, Dr. med., Service de Neuropsychologie et de Neurorehabilitation, CHUV, Bugnon 46, Lausanne CH 1011, Switzerland. E-mail: Stephanie.Clarke@chuv.ch*

#### Symposium 4: Theory of Mind: Facets and Mechanisms of Impairment

Chair: *Anna Rita Giovagnoli*

3:00–4:30 p.m.

##### A. GIOVAGNOLI, A. GIOVAGNOLI, R. CORCORAN, R. RENIERS, S. BROICHER & A. RAGLIO. Theory of Mind: Facets and Mechanisms of Impairment.

**Symposium Description:** Theory of mind (ToM), the ability to attribute mental states (knowledge, affects, intentions, will, desires) to others or own-self, and to understand if such states correspond to real situations or to a manipulation or altered perception of reality (e.g., persuasion, lie, irony, metaphor, delusion), plays an important role in self-awareness as well as in social cognition. Since its initial description in scientific literature in chimpanzees (Premack & Woodruff, 1978), an increasing number of studies showed ToM impairments in human conditions such as autism, schizophrenia, and childhood and adult brain damage affecting the amygdale, prefrontal medial and orbital cortex, temporal pole or temporoparietal junction. In such conditions, a variety of aspects were explored using different behavioural and neuropsychological methods, highlighting the complexity of ToM affective and cognitive components and interactions.

This symposium addresses some aspects of ToM in adult life, in healthy and brain damaged subjects, focusing on aspects and still unresolved questions that have implications in the diagnosis and treatment of neurological and psychiatric disorders. Specifically, five arguments will be treated: the specificity and relationships of ToM to age, education, and gender in healthy subjects, the difference between ToM and empathy in terms of cognitive-behavioural construct and neural substrates, the arguments and evidence relating ToM to paranoid thinking, the impairments of ToM in patients with mesial temporal lobe epilepsy, and the implications of ToM in musical communication and music therapy in psychiatric and neurological patients.

Correspondence: *Anna Rita Giovagnoli, M.D., Ph.D., Clinical Neurosciences, Carlo Besta Neurological Institute, Via Celoria 11, Milano 20133, Italy. E-mail: rgiovagnoli@istituto-besta.it*

##### G. ANNA RITA. Theory of Life in Adult Life.

**Objective:** Different researchers established that in children does exist a consistent sequence of stages in theory of mind (ToM) development, stable across cultures and independent from general intelligence (Abu-Akel & Bailey, 2000). In adult life, ToM modularity and distinction from other cognitive domains has received inconstant determination and the specific cognitive operations contributing to normal ToM functioning are unclear. In particular, there is no agreement as to whether ToM is independent from fluid and crystallised intelligence, language, memory, the ability to inhibit interference from reality or executive functions. Other questions include the influence of gender, age and education. Clarifying these aspects should help understanding the mechanisms (e.g., thinking alterations, ageing related decline) that characterize ToM impairments in neurological and psychiatric adult patients. We evaluated ToM in healthy adults aiming to determine its components and its relationships to other cognitive abilities and demographic variables.

**Participants and Methods:** A hundred and twenty-four healthy subjects were evaluated using a faux pas task that assesses the comprehension of others' mental states and neuropsychological tests for executive functions, attention, memory, language, and visuospatial abilities.

**Results:** Data analysis showed that ToM includes two main factors, the recognition of beliefs/emotions and intentions, that are distinct from other cognitive factors and independent from age and schooling: women showed better ToM performances than men. These results were replicated in neurological patients.

**Conclusions:** These findings suggest that in adult subjects ToM is a modular function, independent from age and schooling, maybe characterized by a life long development process, important not only to social interactions but also to survival.

Correspondence: *Anna Rita Giovagnoli, M.D., Ph.D., Clinical Neurosciences, Carlo Besta Neurological Institute, Via Celoria 11, Milano 20133, Italy. E-mail: rgiovagnoli@istituto-besta.it*

##### R. CORCORAN. Theory of mind and paranoid delusions.

**Objective:** In 1992 Chris Frith argued that schizophrenia could be understood as a disorder of metarepresentation and in so doing he placed theory of mind difficulties (or problems representing other people's thoughts, intentions and beliefs) at centre stage in our understanding of the cognitive aetiology of schizophrenia. 18 years on, a plethora of studies focussing on this construct have demonstrated that it is indeed impaired in people with a diagnosis of schizophrenia. What is less well agreed is the central importance that this socio-cognitive skill has in explaining paranoid or persecutory delusions. This talk will explore the evidence that links paranoia to theory of mind difficulties.

**Participants and Methods:** Literature on theory of mind and paranoia was critically revised.

**Results:** The results of different studies demonstrated specific mechanisms linking theory of mind and delusional beliefs.

**Conclusions:** There is evidence that theory of mind difficulties are transdiagnostic features of paranoid thinking.

Correspondence: *Anna Rita Giovagnoli, M.D., Ph.D., Clinical Neurosciences, Carlo Besta Neurological Institute, Via Celoria 11, Milano 20133, Italy. E-mail: rgiovagnoli@istituto-besta.it*

##### R. RENIERS. Theory of mind and empathy.

**Objective:** The concepts of Theory of Mind (ToM; the ability to attribute mental states to others) and empathy (the ability to be sensitive to and vicariously experience the feelings of others and being able to construct a working model of their emotional states) are closely related. This is not without a reason, as failure to represent other people's beliefs, knowledge and intentions may result in a failure to see things from other people's perspective and thus interferes with empathy. We discuss the results of imaging studies comparing ToM and empathy.

**Participants and Methods:** Previous studies on ToM and empathy were revised.

**Results:** Neuroimaging studies investigating the functional neuroanatomy of ToM and empathy have reported overlapping, but also distinct, areas. Performance on ToM tasks can be impaired while other abilities remain intact, suggesting that a specific neural system underlies ToM. In contrast, a broad range of imaging studies has tapped different aspects of the empathic experience, resulting in a complex network of prefrontal and temporal structures. Recent studies directly compare brain activations associated with these two processes.

**Conclusions:** Differential patterns of responding in temporal pole, temporoparietal junction and prefrontal regions suggest that components of a putative ToM/empathy network may play subtly distinct roles. This may be grounded in the additional recruitment of networks involved in emotional processing for the empathic experience. These findings have implications for understanding the complex neuronal mechanisms of social cognition.

Correspondence: *Anna Rita Giovagnoli, M.D., Ph.D., Clinical Neurosciences, Carlo Besta Neurological Institute, Via Celoria 11, Milano 20133, Italy. E-mail: rgiovagnoli@istituto-besta.it*

##### S. BROICHER. Theory of mind and epilepsy.

**Objective:** Numerous clinical studies have revealed that psychosocial maladjustment is a serious issue for many patients with epilepsies (Hermann et al., 2000). To what extent these maladjustments are caused by social burdens, stigma, and the risk factors of epilepsy, and to what extent they are due to dysfunctional social cognition, is still a matter of controversy (Shackleton et al., 2003). Mesial temporal lobe epilepsy (MTLE) is the most prevalent focal epilepsy syndrome. It is typically associated with structural and functional lesions involving critical limbic and neocortical structures (Jokeit et al., 1997). These fronto-temporo-limbic structures have also been found to play a critical role in "Theory of Mind" (ToM) (Amodio & Frith, 2006). Despite knowledge

about the remarkable overlap between structures associated with ToM and those which are frequently affected in patients with epilepsy, social-cognitive abilities have received little attention in this patient group. However, recent studies have demonstrated impairments in social cognition in patients with MTLE using specific tasks involving emotional recognition (Meletti et al., 2009). In this study, we evaluated ToM impairment in patients with MTLE.

**Participants and Methods:** Patients with left or right TLE or frontal lobe epilepsy and healthy subjects were compared using neuropsychological tests for ToM and other cognitive functions.

**Results:** Accordingly, we were able to demonstrate that patients with MTLE, as compared to patients with epilepsy not originating in the mesiotemporal or frontal lobe and healthy controls, were impaired in their ability to recognize a faux pas, a typical ToM skill (Schacher et al., 2006).

**Conclusions:** This finding suggests that MTLE as such could be a specific etiology of deficits in higher-order social cognition such as ToM. This would have consequences for the diagnostics and treatment of this epilepsy syndrome.

Correspondence: *Anna Rita Giovagnoli, M.D., Ph.D., Clinical Neurosciences, Carlo Besta Neurological Institute, Via Celoria 11, Milano 20133, Italy. E-mail: rgiovagnoli@istituto-besta.it*

#### A. RAGLIO. Theory of mind, music and music therapy.

**Objective:** This presentation shows the state of the art and introduces new perspectives of research about theory of mind, music and music therapy.

**Participants and Methods:** Literature on music, music therapy and theory of mind was critically revised.

**Results:** One of the specific and recent field of research about music and neuroscience is the relationship between music and the theory of mind (Koelsch, 2009). Another study (Molnar-Szakacs and Overy, 2006) proposes that the music can stimulate the mirror neuron system and thus can communicate meaning and human affect.

**Conclusions:** We suggest that the use of the music therapy intervention based on intersubjective approach (Fogel, 1993; Tronick, 1998; Stern, 1985, 2004; Trevarthen & Aitken, 2001) can stimulate the Social Cognition area in the brain and can allow to improve the ability to process the mental state attribution (the other's intentions, desires and beliefs).

Correspondence: *Anna Rita Giovagnoli, M.D., Ph.D., Clinical Neurosciences, Carlo Besta Neurological Institute, Via Celoria 11, Milano 20133, Italy. E-mail: rgiovagnoli@istituto-besta.it*

### Paper Session 2: Intervention/Rehabilitation

Moderator: Maria Pachalska

3:00–4:30 p.m.

R. TATE, S. MCDONALD, M. PERDICES, L. TOGHER, K. GODBEE, A. CASSEL, B. COWARD & U. ROSENKOETTER. **Single-case Experimental Designs and N-of-1 Trials in Rehabilitation Research.**

**Objective:** Increasingly, single-case experimental designs (SCED) are used to examine treatment effect in people with neuropsychological impairment. They are well suited to this population having the capacity to tailor treatment to the patient. The aim of this study was to survey the methodological quality of a sample of published SCEDs using the SCED rating scale of methodological quality. The SCED scale contains a core set of 11 criteria recommended for these research designs and it has high inter-rater reliability.

**Participants and Methods:** We retrieved 253 SCEDs archived on PsycBITE (www.psychbite.com), which contains all the published literature on non-pharmacological interventions for acquired brain impairment. Each trial was rated with the SCED scale.

**Results:** The 253 trials spanned the range of methodological quality from 0 (1.6%) to 10 (0.4%), but only 52% of trials scored 5/10 or higher. No single item on the SCED scale was passed by all trials. The most frequently passed item was item 2 (specification of the target behaviours, 83%); the least frequently passed item was item 8 (independent assessors, 14%).

**Conclusions:** These results demonstrate considerable variability in methodological quality of SCEDs in neuropsychological rehabilitation. Moreover, many reports had low SCED scale scores, with nearly half of the reports failing to meet criteria on 50% of the SCED items. This raises concerns about the degree to which readers can rely upon the results of those studies with low SCED scores. Use of the SCED scale provides one means for researchers and clinicians to ensure that the basic criteria integral to SCEDs are met.

Correspondence: *Robyn Tate, Rehabilitation Studies Unit, University of Sydney, 59 Charles St, PO Box 6, Ryde, NSW 1680, Australia. E-mail: urosenkoetter@med.usyd.edu.au*

#### J. SARAJUURI & Y. BEN-YISHAY. Correlates of Self-Appraisal with Selected Outcomes of Neuropsychological Rehabilitation: An International Pilot Study.

**Objective:** The aim of this study was to explore, in a large number of successfully rehabilitated traumatically brain-injured persons, from a variety of programs, in different countries, whether or not the relationship between objectively measured outcomes of neuropsychological rehabilitation and the subjective valuations by the patients themselves of those outcomes, could be established.

**Participants and Methods:** This cross-cultural, multi-center pilot study involved 201 brain injured individuals from ten countries. Following systematic and comprehensive out-patient neuropsychological rehabilitation, these individuals resumed working in some, part-time or full-time, capacity; and experienced no functionally incapacitating, medical or psychological problems, for a minimum of six months after discharge from active rehabilitation. All subject were asked to rate themselves in six areas of post rehabilitation outcomes on a self-appraisal instrument that was proposed by Ben-Yishay and Daniels-Zide (2000).

**Results:** Results showed that (a) these, successfully rehabilitated individuals rated the outcomes of their rehabilitation in a similar fashion and (b) their self-ratings correlated highly with the objectively assessed outcomes of their rehabilitation. Results further suggested that (c) this subjective self-rating instrument may become a useful (and reliable) cross-cultural method of assessing successful neuropsychological rehabilitation of brain injured individuals in western oriented cultures.

**Conclusions:** The results support the suggestion that the positive relationship between objectively measured outcomes in successfully rehabilitated brain injured individuals and measures of self-appraisal, found in the context of an intensive holistic type of neuropsychological rehabilitation programs, would be found. This finding fits-in well with the growing trend in positive psychology to consider experiential issues following rehabilitative interventions.

Correspondence: *Jaana Sarajuuri, LichPsych, Käpylä Rehabilitation Centre, Nordenskiöldinkatu 18 B, Helsinki 00251, Finland. E-mail: jaana.sarajuuri@invalidilitto.fi*

#### R.P. KESSELS, A. DECHAMPS, L. FASOTTI & M.G. OLDE RIKKERT. A Comparison of Trial and Error Learning, Errorless Learning and Learning by Modeling of Everyday Activities in Alzheimer Patients.

**Objective:** Recent advancements in cognitive rehabilitation have shown promising results on learning methods in Alzheimer's dementia about (re)learning instrumental activities of daily living. We aimed to determine whether Errorless Learning (EL), Learning by Modeling (LM) or Trial and Error Learning (TEL) were advantageous learning methods in the acquisition of an instrumental activity of daily living (IADL) in people with mild to moderately severe stage of Alzheimer's dementia.

**Participants and Methods:** Using a counterbalanced within-subject design, all participants took part in all learning conditions. EL consisted of straightforward prompts before any action, LM focused on the modeling of each step of the tasks by the therapist and standard TEL without cues was used as a control condition. The participants had to (re)learn three instrumental activities of daily living over two weeks (6 sessions of 30 per task). Performance and errors were measured using a comprehensive standardized assessment. Repeated-measure analyses during learning and with one and four weeks follow-up were performed.

**Results:** Patients who received the LM and the EL procedures had significantly better learning performance compared to Trial and Error at the physical performance, with a mean difference at four-week follow-up of 15.4 CI95% [5.6-25.3],  $p=0.003$  and 9.6, CI95% [3.5-15.6],  $p=0.003$  respectively.

**Conclusions:** This pilot study showed that new learning and relearning of IADLs is possible in AD patients using strict EL and using LM. The improvements were maintained at one month after the training. Since both EL and LM are characterized by a reduction of errors during learning compared to TEL, these results provide evidence that errorless learning principles may be beneficial in dementia care.

Correspondence: *Roy P. Kessels, PhD, Department of Medical Psychology, Radboud University Nijmegen Medical Centre, PO Box 9101, Nijmegen 6500 HB, Netherlands. E-mail: r.kessels@mps.umcn.nl*

**S. GUERREIRO, A. CASTRO CALDAS, A.R. DORES, B. MARTINS-ROCHA, I. ALMEIDA, S. VICENTE & F. BARBOSA. Outcome Evaluation of a Neuropsychological Rehabilitation Program Through a Follow-up Study.**

**Objective:** Evaluate the outcome of a neuropsychological rehabilitation holistic program implemented in CRPG - vocational rehabilitation centre in North Portugal- through a follow-up study. We will analyze the current status of people with traumatic brain injury (TBI) who have participated in this programme. The comparison will be made relatively to employment status, emotional stability and functional ability, regarding the type of rehabilitation program attended and the outcome after program discharge.

**Participants and Methods:** Two groups have been constituted from a data base with 111 persons with TBI in chronic condition, evaluated in CRPG between 2001 and 2009: Group I, N= 59 undergone the holistic program and Group II - N= 52 undergone physical-functional rehabilitation.

For data collection we have been undertaking reevaluations in the form of semi-structured interviews and questionnaire filling. The injury severity has been measured by GCS; the functionality has been measured by GOSE; the anxiety and depression have been measured by HADS and the socio-demographical variables have been gathered by structured interview.

Comparison of both groups, matching participants by demographics characteristics and injury severity, regarding the follow-up variables: employment status, emotional stability and functional ability through the Independent-Samples T Test procedure. The comparison of the result of the orientation after holistic program discharge and the current status will be made through a Chi-square analysis.

**Results:** It is expected that Group I presents significantly higher values in functional ability, emotional stability and employment integration than Group II.

**Conclusions:** We hope this study contribute to the evaluation of impacts of neuropsychological rehabilitation as to the awareness of its relevance.

Correspondence: *Sandra Guerreiro, University Degree, Av. João Paulo II, Arcozelo - VNG 4410-406, Portugal. E-mail: sandra.guerreiro@crpg.pt*

**B.M. HAMPSTEAD, A.Y. STRINGER, R.F. STILLA, A. AMARANENI & K. SATHIAN. Neural networks mediating cognitive rehabilitation of memory in patients with mild cognitive impairment.**

**Objective:** We previously demonstrated that focused cognitive rehabilitation can be effective in patients with mild cognitive impairment (MCI). Here, we extended that work using a novel object-location association paradigm and randomly assigned MCI patients to either an explicit memory training (EMT) or an exposure-only group.

**Participants and Methods:** All patients completed functional magnetic resonance imaging (fMRI) scanning pre- and post-training as they encoded and later retrieved object-location associations. During three intervening training sessions, EMT patients learned mnemonic strategies to remember object-location associations. The exposure group received the same number of sessions and stimulus repetitions as the EMT group but without mnemonic training.

**Results:** Both groups demonstrated significant memory test improvement following training; the magnitude of which was significantly greater in EMT than Exposure patients. These behavioral improvements were associated with markedly different training-specific changes in fMRI ac-

tivation. Whereas Exposure patients demonstrated minimal change in encoding-related activation, EMT patients showed widespread increased activation within medial frontal and parietal areas associated with the default network and memory functioning. During retrieval, both groups showed decreased activation within the occipital and inferior temporal cortices, suggestive of repetition suppression effects. The Exposure group demonstrated increased activity within the right middle frontal gyrus and around the right temporoparietal junction. The EMT group demonstrated increased activation within a different, extensive, bilateral network that involved temporo-parietal cortices, medial parietal cortex, and ventrolateral prefrontal cortex; regions that are associated with contextually rich memories.

**Conclusions:** We conclude that EMT is superior to exposure alone in patients with MCI and that it engages the explicit memory network.

Correspondence: *Benjamin M. Hampstead, Ph.D., Emory University, 1441 Clifton Rd NE, Room 150, Atlanta, GA 30322. E-mail: bhampst@emory.edu*

**A.I. TRÖSTER & J.A. FIELDS. Mild Cognitive Impairment and Neuropsychological Outcome after Subthalamic Deep Brain Stimulation for Parkinson's Disease.**

**Objective:** Subthalamic deep brain stimulation (STN DBS) for Parkinson's disease (PD) is usually a neuropsychologically safe procedure. A minority of patients experience cognitive declines, most often in verbal fluency. STN DBS is not considered a suitable treatment for PD patients with dementia but whether Mild Cognitive Impairment (MCI) is associated with poorer neuropsychological outcomes after DBS is unknown.

**Participants and Methods:** 24 consecutive bilateral STN DBS patients who had undergone neuropsychological evaluation before and three to four months after DBS were classified as having had pre-operative MCI or not. MCI was defined as scores 1.5 or more SD below age appropriate normative means on one or more tests of attention, language, visuospatial function, executive function and memory in the absence of dementia. Outcome measures were independent from those used to define MCI.

**Results:** Of the 24 patients, 7 had MCI (1 multiple domain, 6 single domain; 1 amnesic MCI). PD with and without MCI groups were comparable at baseline in demographics, disease duration and severity, depression and anxiety, and dopaminergic medication dosage. On an extensive neuropsychological test battery, PD with MCI showed significantly greater declines compared to the non-MCI group only in visuospatial memory. Motor outcomes and stimulation parameters were comparable.

**Conclusions:** Prevalence of MCI in this DBS sample of PD patients without dementia was comparable to that previously reported in community and tertiary care samples. Preliminary findings from this small sample show that MCI in PD may predispose to poorer neuropsychological outcome in only very circumscribed areas, and that short-term outcomes in this PD with MCI group are mostly comparable to those in PD patients without MCI.

Correspondence: *Alexander I. Tröster, PhD, Dept of Neurology, University of North Carolina - Chapel Hill, CB7025, 170 Manning Drive, Ste 3129, Chapel Hill, NC 27599-7025. E-mail: trostera@neurology.unc.edu*

**Presidential Address:  
Preclinical Detection of Neurodegenerative Disorders**

**INS President: Stephen Rao**

**5:00–6:00 p.m.**

**S. RAO. Preclinical Detection of Neurodegenerative Disorders.**

Pathological changes associated with neurodegenerative conditions, like Alzheimer's disease (AD) and Huntington's disease (HD), begin decades prior to diagnosis. As novel pharmacotherapeutics emerge, investigators have begun to emphasize the need to intervene at the very earliest stages of neurodegeneration, even before the emergence of clinical symptomatology. Valid biomarkers for early detection and monitoring of treat-

ment response, therefore, are critically important for prevention studies designed to slow progression. Several candidate biochemical, anatomical, and functional biomarkers have shown promise for identifying disease risk or treatment response potential, but vary in their efficacy and invasiveness. Among these candidate biomarkers, task-activated functional magnetic resonance imaging (fMRI) is a promising approach that is noninvasive and offers a high potential for identifying early neurodegeneration. This presentation will describe results from two longitudinal fMRI studies involving individuals in the prodromal stages of AD and HD. Using a semantic memory task, we have demonstrated that the presence of the apolipoprotein-E (APOE)  $\epsilon 4$  allele, a family history of AD, and a diagnosis of Mild Cognitive Impairment (MCI) are each associated with aberrant patterns of brain activation in several key brain regions (e.g., hippocampus, posterior cingulate, inferior parietal); furthermore, our results suggest that baseline fMRI activation patterns can predict future cognitive decline in cognitively intact older adults. In prodromal HD, our fMRI results suggest that deviant patterns of brain activation can occur as much as 5-10 years prior to the onset of cognitive dysfunction and brain atrophy. Our results suggest that fMRI holds promise for identifying at-risk individuals for clinical prevention trials. Correspondence: *Stephen Rao, Schevy Center for Cognitive Neuroimaging, Cleveland Clinic, Neurological Institute, 9500 Euclid Avenue / U10, Cleveland, OH 44195. E-mail: raos2@ccf.org*

**Poster Session 2:  
Intervention/Neuroscience/TBI**

**6:00–7:15 p.m.**

**TBI (Adult)**

**L.J. MILLER & W. MITTENBERG. Neuropsychological Tests and Behavioral Variables as Prognostic Indicators of Vocational Problems Following Traumatic Brain Injury.**

**Objective:** The purpose of this study was to investigate patterns of neuropsychological test performance that we hypothesized would predict vocational adjustment among persons who had sustained a traumatic brain injury.

**Participants and Methods:** This prospective study was conducted on 76 consecutive inpatient admissions for head trauma to two major urban area hospitals. Injury severity indicators and neuroimaging data were collected on all individuals through review of hospital records. A battery of neuropsychological tests was administered to the participants, following resolution of post traumatic amnesia. An adult family member was contacted for follow up regarding return to work and vocational functioning at one month and six months post discharge.

**Results:** The Ruff Figural Fluency Test, Stroop, Rey Osterrieth Complex Figure, and Rey Auditory Verbal Learning Test were significantly correlated with outcome data, including returning to work, inability to perform the same job, problems in the workplace, and trouble holding a job. Behavioral changes indicative of aggression and poor impulse control were also correlated with vocational outcome measures. These difficulties were not better explained by injury severity indicators. Neuroimaging results indicate that visualizable temporal and parietal lesions were correlated with specific vocational problems at six months, but not at one month follow up.

**Conclusions:** The results of this study support the hypothesis that selected neuropsychological test results may be predictive of vocational problems related to behavioral difficulties following traumatic brain injury, and may be a useful prognostic indicator.

Correspondence: *Lori J. Miller, Ph.D., Psychology, Eastern Mediterranean University, Arts & Sciences 310, Famagusta Mersin 10, Turkey. E-mail: dr.lorij.miller@gmail.com*

**J.L. MATHIAS, S.N. MCLENNAN, E.D. BIGLER, S.C. BOWDEN & J.V. ROSENFELD. Impact of Day-of-Injury Alcohol Consumption and General Alcohol use on Outcome after TBI.**

**Objective:** The impact of day-of-injury alcohol consumption and general alcohol consumption on outcome after a traumatic brain injury (TBI) remains poorly understood. Theoretically, the presence of a neu-

rotoxic substance at the time of an injury could compound the effects of a TBI, worsening outcome. Similarly, high general alcohol consumption could lower brain reserve and compromise outcome. We examined the impact of both day-of-injury and general alcohol consumption on outcome after mild, moderate and severe TBI.

**Participants and Methods:** Participants had sustained a mild (N=169) or moderate to severe (N = 46) TBI and were assessed 3-6 months post-injury on measures of cognitive and psychosocial functioning. 89 participants with orthopaedic injuries not involving the head were also assessed. Quantitative MRI results were available for a subset of participants.

**Results:** Participants who had consumed alcohol prior to their TBI or orthopaedic injury performed more poorly on only a few measures of outcome relative to those who had not. In addition, general alcohol consumption was a poorer predictor of outcome following TBI than after orthopaedic injuries.

**Conclusions:** Alcohol has a limited impact on outcome after TBI; less than might be expected. Possible reasons for this are examined.

Correspondence: *Jane L. Mathias, PhD, Psychology, University of Adelaide, North Terrace, Adelaide, SA 5005, Australia. E-mail: jane.mathias@adelaide.edu.au*

**G.L. IVERSON, R.T. LANGE & L.M. FRENCH. Poor Effort is Associated with Greater Post-Concussion Symptom Reporting in Military Personnel with Mild Traumatic Brain Injuries.**

**Objective:** Symptom reporting following mild traumatic brain injury (MTBI) can be influenced by numerous factors including brain injury, vestibular injury, depression, post-traumatic stress, sleep disturbance, chronic headaches or bodily pain, personality characteristics, diverse social psychological factors, and external incentives. This study evaluates the relation between effort testing and symptom reporting following MTBI.

**Participants and Methods:** Military service members who had been medically evacuated from the combat theater for injuries were referred for a neuropsychological screening evaluation. The sample included 105 individuals diagnosed with an MTBI (94.3% male) who were evaluated on average 4.7 months (SD=5.4) post injury. Measures included the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), Test of Memory Malingering (TOMM), and the Neurobehavioral Symptom Inventory. Poor effort was defined as failure on the TOMM (11.4%), RBANS Effort Index (5.7%), or both (3.8%).

**Results:** Those who failed effort testing performed worse on neuropsychological testing compared to those who passed effort testing. The Total RBANS Index score was 85.8 (SD=10.8) and 65.7 (SD=11.4) for those who passed versus failed effort testing, respectively (Cohen's  $d=1.84$ , very large effect size). Those who failed effort testing reported significantly more post-concussion symptoms, and more severe symptoms. Memory problems ( $d=1.3$ ) and headaches ( $d=1.2$ ) had the largest effect sizes.

**Conclusions:** Effort testing is an important component of post-acute neuropsychological evaluations following combat-related MTBI. Those who fail effort testing are likely to be misdiagnosed as having severe cognitive impairment, and it is possible that their post-concussion symptom reporting is inaccurate.

Correspondence: *Grant L. Iverson, Ph.D., Psychiatry, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2A1, Canada. E-mail: giverson@interchange.ubc.ca*

**M. SAXTON, S. YOUNAN & S. LAH. The Role of Cognitive and Emotional Empathy in Social Behavior Post Traumatic Brain Injury.**

**Objective:** Difficulties in social behavior and empathy are known to be common in people who have sustained traumatic brain injury (TBI) and pose a major barrier to rehabilitation. However, there is little research into the relationship between these two constructs in patients with TBI. In the current study we aimed to establish whether and which components of empathy are associated with the difficulties in social behavior of people who have sustained TBI.

**Participants and Methods:** Eighteen participants with severe TBI (Glasgow Coma Scale score  $\leq 8$  and/or Post Traumatic Amnesia duration  $\geq 7$  days) completed two sets of questionnaires that assessed (i) social behavior: communication and interpersonal behavior; and (ii) empathy: cognitive [imagination of emotional future outcomes (FS) and perspective taking (PT)] and emotional [empathetic concern (EC) and personal distress (PD)].

**Results:** Participants with TBI obtained scores that were significantly below the normative means on both aspects of social behavior [communication and interpersonal scales,  $p < 0.05$  in both instances], but just one of the empathy scales [cognitive, FS scale,  $p < 0.05$ ]. Subsequent analyses revealed significant correlations between cognitive empathy (PT scale) and social behavior [communication ( $r = 0.61$ ) and interpersonal ( $r = 0.53$ ) scales,  $p < 0.05$  in both instances]. Emotional empathy (EC scale) also correlated significantly with social behaviour [interpersonal ( $r = 0.481$ ;  $p < 0.05$ ), but not communication].

**Conclusions:** Both cognitive and emotional empathy were found to play a role in interpersonal behavior difficulties in patients with TBI, whilst only cognitive empathy was related to communication difficulties in this population.

Correspondence: *Melissa Saxton, Doctorate of Clinical Psychology/Master of science, Psychology, University of Sydney, 2/41 Fotheringham Street, Enmore, Sydney, NSW 2042, Australia. E-mail: melissa.saxton@gmail.com*

#### A. GIAZKOULIDOU, A. DARDAGANI, I. KAMPELIS & M.H. KOSMIDIS. Invalid MMPI-2 profiles and neuropsychological test performance in traumatic brain injury patients.

**Objective:** Given the potential influence of cognitive deficits after traumatic brain injury (TBI) on responding on the Minnesota Multiphasic Personality Inventory-2 (MMPI-2), we explored the relationship between performance on specific neuropsychological tests and the validity indices of the MMPI-2.

**Participants and Methods:** We recruited individuals with a TBI through hospital records. Of 110 called, 40 agreed to participate and met inclusion criteria: (a) no history of neurological or psychiatric disease; (b) time post injury over 6 months; (c) age range from 18-55; (d) at least 12 years of education. Average time since injury for our sample was 3.5 (SD=2.2) years. None of our participants was in litigation. Our neuropsychological battery comprised the following tests: Trail Making Test, Ruff's 2 & 7 Selective Attention Test, Stroop Word and Color Test, Word List Learning Test, Logical Memory (WAIS-III), Verbal Fluency Test, Rey-Osterrieth Complex Figure Test (ROCF), Judgment of Line Orientation Test, Sentence Span Test, Visual Patterns Test, Vocabulary and Abstract Reasoning Test, Test of Memory Malingering, and MMPI-2.

**Results:** We found a negative correlation between infrequency validity scales F, Fp and Fb and performance on both semantic and phonemic verbal fluency, and between Fp and Fb validity scales and performance on vocabulary and abstract thinking. Additionally, the Fb validity scale correlated with performance on delayed recall of the ROCFT and the inconsistency scale VMDN correlated with performance on semantic verbal fluency.

**Conclusions:** Elevations of the MMPI-2 may not necessarily reflect malingering or psychopathology, but may be one of the sequelae of persistent cognitive dysfunction after TBI.

Correspondence: *Aikaterini Giazkoulidou, School of Psychology, Aristotle University of Thessaloniki, University Campus, Thessaloniki 54124, Greece. E-mail: giazkoulidou@yahoo.com*

#### A. DARDAGANI, A. GIAZKOULIDOU, I. KAMPELIS & M.H. KOSMIDIS. Assessing Motivation for Rehabilitation after Traumatic Brain Injury: The Role of Psychopathology.

**Objective:** We explored the relationship between motivation for rehabilitation in individuals who sustained a traumatic brain injury (TBI) and their MMPI-2 profiles.

**Participants and Methods:** We recruited individuals with a TBI through hospital records. Of 110 called, 40 agreed to participate and met inclusion criteria: (a) no history of neurological or psychiatric disease; (b) time post injury over 6 months; (c) age range: 18-55; (d) at least 12 years of education. Average time since injury for our sample was 3.5 (SD=2.2) years. None of our participants was in litigation, nor had any been in cognitive rehabilitation in the past. Participants completed the Motivation for Traumatic Brain Injury Rehabilitation Questionnaire (MOT-Q) and the MMPI-2.

**Results:** Factor analysis yielded four factors on the MOT-Q: Denial, Interest in Rehabilitation, Anger, and Reliance on Professional Help, consistent with those reported by Chervinsky and colleagues (1998). Linear regression analysis showed that the MMPI-2 clinical scale De-

pression and the content scale Anxiety contributed to the MOT-Q factor Denial (greater depression and anxiety was associated with less motivation). The MMPI-2 Personality Psychopathology-5 (PSY-5) scale Disclosure contributed to the MOT-Q factor Interest in Rehabilitation. Finally, the PSY-5 scale Aggression and the supplementary scale Repression contributed to the MOT-Q factor Anger.

**Conclusions:** Our findings suggest that motivation for rehabilitation in individuals who sustained a TBI may be influenced by psychopathology as assessed by the MMPI-2. Thus, evaluation of potential psychopathology and personality features in TBI patients may reveal motivational and emotional issues relevant to the rehabilitation process as well as treatment outcome.

Correspondence: *Aikaterini Giazkoulidou, School of Psychology, Aristotle University of Thessaloniki, University Campus, Thessaloniki 54124, Greece. E-mail: giazkoulidou@yahoo.com*

#### TBI (Child)

#### I. WRIGHT, A. LAVEROCK, I. CULPIN & S. MAHAN. Symptoms of Posttraumatic Amnesia (PTA) in Children Following Traumatic Orthopaedic Injuries.

**Objective:** Posttraumatic Amnesia (PTA) is a fluctuating state of recovery commonly reported following traumatic brain injury (TBI). It is characterised by memory impairments, disorientation, confusion and impaired attention. PTA duration offers an important measure of injury severity and possible outcome, as well as signalling when rehabilitation procedures may begin, and is therefore of great clinical importance.

PTA symptomatology may not be unique to TBI. Past research has demonstrated the effects that trauma and posttraumatic stress reactions may have on 'normal' functioning in paediatric populations; including disorientation, memory and learning deficits. The overlap in symptomatology between the PTA state and that of general trauma and hospitalisation has the potential to confound the assessment of children with brain injuries and hold implications for the current conceptual definition of PTA.

**Participants and Methods:** In a repeated measures design, the performance of thirty-four children with traumatic orthopaedic injury on the Frenchay PTA scale and the Impact of Events Scale (IES); a measure of the presence of symptoms relating to posttraumatic stress, is evaluated.

**Results:** Comparisons are made with the performance of a paediatric traumatic brain injury sample using the same measures.

**Conclusions:** Comments are made on the sensitivity and specificity of the Frenchay PTA scale in measuring the PTA state in such paediatric populations and the implications that this has on the clinical utility of this scale as described.

Correspondence: *Ingram Wright, PhD DCLinPsychol MA (Cantab), Paediatric Neuropsychology, North Bristol NHS Trust, Stroke Unit, Frenchay Hospital, Frenchay Park Road, Bristol BS16 1LE, United Kingdom. E-mail: ingram.wright@nbt.nhs.uk*

#### J. ARIAS-ALVAREZ, I. MÁLAGA-DIÉGUEZ, R. BLANCO-LAGO & J. TORRES-CAMPA-SANTAMARIA. Neuropsychologic Profile of Two Pediatric Patients with Ample Right Parieto-Occipital Lesions after Brain Tumour Resection.

**Objective:** To describe the neuropsychological profile of two patients with very extensive lesions secondary to resection of CNS tumours located at the parieto-occipital right hemisphere.

**Participants and Methods:** The medical records as well as the neuroimages (pre and post-surgery) were collected. Both patients underwent neuropsychological evaluation at the age of 8 and 10 respectively. Two evaluations were made with one year period in between. They included complete WISC-IV, intellectual ability, executive function evaluation, attention and speed of processing, verbal and non verbal learning and memory, spatial and construction skills and educational skills like reading, writing or arithmetic. The patients were diagnosed with the CNS tumours at the ages of 2 and 8. Both patients required at least two surgical interventions to achieve complete tumour resection. None of them presented significant motor / neurosensory deficits. One of the patients had pre-surgery epilepsy secondary to the tumour, that was not controlled with tumour resection. She was kept on antiepileptic medication (levetiracetam) at the time of neuropsychological evaluation.

**Results:** Both patients showed at the initial and the control evaluation severe deficits that included low results in performance IQ test, reduced speed of processing especially for visuomotor output, executive dysfunction with significant attentional deficits, abstraction and flexibility reduced skills, nonverbal learning and memory disability, visospatial dysfunction and reading and writing disorder.

**Conclusions:** Interestingly, it was the patient that underwent surgery at a younger age who showed a more severe affectation. This has been previously reported and could also suggest that it would be more important to have previously acquired neurocognitive skills in order to develop compensatory strategies rather than a young brain with increased neuronal plasticity.

Correspondence: *Juan Arias-Alvarez, Unidad de Neuropediatría, Hospital Universitario Central de Asturias, Celestino Villamil s/n, Oviedo 33006, Spain. E-mail: juanarias@centrogoa.es*

**P. MARIA, M. MOSKALA, J. POLAK, I. HERMAN-SUCHARSKA & A. GIBEK. Cerebral plasticity in children with post-traumatic aphasia, based on data from functional magnetic resonance (fMRI).**

**Objective:** Assuming that regional blood flow and metabolism reflect neuron activity, we designed an experiment using fMRI to determine how the patterns of neuron activation change in patients with aphasia after post-TBI left hemisphere damage.

**Participants and Methods:** Our experimental group (E) included 13 right-handed patients with documented post-TBI focal brain damage in the left hemisphere, and initially diagnosed with a non-fluent aphasia. The control group (K) consisted of 13 right-handed healthy individuals, paired individually for age and gender to each patient from group E, without a history of significant illness or symptoms at the time of examination. Standard neuropsychological tests were used to assess the cognitive status of the patients (the "Mindstreams"® interactive computer tests, language tests, WAIS-III, WMS-III, Wisconsin Card Sorting Test).

**Results:** In group K, post-TBI focal damage to the LH produces significant involvement of the right hemisphere in performing language-related tasks. Moreover, this reorganization of dominance involves parts of the brain homologous to the regions of the left hemisphere that are typically dominant for language in normal conditions. However, a closer examination of the detailed results indicates that not all patients display this right-hemisphere dominance, and not in every task.

**Conclusions:** Our results are of extraordinary importance for clinical practice, since they justify the introduction of therapeutic strategies oriented towards making use of undamaged brain areas to take over disturbed functions, which allows for a greater degree of recovery after brain damage.

Correspondence: *Pachalska Maria, Institut of Psychology, Imbramowska 1/34, Krakow 31-212, Poland. E-mail: neuropsychologia23@o2.pl*

### Cognitive Intervention/Rehabilitation

**K. WALEWSKA, A. BIENIEK, J. KOWALSKA, D. OPPENHEIM & H. OPPENHEIM-GLUCKMAN. Severe Brain Injuries: Challenges for Contemporary Psychotherapist.**

**Symposium Description:** The main goal of the symposium is to show an important place of psychotherapist and clinical psychologist in the process of cure and rehabilitation of the patient. Interdisciplinary approach to the severe brain injuries for four different professional areas will be presented.

1. PSYCHOTHERAPY FOR INDIVIDUALS WITH SPECIFIC DYSFUNCTION OF NERVOUS SYSTEM. CLINICIAN TOWARDS PEOPLE WITH HEARING IMPAIRMENT - Joanna Kowalska

2. COMPLEX TREATMENT OF PATIENTS AFTER TOXIN OR SUBSTANCE POISONING - Anna Bieniek

3. WHAT EXPRESS DRAWINGS PRODUCED BY CHILDREN TREATED FOR A BRAIN TUMOR - D. Oppenheim

4. PSYCHOTHERAPY OF BRAIN-INJURED PATIENTS - H. Oppenheim-Gluckman

Correspondence: *Katarzyna Walewska, Psychology, University of Warsaw, Zuga 33, Warsaw 01-806, Poland. E-mail: katwal@psych.uw.edu.pl*

**A. BIENIEK. Complex Treatment of Patients after Toxin or Substance Poisoning.**

**Objective:** Patients with micro-damages within the CNS (Central nervous system) after accidental or suicidal poisoning manifest significant functional recovery after a 6 or 9 month-long treatment in residential therapeutic department.

**Participants and Methods:** The report concerns treatment in the 4th Department of Adolescent Neurosis Treatment in Zagrze near Warsaw. Patients in the above mentioned department participate in 6 or 9 month therapeutic treatment sessions. During treatment the patients are under counseling, medical, nursery care and attend psycho-dynamically oriented psychotherapy. Patient participate in regular individual psychotherapy sessions twice a week. A significant part of treatment is operating in a therapeutic community, within which patients make decisions and undertake actions according to an appropriate, for particular patients, sphere of autonomy.

**Results:** The opportunity to discuss, dispute and negotiate certain arguable issues in secure conditions is a significant factor. It has a positive impact on patients' self-esteem and evokes a feeling of control and influence, especially in patients who suffer anxiety concerning their intellectual capabilities after CNS poisoning. Patients have the opportunity to continue their education in a Special Schools Complex closely cooperating with the department.

**Conclusions:** Cooperation of various sub-teams including medical and nursery, counseling and educational, psychological and psycho-therapeutic and environmental teams provides possibility to significantly improve psychological and neurocognitive functioning of a person after accidental or suicidal poisoning.

Correspondence: *Katarzyna Walewska, Psychology, University of Warsaw, Zuga 33, Warsaw 01-806, Poland. E-mail: katwal@psych.uw.edu.pl*

**J. KOWALSKA. Psychotherapy for Individuals with Specific Dysfunction of Nervous System - Clinician Towards People with Hearing Impairment.**

**Objective:** Psychological support for individuals with brain dysfunctions most often concentrates on somatic or neurocognitive disabilities. However, it should be noticed that disabled brain damaged patients may also suffer because of psychological problems and can significantly benefit from psychotherapeutic service.

**Participants and Methods:** The aim of the presentation is to consider an accessibility of psychotherapeutic services for individuals with hearing disorders after specific brain dysfunctions. In these cases, the psychotherapeutic contact requires working out the satisfying way of communication between client and clinician as well, taking into account the specificity of social and cultural experiences of a client. On the basis of the questionnaire form we analyzed, in which institutions in Poland deaf individuals could use the psychotherapy and what form of assistance was offered to them.

**Results:** Results of the study indicate the deficiency of psychotherapeutic services available to hearing-impaired individuals. Data suggest that hard-of-hearing persons may access to psychotherapy only when they could use services available to normally hearing population.

**Conclusion:** There is a strong need for specialized services addressed to people with hearing impairment due to specific brain dysfunctions. It constitutes a challenge for clinicians to modify stereotyped perception of deaf clients and to develop new methods of communicating with these clients. Programs providing training for psychotherapeutic services for this neglected population should also be created.

Correspondence: *Katarzyna Walewska, Psychology, University of Warsaw, Zuga 33, Warsaw 01-806, Poland. E-mail: katwal@psych.uw.edu.pl*

**D. OPPENHEIM, J. GRILL & O. HARTMANN. What Express Drawings Produced by Children Treated for a Brain Tumor.**

**Objective:** The drawings children treated for a brain tumor produce show their concerns often better than words.

**Participants and Methods:** I work as a psychoanalyst and psychiatrist in this Department of Pediatric Oncology since 1987. I present some significant drawings chosen among all produced during the psychotherapeutic interviews I have had with the children who were treated or had been treated for a brain tumor

**Results:** This analysis shows that their major concerns are: sadness (sad colors), suffering, anxiety, disarray, lowered narcissism (tiny characters); a distorted body image, distorted perceptions; family problems

(father rarely depicted); imagining the tumor (a hole in a roof); loneliness (an empty landscape); doubting the likelihood of cure (a story with a bad ending); death (crosses); a disturbed sense of identity (a face split in two); the cause of cancer (a witch); the 'black hole' (in a tree). Each drawing can express several concerns, and all express at least one. They also show the intensity of the distress experienced (disorganisation, void, inability to draw, the theme, etc.) which is real but not always related to objective causes. Each is still important: the colours, the themes, the characters or the absence, the firmness of the lines, the use of space, etc. They express reality and fantasy, the present, past and future, fears and desire, revolt and confidence, illness and daily life.

**Conclusions:** The collaboration between the psycho-oncologist and the other caregivers makes it easier to better understand and use these drawings, to help parents to become aware of their children's needs and respond to them. Ten years ago, we have launched a monthly multidisciplinary meeting (oncologist, neuropsychologist, psychoanalyst, teachers, physiotherapists, etc.) which proved most useful to define the best help that these children can receive. Drawings illustrating these themes are presented.

Correspondence: *Katarzyna Walewska, Psychology, University of Warsaw, Zuga 33, Warsaw 01-806, Poland. E-mail: katual@psych.uw.edu.pl*

### H. OPPENHEIM-GLUCKMAN. Psychotherapy of brain-injured patients.

**Objective:** For twenty years, psychoanalysts have cared for and followed brain-injured patients with psychotherapy sessions. It is about time to assess whether and how does this approach help patients.

**Participants and Methods:** We report here the case a patient with autobiographical amnesia and confabulations and describe the psychotherapy sessions he was submitted to therefore.

**Results:** This case shows:

That cognitive impairment (autobiographical amnesia with confabulations) is also involved in the unconscious psychic life of the brain-injured person.

That psychotherapy sessions may help the patient to recover the feeling of his identity and of his value.

**Conclusions:** Neuropsychology and psychoanalysis psychopathology provide different and complementary points of view and their levels of investigation are different.

Collaboration between the psychoanalyst and the rehabilitation team makes it easier to understand the subjective experience of brain-injured patients and help them to keep the feeling of their identity, of their value, and to find their place in their family and in society.

Correspondence: *Katarzyna Walewska, Psychology, University of Warsaw, Zuga 33, Warsaw 01-806, Poland. E-mail: katual@psych.uw.edu.pl*

### C. SALAS. Recovery from Catastrophic Reaction in Brain Injury Survivors. The Use of Others and Mentalizing .

**Objective:** Describe the intra-personal and inter-personal mechanisms that brain injury survivors use to recover from catastrophic reactions (CR), specifically, the use of significant others (Attachment) and the representation of experience (Mentalizing).

**Participants and Methods:** The study has a qualitative design based on content analysis. 5 stroke patients (1 right fronto-parietal, left fronto-parietal, 1 right fronto-ventral) were followed during psychotherapy (30 months average each). The raw data was gathered from notes during patient sessions and relative interviews. Later, the content of the different sources was analyzed and related to lesion site and specific categories (the experience of CR, strategies used to modulate CR and capacity to mentalize it)

**Results:** Catastrophic reactions are present in patients with right and left brain lesion. Patients with right hemisphere damage (specifically frontal and parietal) used projection and reality distortion to deal with negative affect. The use of others, as source of emotional compensation, appears to be impaired in relation to their inner states. Regarding Mentalization, the failure in perceptual response inhibition is a cardinal feature. Patients with left brain damage do not tend to use primitive defense mechanism, which increases the duration and intensity of CR. The cognitive demands of interpersonal relationships generate avoidance and interfere with the use of others as a source of regulation. Failures in executive functions impact the capacity to denominate somatic states, compromising the regulation of emotion.

**Conclusions:** CR is an enduring cognitive and emotional consequence of brain injury. The comprehension of how brain injury survivors deal with it is crucial to implement individual tailored interventions. This work offers preliminary guidelines to explore this phenomenon, suggesting how CR is managed differentially according to lesion site.

Correspondence: *Christian Salas, Master in Arts, Psychology, University of Wales, Adeilad Brigantia, Bangor University, Bangor LL57 2AS, United Kingdom. E-mail: pspa35@bangor.ac.uk*

### X. MONTANER, M. ÁLVAREZ, G. RIBERA & M. JÓDAR. Malingering Sabadell test (MST). A Pilot study for the development of a brief memory malingering test.

**Objective:** We describe the pilot study for the development of the Malingering Sabadell Test (MST). The MST is a brief and quickly screening tool based on a forced choice procedure. It pretends to be an efficient symptom validity test, and a useful instrument to detect insufficient effort and malingering.

**Participants and Methods:** 43 subjects with ages between 16 and 82 participated in the study: 26 healthy subjects, 10 patients with amnesic syndrome and 7 subjects "at risk" of malingering. Mean education level: 10,47 years (sd=3,9).

Verbal and spatial attention were assessed using the digits and spatial localization of the WMS-III; verbal memory with the Rey AVLT; and spatial memory with the 10/36 Test and Benton Retention test. IQ was estimated with the vocabulary subtest (WAIS III). The test of Memory Malingering (TOMM) and MST were used to detect malingering. We also recorded a new variable (Simulation Index) using the commonly used qualitative signs of Malingering on tests of cognitive abilities.

**Results:** A significant correlation was observed between MST and Simulation Index scores (-,642\*\*sig. 0,000) and between the MST and TOMM scores (.665 \*\*sig. 0,000). We found no correlations between MST and verbal or spatial memory scores.

**Conclusions:** MST is a brief tool (4 minutes) that allow clinicians to obtain a first impression about the reliability of the neuropsychological assessment in poor effort or malingering patients. In the pilot study, MST scores correlated with TOMM scores and appeared as an efficient screening test to detect malingering. Verbal and spatial retention scores were independent of the MST performance.

Correspondence: *Xavier M. Casino, Psychology, Clinical Psychology, Universitat Autònoma de Barcelona, Despatx B5/016b, Facultat de Psicologia, Bellaterra 08193, Spain. E-mail: xavier.casino@gmail.com*

### S.R. ROSS, J. ZJORKA, E. JONES, S.H. PUTNAM & K.M. ADAMS. A Cluster Analytic Investigation of Litigating Mild Head Injury Using the Personality Assessment Inventory.

**Objective:** The Personality Assessment Inventory (PAI) is an increasingly popular measure of personality and psychopathology for use in forensic neuropsychological settings. Individual differences in symptom-reporting as measured by the clinical scales may provide insight into likely profile types found in forensic settings, especially in litigating mild head injury (MHI). To this end, most studies have focused on the Minnesota Multiphasic Personality Inventory - 2 (MMPI-2). In the current study, we examined the composition of a group of litigating patients with suspected MHI, using PAI clinical and validity indices.

**Participants and Methods:** A total sample of 504 participants with questionable MHI who were seeking compensation for alleged dysfunction were included in a cluster analysis. We examined only major clinical and validity scales for the PAI.

**Results:** Data were subjected to a three group k-means cluster analysis. We also specified two and four cluster solutions for comparison. A three cluster solution resulted in best fit, which we describe as (1) Normal Functioning (low symptom-reporting and validity indices within normal limits; n = 126; 41.4%), (2) Symptomatic MHI (elevated symptom-reporting and validity indices within normal limits; n = 130; 42.8%), and (3) Probable Malingering (elevated symptom-reporting and elevated validity scales, especially Negative Impression Management (NIM) and Mean Clinical Elevation (MCE); n = 48; 15.8%). Cluster groups meaningfully predicted demographic variables and personality-based indices of insufficient effort not included in the formation of these groups.

**Conclusions:** Overall, findings provide support for the use of the PAI in identifying subgroups of MHI patients involved in litigation.



Correspondence: *Scott R. Ross, Psychology, DePauw University, 7 Larabee St, Greencastle, IN 46135. E-mail: srross@depauw.edu*

**A. PACHECO, L. FAÍSCA, K. PETERSSON & A. REIS. Reading Interventions: a Content Analysis of Specialized Literature.**

**Objective:** Understanding the most efficient strategies to promote fluency and comprehension during reading has been the goal of many researchers. The aim of this work was to revise investigations regarding reading skills' interventions, to understand how approaches to reading disorders have been developing.

**Participants and Methods:** The discussion section of a sample of 89 research papers on reading remediation published during the last five years was submitted to an automatic content analysis using ALCESTE 4.9. This software uses the vocabulary similarity between units of text in order to identify themes in the corpus.

**Results:** Themes, subthemes and classes which structure the contents were analyzed, as well as their years and sources of publication, specific vocabulary and exemplificative extracts. Two major themes were identified: one more focused on the skills and strategies of reading, and the other concerning more specifically dyslexics and their remediation programs.

**Conclusions:** The content analysis results suggest that research on reading intervention seems to be shifting from the traditional focus on reading disabilities, such as dyslexia, and heading to the effectiveness and assessment of the results of interventions with the purpose of improving reading skills in poor readers, on distinct environmental scenarios. Correspondence: *Andreia Pacheco, FCHS, University of the Algarve, Campus de Gambelas, Faro S005-139, Portugal. E-mail: aspacheco@ualg.pt*

**A.E. PAPROT. Neuropsychological consequences of cerebral anoxia following out-of-hospital cardiac arrest and attempt of therapeutic intervention.**

**Objective:** Out-of-hospital cardiac arrest may result in various neuropsychological impairments, the characteristic and scale of which depend on the degree of brain injury.

The most frequent pattern of ischemic-anoxic brain injury, as described in the literature, may include: isolated memory disabilities, general intellectual deterioration, visuospatial deficits, impairment of attention, praxia and language, as well as dysexecutive syndrome (disorder of programming and control of behavior, affective dysregulation, and limited self-awareness). The most severe forms of anoxic encephalopathy include disturbance of consciousness of various degrees (ranging from confusional state to minimally conscious state, coma, up to persistent vegetative state).

**Participants and Methods:** The presented study concerned the early stage of neuropsychological rehabilitation of 32 patients (including patients in a minimally conscious state) post out-of-hospital cardiac arrest. Therapeutic programme was individually adjusted to the needs and capabilities of the patients, with the broadest rehabilitation programme being applied to the patients not showing disturbance of consciousness, and cooperating to some extent.

**Results:** Based on our study, the rehabilitation is relatively effective in recovery of attention, visuoperceptual and visuospatial functions, and retrograde memory. However, the improvements in some other deficits, in particular learning and storage of new information, and executive abilities were limited.

**Conclusions:** While many cardiac arrest survivors need neuropsychological rehabilitation, the functional outcome of therapy is open to debate.

Correspondence: *Agnieszka E. Paprot, master, II Department of Neurology; Institute of Psychiatry and Neurology; al. Sobieskiego 9, Warsaw 02-957, Poland. E-mail: epaprot@ipin.edu.pl*

**R. FERNÁNDEZ DE BOBADILLA, C. GARCÍA-SÁNCHEZ, B. PASCUAL-SEDANO, S. MARTÍNEZ-HORTA, A. GIRONELL, J. PAGONABARRAGA, A. ESTÉVEZ-GONZÁLEZ, A. CAMPOLONGO & J. KULISEVSKY. Neuropsychological Effects of Cognitive Stimulation in a Non-Demented Parkinson's Disease Group.**

**Objective:** Cognitive impairment is common in Parkinson's Disease without dementia (PD-ND), including deficits in general intellectual functioning, language, attention, memory, visual-spatial and executive functions, and affective processes. These alterations can interfere with the complex cognitive functioning and the quality of life.

The aim of the present study was to assess a cognitive stimulation program (CSP) on a group of PD-ND patients and analyze a possible positive effect in the cognitive performance.

**Participants and Methods:** Thirty idiopathic PD-ND patients, demographically and clinically matched, after a complete neuropsychological assessment (Mini-Mental State Examination (MMSE), Mattis Dementia Rating Scale (MDRS), Digit Span, Continuous Performance Test (CPT), D2 Attention Test, Stroop Test, Parkinson's Disease Questionnaire (PDQ-39) and Verbal Fluency) were randomly distributed in two groups: a control (n=15) and a cognitive stimulation group (n=15).

A 10 consecutive weeks CSP was applied to 15 PD-ND patients while the control group did not receive any kind of cognitive stimulation and they were in a waiting list for a posterior CSP. Both groups were re-evaluated three months later.

**Results:** After three months, the cognitive stimulation group showed a significant improvement on MDRS Total score ( $p<0.03$ ) and on MDRS Initiation-Perseveration score ( $p<0.05$ ). Control group showed higher D2 commission errors ( $p<0.05$ ).

Significant differences on MDRS Total ( $p<0.01$ ), MDRS Initiation-Perseveration ( $p<0.01$ ) and MDRS Memory ( $p<0.006$ ) were also found when we compared cognitive stimulation group vs. control group.

**Conclusions:** Our results suggest that: a) cognitive stimulation exerts a positive improvement in the cognitive performance of PD-ND patients; b) cognitive stimulation programs could be implemented as a non-pharmacological treatment.

Correspondence: *Ramón Fernández de Bobadilla, Hospital Sant Pau, Sant Antoni M. Claret, 167, Barcelona 08025, Spain. E-mail: ramonfbm84@gmail.com*

**H. PARK, W. CHANG, M. KO, Y. SHIN, P. LEE & Y. KIM. Domain-specific and Shared Training Effect on Attention and Memory in Acquired Brain Injury Patients.**

**Objective:** We investigated the effects of computer-assisted cognitive rehabilitation on attention and memory function of the patients with acquired brain injury.

**Participants and Methods:** Eighty-three subjects with acquired brain injury were enrolled (46 females, mean age 46.8 years). Two randomized controlled experiments were conducted to investigate the effect of attention and memory training, respectively. In each experiment, patients were divided into the cognitive training and control groups. Training group received attention or memory training, respectively, using Computer-assisted Cognitive Rehabilitation program (ComCog®, MaxMedica, Korea) which consists of graded attention and memory training softwares, 30 minutes a day, three times per week, for 4 weeks in addition to the conventional rehabilitation therapy. Control group received only conventional rehabilitation therapy. Comprehensive cognitive assessments were performed before and after treatment in both groups.

**Results:** After the treatment, the attention training group showed significantly higher performance in attention functions, whereas memory training group showed significant improvement in long-term memory function compared to the control group. Interestingly, working memory function was superior in both attention and memory training groups than the control group, which reflected a shared neural network between two cognitive domains.

**Conclusions:** Results of this study supported that cognitive rehabilitation presents both the domain-specific and the shared training effects in patients with acquired brain injury (KRF-2008-1093-000) and by a KOSEF grant funded by the Korean government (M10644000022-06N4400-02210).

Correspondence: *Heungseok Park, Rehabilitation, Samsung Medical Center, 50 Irwon-Ding, Gangnam-Gu, Seoul 135710, Republic of Korea. E-mail: kotphs@gmail.com*

**H. PARK, W. CHANG, I. AHN, W. HONG & Y. KIM. Computer-assisted Cognitive Rehabilitation for Adults Survivors after Cardiac Arrest.**

**Objective:** The purpose of this study was to assess the characteristics of cognitive deficit in survivors after cardiac arrest (CA) and to investigate the effects of computer-assisted cognitive rehabilitation (CACR) in these patients.

**Participants and Methods:** Nine patients who were survivors after CA were enrolled (7 males, mean age 43.1 years). In all patients, comprehensive cognitive assessment was performed using the computerized neuropsychological test battery. Clinical characteristics such as

time from CA to cardiopulmonary resuscitation (CPR), CPR duration, coma duration, and time since CA were also evaluated. Four of 9 patients received CACR using computer-assisted cognitive rehabilitation program using both ComCog® (MaxMedica, Korea) and RehaCom® (HASOMED, Germany), for 30 minutes a day, 3 or 5 times per week, over 4 weeks. The follow-up cognitive assessment was performed after training.

**Results:** Attention deficits were noticed in the two thirds of the CA survivors. The most involved cognitive functions were verbal learning and delayed recall which showed impairment in all patients. Moreover, 7 of 9 patients showed impaired executive function. All patients who received CACR showed significant improvements in most of the cognitive domains after CACR, especially in attention and executive functions.

**Conclusions:** This study provided information about distinct involvement of cognitive functions in CA survivors and introduced the CACR as a potential tool of intervention to improve cognitive function in these patients (Supported by the Korea Research Foundation Grant funded by the Korean Government (KRF-2008-1093-000) and by a KOSEF grant funded by the Korean government (M10644000022-06N4400-02210)).

Correspondence: *Heungseok Park, Rehabilitation, Samsung Medical Center, 50 Irwon-Ding, Gangnam-Gu, Seoul 135710, Republic of Korea. E-mail: kotphs@gmail.com*

#### A.R. DORES, I.P. CARVALHO, I. ALMEIDA, S. GUERREIRO, L. DE SOUSA & A. CASTRO-CALDAS. Cognitive Rehabilitation of Brain Injured Patients with Dysexecutive Syndrome: The Test of a Prototype of a Virtual Environment.

**Objective:** Patients with Acquired Brain Injury (ABI) frequently experience sequelae, due to frontal lobe lesion, in functions such as planning, initiating, regulating and evaluating goal-directed behaviour. Because many complex, unstructured, or outside of the routine daily life situations are affected as a result of ABI, the person's capacity for autonomous functioning and for performance in previous activities becomes impaired. This has major negative consequences for the quality of life of patients and their relatives.

Our goal is to test a virtual environment (VE) for cognitive rehabilitation of dysexecutive syndrome. In this work we present the results of an exploratory study in which we investigate patients' satisfaction and performances (time and number of errors).

**Participants and Methods:** Seven subjects (3 males and 4 females; mean age of  $25.14 \pm 5.58$  years old) with ABI were recruited for this study. The creation of the environment followed a Rehabilitation Program Development Process model, using virtual reality technology. The developed VE allows patients to explore a setting where they solve a series of tasks, ordered by level of complexity. It was developed by the authors in the context of a multidisciplinary team.

**Results:** We expect that patients will reveal interest in, and satisfaction with the use of the VE (assessed with the VE Use Satisfaction Questionnaire adapted from Dore, et al., 2007) and that their performance (assessed through mean comparison procedures) will improve with repeated training.

**Conclusions:** In the future this VE will be employed as part of a cognitive rehabilitation program based on a holistic and constructivist approach.

Correspondence: *Artemisa R. Dore, Master, PhD Student, Ciências Sociais e Humanas, Escola Superior de Tecnologia da Saúde do Porto (ESTSP-IPP); Instituto de Ciências Biomédicas Abel Salazar (ICBAS-UP), R. Valente Perfeito, 322, Vila Nova de Gaia 4400-330, Portugal. E-mail: artemisa@estsp.ipp.pt*

#### M. SHIBASAKI & M. TOYOTA. Effectiveness of Cognitive Rehabilitation for Activation Deficit in a Patient with Frontal Lobe Lesions.

**Objective:** Activation, or energization, plays a key role in generating and sustaining any response or mental processes, and is frequently impaired by medial frontal lobe lesions. This study investigates the effectiveness of long-term cognitive rehabilitation for activation deficit in a patient with frontal lobe lesions by using a single-case experimental design.

**Participants and Methods:** OT, a 38-year-old right-handed man who exhibited severe activation problems following bilateral frontal lobe le-

sions, received four training programs for two years. To improve OT's responsiveness to environmental stimuli, Go (training program 1, 3) and Go/No-go (training program 2, 4) target detection tasks, involving pressing a response button (training program 1, 2) and touching the targets on a screen (training program 3, 4), were used as assessment and training tasks in the training programs. The target behaviors of this study were decreases in miss rates and reaction times to the targets in the assessment tasks.

**Results:** Although no clear training effect was observed in OT's response speed during all training programs, he showed a significant reduction in his miss rates and an improvement in his responsiveness to the targets in training program 1, 2, and 3. He also showed generalization of the training effect in several executive function tests (e.g., Wisconsin Card Sorting Test) after each training program.

**Conclusions:** Activation deficit can be improved, to some degree, by cognitive rehabilitation intervention in patients with chronic, severe activation problems. Moreover, improvement of activation function has a positive influence on other frontal lobe functions, such as executive functions.

Correspondence: *Mitsuyo Shibasaki, Psychology, Meisei University, 2-1-1, Hodokubo, Hino City, Tokyo 191-8506, Japan. E-mail: mitsuyo@psy.meisei-u.ac.jp*

#### E. FERSTEN, H. KOZIARA, T. MANDAT, M. JAKUCINSKI, R. KULINSKI, B. MROZIAK & P. NAUMAN. The effect of intraoperative monitoring of cognitive function on postoperative functioning of patients who underwent awake brain surgery for tumors located in eloquent areas.

**Objective:** The aims of the study were: to evaluate the usefulness of cortical stimulation and intraoperative mapping of cognitive function during awake brain surgery for tumors in eloquent areas in order to estimate the safe operating area, thus minimizing the risk of postoperative deficits; and to assess the patients' functioning after surgery.

**Participants and Methods:** Awake brain surgery with intraoperative mapping of cognitive functions was performed in 12 patients with cerebral glioma. In 9 cases preoperative fMRI examination during tasks tapping language functions revealed neuronal activation in areas either directly adjacent to or within the tumor site, while in other 3 patients MRI tractography suggested the presence of neural pathways in tumor vicinity. In the awake part of surgery each patient was administered an individual set of cognitive tasks based on the preoperative neuropsychological and fMRI assessment of his/her deficits, tumor location and likely impairments after surgery. Follow-up fMRI and neuropsychological examinations were conducted at 7 days, 6 weeks and 3 months after surgery.

**Results:** The major findings are:

- selective cognitive deficits increased immediately after the surgery in 4 patients,
- the patients' cognitive functioning was much improved at the 6-week follow-up,
- all the 12 patients were capable of independent functioning and 8 of them even returned to work 3 months after surgery,
- follow-up fMRI revealed that brain areas crucial to speech may re-organize within the same cerebral hemisphere, or shift to the hemisphere opposite to the glioma site.

**Conclusions:** Intraoperative monitoring of cognitive functions allows to identify cerebral structures crucial to their normal course. Deficits elicited by cortical stimulation during awake craniotomy may provide clues to verify the neurosurgical management. The procedure significantly reduces the risk of postoperative neurological and neuropsychological deficits, and increases the likelihood of the patient's return to independent living.

Correspondence: *Ewa Fersten, Ph.D, Polish, Pawlowskiego 5, Warszawa 02-106, Poland. E-mail: ewmed@acn.uaw.pl*

### Cognitive Neuroscience

#### M. MATSUI, M. NARAHARA, A. MIYAZAKI, T. KOBAYASHI & H. NISHIJO. Self-conscious emotion influences moral conscious: a near-infrared spectroscopy study.

**Objective:** The purpose of this study was to examine the relationships between moral conscious and self conscious emotion such as shame and guilt, and to investigate the neural mechanism of moral conscious using near-infrared spectroscopy (NIRS).

**Participants and Methods:** Healthy adult participants were investigated with NIRS as they were presented brief stories including description of deviant behavior and were asked to image what happened before and after the stories and to write down the added stories of their images. There were three conditions: self deviant condition, other deviant condition and control condition. The story in each condition consisted of content related to social deviant situation.

**Results:** Self evaluation score of shame and guilt in self deviant condition was significantly higher than that in other deviant condition. The results also showed that arousal of self conscious emotion brought an increase of oxygenated hemoglobin concentrations in the prefrontal area. Especially, concentration change of oxygenated hemoglobin in the prefrontal area under self deviant condition increased more than that under other deviant condition.

**Conclusions:** This result showed arousal of self conscious emotion would have been related to activation of prefrontal area. These findings suggest that it will be important for production of moral conscious to arouse self conscious emotion.

Correspondence: *Mie Matsui, Ph.D., Psychology, University of Toyama, 2630 Sugitani, Toyama 930-0194, Japan. E-mail: mmatsui@las.u-toyama.ac.jp*

**M. MATSUI, A. MIYAZAKI, M. NARAHARA, T. KOBAYASHI & H. NISHIJO. Brain activation related to memory organization: a near-infrared spectroscopy.**

**Objective:** Near-infrared spectroscopy (NIRS) is an optical method to determine oxygenated and deoxygenated hemoglobin concentration changes in the human cerebral cortex. The purpose of this study was to examine the change of oxygenated hemoglobin concentrations during memory organization task using NIRS.

**Participants and Methods:** Participants were ten healthy volunteers aged 20-26. Hemoglobin concentration changes were measured with a 103-channel NIRS instrument during the Japanese Verbal Learning Test (JVLT). Behavioral indices were the number of total words recalled and stimulus category repetition (SCR) based on the JVLT analysis. SCR is an index of semantic clustering in the words recall. We examined the correlation between SCR and change of oxygenated hemoglobin concentrations [oxyHb] in each brain region.

**Results:** The result showed activation in the left inferior prefrontal area was significantly positively correlated with SCR. In addition, change of [oxyHb] in the left inferior prefrontal area increased in case of subjects who noticed category classification. In contrast, there was no change of [oxyHb] in subjects who did not notice the classification of the category.

**Conclusions:** The left prefrontal cortex (Brodmann's areas 45, 46, 47) has been reported to show increased activation during semantic encoding so far. This finding suggests that an important aspect of prefrontal contribution to memory function lies in organization of verbal material. In summary, this study suggests the left inferior prefrontal function has an important role in memory organization.

Correspondence: *Mie Matsui, Ph.D., Psychology, University of Toyama, 2630 Sugitani, Toyama 930-0194, Japan. E-mail: mmatsui@las.u-toyama.ac.jp*

**R. KILPINEN, T. SAUNAMÄKI, S. HIMANEN & M. JEKONEN. Does Age Affect Cognitive Processing Speed in Patients with Obstructive Sleep Apnea Syndrome?**

**Objective:** Obstructive sleep apnea syndrome (OSAS) is associated with slowed information processing and motor speed, and increased reaction time. It has been suggested that ageing, too, may be associated with cognitive slowing. Our aim was to find out whether OSAS patients have reduced cognitive processing speed compared to healthy controls, and to determine whether age increases slowness.

**Participants and Methods:** A full-night polysomnography and a neuropsychological assessment were conducted in 16 newly-diagnosed OSAS patients and 15 healthy controls. OSAS patients were divided into two groups: age < 50 years (n=12), and age ≥ 50 years (n=4). Cognitive processing speed was measured using Block Design and Digit Symbol from WAIS-R, Symbol Search from WAIS-III, and Stockings of Cambridge (SOC), Rapid Visual Information Processing (RVP), Reaction Time from CANTAB, and Grooved Pegboard Test.

**Results:** All subjects were right-handed men of working age. The patients and healthy controls did not differ statistically significantly in terms of age or education. Patients showed mild slowing in the Grooved

Pegboard Test (non-dominant hand) as well as in processing speed in Block Design and in Digit Symbol. Age seemed to interact with OSAS by slowing down time-pressured cognitive and motor performance in some SOC tests. Older subjects showed more false alarms than younger subjects in RVP.

**Conclusions:** OSAS patients show mild slowing in some areas of cognitive functioning compared to healthy controls, but age can increase the effect and number of errors made.

Correspondence: *Riikka Kilpinen, Tampere University; Laasontie 3, Lemppälä 37500, Finland. E-mail: riikka@kilpinen.eu*

**I. BRAMÃO, F. INÁCIO, L. FAÍSCA, K. PETERSSON & A. REIS. The influence of color information in diagnostic and non-diagnostic color objects recognition.**

**Objective:** There is evidence that visual color information improves object recognition independently of object color diagnosticity. In the present study we intend to explore at which level of visual object recognition color attribute improves the recognition of diagnostic (DCO) and non-diagnostic color objects (NDCO). We expect that color information would be a central cue for DCO recognition both extracting the structural descriptions from the object image and triggering the access to stored semantic information about the object; while, for the NDCO recognition we predict that color information only helps in the extraction of the structural descriptions from the object image.

**Participants and Methods:** To address this issue, 144 subjects performed three object recognition tasks with different cognitive demands: an object verification task, a category verification task and a name verification task. Color and black and white versions of the DCO and NDCO were used.

**Results:** We observed that color information improved DCO recognition mainly when the task involved the access to stored semantic information about the object – category and name verification. In contrast, we found that color information improved NDCO recognition mostly when the task required object structural descriptions access – object verification task.

**Conclusions:** The role of color information in object recognition seems to be dependent of color diagnosticity: color participates in DCO recognition mainly triggering the access to stored semantic information about the object, while in NDCO recognition color facilitates the extraction of visual elements during the structural identification of the object image. Correspondence: *Inês Bramão, Universidade do Algarve, Faculdade de Ciências Humanas e Sociais, Campus de Gambelas, Universidade do Algarve, Faro 8005-139, Portugal. E-mail: mibramao@ualg.pt*

**R. FERRUCCI, M. VERGARI, G. GIANNICOLA, M. ROSA, L. TADINI, M. FUMAGALLI, F. MAMELI, S. BARBIERI & A. PRIORI. Cerebellum and the Emotional Recognition of Facial Expression: a Study with Cerebellar Transcranial Direct Current Stimulation (ctDCS).**

**Objective:** Recognition of facial emotions is important for communication and social interactions. Though several brain areas are activated during tasks of facial emotion recognition, it is unknown whether and how subcortical structures are also involved. In this study, to evaluate the role of the cerebellum in recognizing facial expressions we used cerebellar transcranial direct current stimulation (ctDCS) a non-invasive technique for modulation of cerebellar function.

**Participants and Methods:** A facial emotion recognition task was tested in 21 healthy subjects (aged 20-40 years; 12 female-9 male) before and after ctDCS (2 mA, 20 min.). In each subject anodal, cathodal and sham ctDCS were tested in random order in three separate sessions, at intervals of at least 1 week.

**Results:** The effect of ctDCS was assessed in terms of slope percentage changes (post ctDCS - baseline)/(baseline). Percentage changes after anodal and cathodal ctDCS were compared with percentage changes after sham for all emotions.

The learning function after anodal ctDCS whereas significantly differed from sham ctDCS for anger (percentage slope ± 95% c.i.: -12.96±7.28 anodal vs. 0.56±7.25 sham, p=0.0389), failed to change for the other emotions. Conversely, the learning function after cathodal ctDCS did not differ from sham ctDCS for all the emotions (cathodal vs. sham: -10.48±6.82 vs 0.56±7.25; p= 0.10)

**Conclusions:** In conclusion, ctDCS specifically modulates the recognition of facial angry. This finding would suggest that the cerebellum plays a role in the emotional recognition of negative facial emotions implying a generalized behavioral arousal and a defense reaction.

Correspondence: *Roberta Ferrucci, Fondazione IRCCS Cà Granda Ospedale Maggiore Policlinico, via F. Sforza 35, Milan 20122, Italy. E-mail: roberta.ferrucci@policlinico.mi.it*

**F. MAMELI, S. MRAKIC-SPOSTA, M. VERGARI, M. FUMAGALLI, M. MACIS, R. FERRUCCI, F. NORDIO, S. BARBIERI, G. SARTORI & A. PRIORI. The Fibber Brain: an Insight into Neural Mechanisms of Deception with Brain Stimulation.**

**Objective:** Despite intensive research into ways of detecting deception in legal, moral and clinical contexts, few experimental data are available on the neural substrate of different types of lies.

We used transcranial Direct Current Stimulation (tDCS) to modulate the dorsolateral prefrontal cortex (DLPFC) function and to assess its influence on different types of lies.

**Participants and Methods:** Twenty healthy volunteers were tested before and after tDCS. All participants received anodal and sham tDCS, tested during two separate experimental sessions held at least 1 week apart. tDCS was bilaterally (F3-F4 according to the 10-20 EEG international system) delivered by a pair of sponge electrodes to the DLPFC (2 mA x 15 min). In each session the Guilty Knowledge Task (GKT) and Visual Attention Task were administered at baseline and immediately after tDCS ended. Two types of truthful (truthful for personal question; truthful for general knowledge) and deceptive (lie for personal question; for general knowledge) responses were evaluated using a computer-controlled task. Dependent variables collected were reaction times (RTs) and accuracy.

**Results:** In the GKT at baseline the RTs were significantly longer for lies than for truthful responses. After sham stimulation, lie responses remained unchanged ( $p = 0.24$ ) but after anodal tDCS, RTs decreased significantly only for lies involving general knowledge ( $p = 0.02$ ). tDCS left the Visual Attention Task unaffected.

**Conclusions:** These findings show that manipulating DLPFC function with tDCS specifically modulate deceptive responses for general information leaving those on personal information unaffected. Our results suggest that multiple brain structures are involved in deception with a specificity for different types of lies.

Correspondence: *Francesca Mameli, Neurological Sciences, Fondazione IRCCS Cà Granda. Ospedale Maggiore Policlinico, F.Sforza, 35, Milan 20122, Italy. E-mail: francesca.mameli@unimi.it*

**A. BALA & E. LOJEK. Pattern of Cognitive Functioning in Patients with Pituitary Adenoma.**

**Objective:** The aim of the research was to evaluate the cognitive functioning in patients with hormonal disorders in pituitary adenoma. Study was planned with reference to the relationship between the level of hormones and brain functioning.

**Participants and Methods:** There were used a battery of tests investigating cognitive functions such as visual memory (Benton Visual Retention Test - Revised; Rey-Osterreich Complex Figure Test), verbal memory (Rey Auditory Verbal Learning Test), working memory (Digit Span from the Wechsler Adults Intelligent Scale - Revised (WAIS-R)), attention (The D2 Test of Attention), visuo-spatial functions (Block Design - WAIS-R; Squares - APIS-P), language functions (Vocabulary - WAIS-R; Fluency Verbal Test) and executive functions (Trail Making Test B; Stroop Test). Ten patients with hormonal dysfunctions in pituitary adenoma participated in the research before starting their treatment. There were also a control group composed of ten healthy individuals. The subjects were adults aged 25-51, both males and females, recruited from the Clinic of Neurosurgery and the Clinic of Endocrinology of the Medical University of Warsaw.

**Results:** Group of patients, with pituitary adenoma has shown a relevant decrease in performance in memory and attention tests, compared to the healthy subjects. Smaller but also worthy of notice effect has been observed in visuo-spatial and executive functions. There were no significant differences between groups in language functions.

**Conclusions:** Studies have shown that people with hormonal disorders in pituitary adenoma achieve lower levels of cognitive functioning than healthy people.

Correspondence: *Aleksandra Bala, Faculty of Psychology, Warsaw University, ul. Stawki 5/7, Warsaw 00-183, Poland. E-mail: aleksandra.bala@gmail.com*

**A. ORON, A. MARYNIAK, E. SZELAG & E. SZUFLADOWICZ. The Effect of Permanent Atrial Fibrillation on Mental Rhythmisation during Subjective Accentuation of Metronome Beats.**

**Objective:** A lot of neuropsychological data indicates that temporal information processing (TIP) underlies many aspects of human cognition and can be characterized by several temporal processing levels. We concentrate here on a few second level, reflected e.g. in language, motor behaviour or social interactions. In our study we applied subjective rhythmisation during listening to monotonous strings of metronome beats. The aim of our study was to test whether disturbances of a basic heart rhythm in permanent Atrial Fibrillation (AF) can influence such mental rhythmisation.

**Participants and Methods:** We compared the performance of 14 adults with AF and healthy controls.

Subjects were asked to listen to sequences of monotonous beats (presented at frequencies from 1 to 5 beats/second) and to accentuate mentally every 2nd, 3rd or other beat to create an individual rhythmic pattern. They reported verbally the maximum number of beats which they could integrate into one unit. The score was the integration time interval, i.e. the number of reported beats multiplied by a time distance between two successive beats in each presented sequence. To perform this task at least three strategies were possible: integration by time, integration by number or combination of these two strategies.

**Results:** In general, the results showed the similar integration in both AF patients and controls. The only difference was that AF patients integrated less information at higher frequencies of presented beats.

**Conclusions:** Such results may suggest a different mental rhythmisation in AF patients which based predominantly on mental counting, but not on a constant time.

Correspondence: *Anna Oron, Laboratory of Neuropsychology, Nencki Institute of Experimental Biology, Polish Academy of Sciences, 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: a.oron@nencki.gov.pl*

**M. FUMAGALLI, P. PASQUALETTI, M. VERGARI, R. FERRUCCI, F. MAMELI, S. MARCEGLIA, S. MRAKIC-SPOSTA, S. BARBIERI, G. PRAVETTONI, G. SARTORI, S. CAPPÀ & A. PRIORI. Gender-Dependent Modulation of Utilitarian Judgment after Ventral Prefrontal Cortex Direct Current Stimulation.**

**Objective:** Moral dilemmas lead to situations that have conflicting outcomes, and that often implies an utilitarian choice based on personal gain, even damaging others. Despite the social and economical implications of utilitarian behavior, its neurophysiological bases are still unknown.

**Participants and Methods:** Transcranial direct current stimulation (tDCS) is a non-invasive technique for modulating brain excitability. To assess how the brain controls utilitarian behavior, we delivered tDCS over the ventral prefrontal cortex (VPC) and over the occipital cortex (OC) in 78 healthy subjects. Before and after tDCS, mood was evaluated using visual-analog scales and utilitarian behavior was assessed by the moral judgment task, consisting of non-moral, impersonal-moral and personal-moral dilemmas (Fumagalli et al., 2009).

**Results:** At baseline, females provided fewer utilitarian answers than males for personal-moral dilemmas ( $p = .007$ ). Whereas in females cathodal VPC-tDCS tended to decrease and anodal VPC-tDCS significantly increased utilitarian responses ( $p = .005$ ), in males, VPC-tDCS failed to induce changes. Moreover, in both genders OC-tDCS left utilitarian judgments unchanged. In both sexes, reaction times for utilitarian responses significantly decreased after cathodal ( $p < .001$ ) but not after anodal ( $p = .735$ ) VPC-tDCS.

**Conclusions:** We conclude that VPC-tDCS interferes with utilitarian decisions, influencing the evaluation of the advantages and disadvantages of each option in both sexes, but does so more strongly in females. Whereas cathodal tDCS alters the time for utilitarian reasoning in both sexes, anodal stimulation interferes more incisively in women, modifying utilitarian reasoning and the possible consequent actions. These findings argue for gender-related differences in the neural mechanisms involved in social interactions and cooperation.

Correspondence: *Manuela Fumagalli, Università degli Studi di Milano, via Francesco Sforza 35, Milano 20122, Italy. E-mail: manuela.fumagalli@policlinico.mi.it*

V.D. VAITSES, F.A. KLIEMANN, R.B. RODRIGUES & C.S. GOLBERT. **Visual Memory Performance and Global Field Synchronization in the Electroencephalography: Correlation in Children with Learning Disabilities.**

**Objective:** This study aimed to verify the hypothesis that a better score in the performance of a cognitive test corresponds to a greater functional connectivity, as expressed by Global Field Synchronization (GFS).

**Participants and Methods:** Sixty five children of elementary school underwent EEG during playback of the Rey Complex Figure (RCF) by remembrance. Results obtained in RCF and task in GFS in alpha and theta band power were correlated by Pearson linear correlation statistic test. GFS index was obtained from the analysis software developed and provided by König (<http://www.puk.unibe.ch>)

**Results:** None of the subjects achieved a correlation index superior of 0.5.

**Conclusions:** A correlation was found between performance in visual memory as verified by playback of the RCF and functional bioelectric connectivity, as studied by the GFS methodology. These results probably were determined by the inspecificity of the frequencies studied in theta and alpha band power.

Correspondence: *Virian D. Vaitses, physician, Education, UFRGS, Fernandes Vieira, 140/14 Bomfim, Porto Alegre 90035-090, Brazil. E-mail: virian.vaitses@ufrgs.br*

M. BALCONI & D. CRIVELLI. **Mismatching Action-feedback Relationship and Sense of Agency: the Contribution of ERP Modulation (FRN and P3b), Behavior Inhibition/activation Systems (BIS/BAS), and Behavior Identification of Actions (BIF).**

**Objective:** Our sense of being agents relies on our action-effectiveness in a context and on our sense of causal power. The sense of agency has been related to correspondence between goals and actions and to correspondence between predicted and actual effects of our acting. The present study investigates the disruption of subjects' sense of agency consequent to the perception of action-effect mismatching, checking for specific cortical responses (ERPs), taking into account subjective sensitivity to external cues (through Behavioural Inhibition System - BIS - and Behavioural Activation System - BAS -) indexes, and behavior identification process (through Behavior Identification Form - BIF -).

**Participants and Methods:** We have presented erroneous feedbacks (N=25) in response to subjects' actions, characterized by a discordance between actual subjective response on spatial features and the expected feedback.

**Results:** Two negative electrophysiological components were found, an ampler in case of erroneous feedback. The first, peaking at 210 ms and posteriorly distributed, has been associated to monitoring of unattended feedbacks, supposed to be an analogue of FRN. The second positive deflection plausibly a P3b component and posteriorly distributed, has been associated to a revision of the mental model of the context.

**Conclusions:** An ampler FRN-analogue was related to higher BIS measures, in response to both veridical and erroneous feedback. On the contrary, higher BAS (especially Reward Responsiveness scale) was associated to an ampler P3b, reflecting an increased proactive attitude to external feedback. Moreover, low-level of action representation (low-BIF) explained FRN amplitude more than high-level one (high-BIF). Results will be discussed from an integrated point of view on agency.

Correspondence: *Michela Balconi, Ph.D., Psychology, Catholic University of Milan, L.go Gemelli, 1, Milan 20123, Italy. E-mail: michela.balconi@unicatt.it*

M. BALCONI & A. BORTOLOTTI. **Self-report Measures, Facial Response, and Personality Differences (BEES) in Cooperative vs. Non cooperative Situations: Contribution of the Autonomic System to the Sense of Empathy.**

**Objective:** The empathy, represented as the capacity to understand and respond to the affective experience of another person, is elicited by social and emotional situations (Decety & Jackson, 2006). Empathy involves a wide range of involuntary response to the affective cues from others and an intentional role-taking ability. Indeed, people are predisposed to react differently to emotional empathic situations, using a large spectrum of autonomic measures, as facial expressions of emotion.

**Participants and Methods:** The present study integrated three different measures of empathic behavior in different social contexts: verbal self-report measures (empathic response, emotional involvement and

emotional significance, and valence), facial expression (activity of corrugator supercillii muscle and of zygomaticus major muscle), and personal response to empathic scale (BEES). Different interpersonal scene types (cooperation, non-cooperation, conflict, indifference) were presented to participants.

**Results:** First, these interpersonal contexts revealed changes into empathic sensitivity, showing a difference for self-rating on empathy, emotional involvement and valence. Secondly, subjective empathic response and emotional involvement were found to be dissociated, whereas self-report measures of empathy and facial mimicry were found to be related. In fact, one's own perception of interpersonal situations evoked distinct facial EMG response patterns in relationship with empathic self-rating. Third, the level derived from the BEES scale was correlated with subjective ratings and physiological measures, since subjects showed different empathic behaviour as a function of BEES. High empathic subjects (hBEES) were more responsive (on both self-report and facial response) to empathy-related situations than low empathic subjects (lBEES).

**Conclusions:** The convergence of these multidimensional measures was discussed.

Correspondence: *Michela Balconi, Ph.D., Psychology, Catholic University of Milan, L.go Gemelli, 1, Milan 20123, Italy. E-mail: michela.balconi@unicatt.it*

A. DOMAGALIK, T. MAREK, M. FAFROWICZ, K. GOLONKA, J. MOJSA-KAJA, H. OGINSKA, K. TUCHOLSKA, E. BELDZIK & A. URBANIK. **Default Mode Network in Tasks Involving Bottom-up and Top-down Processes.**

**Objective:** Default Mode Network (DMN) is a brain system deactivated during goal-oriented activity. More difficult cognitive tasks lead to larger deactivation. Pro-saccadic (PS) and anti-saccadic (AS) tasks are used in the study of elementary cognitive processes involved in preparing and applying, respectively, bottom-up and top-down selection for stimuli and responses. It was hypothesized that AS task, requiring the inhibition of a reflexive response and then voluntary programming of saccade in the opposite direction, will trigger the DMN.

**Participants and Methods:** 23 healthy male volunteers were examined in the MR scanner while performing PS and AS tasks. Each of registrations was combined with 20 task blocks interlaced with fixation point. For each type of task a general map of activation was created and averaged across subjects with corresponding T-test. Then the conjunction of the two was performed to achieve map of common areas for both tasks. Mean beta parameter was extracted from the conjunction map for further task comparison.

**Results:** Both tasks activated brain regions involved in control of eye movements: presupplementary motor area, supplementary motor area and bilaterally frontal eye fields, basal ganglia, thalamus, superior and inferior parietal lobe, fronto-insular cortex, dorso-lateral prefrontal cortex, and visual cortex. The AS task evoked significantly higher activations than PS task ( $t=2.33$ ,  $p<0.05$ ). Additionally, AS deactivated brain regions classified as parts of the DMN: posterior cingulate cortex and bilaterally angular gyrus, superior frontal lobe and hippocampus.

**Conclusions:** The study proved that higher task difficulty results not only in higher activation but simultaneous occurrence of DMN. This is in line with hypothesis of DMN "vascular steal" when resources reallocate to regions involved in demanding tasks. For the first time it has been shown that this phenomenon occurs only in tasks involving top-down processes. Correspondence: *Aleksandra Domagalik, MSc, Dept. of Neuroergonomics, Jagiellonian University, Lojasiewicza 4, Krakow 30-348, Poland. E-mail: aleksandra.domagalik@uj.edu.pl*

N. TSURUYA, M. KOBAYAKAWA & M. KAWAMURA. **Mind-reading Impairment in Parkinson's Disease.**

**Objective:** Theory of mind (ToM) is a specific cognitive ability to understand other people's mental states, and it makes important contributions to higher-level social cognition. Recent research has indicated that emotional processing and social cognitive function are impaired in Parkinson's disease (PD). In the handful of previous studies of ToM in PD, there is no agreement on whether the ToM ability is affected by PD or not. The aim of our study was therefore to examine the ToM ability in PD, using "Reading the Mind in the Eyes" test.

**Participants and Methods:** We developed a Japanese adaptation of the revised version of the Eyes test (Baron-Cohen et al., 2001).

ToM was investigated in 11 PD patients (6 men, 5 women) and 13 healthy control subjects (8 men, 5 women). The participants were asked to judge what the person in the picture is thinking or feeling from only the eye region. To check that the early processing of face perception were intact, the gender attribution task was administered to all participants.

**Results:** Performances on the Eyes test were significantly lower in the PD patients than in the healthy control subjects. This could not be attributed to the perceptual problem, because PD patients could discriminate the gender as well as healthy controls.

**Conclusions:** The present results indicated that PD patients had difficulties in reading the mind of others from the eye region of the face. Our results indicated that social cognitive dysfunction in patients with PD was associated with the ToM ability.

Correspondence: *Natsuko Tsuruya, School of Medicine, Showa University, 1-5-8 Hatanodai, Shinagawa-ku, Tokyo 142-8666, Japan. E-mail: ntsuruya@med.showa-u.ac.jp*

### J. HSUEH. Primary somatosensory cortex in perception and localization of noxious stimuli.

**Objective:** Numerous cortical areas, such as primary (SI) and secondary (SII) somatosensory cortices and anterior cingulate cortex, have been demonstrated in response to noxious stimuli. In addition to a hierarchical sensory process in the cortex, parallel cortical activation in SI and SII to noxious stimuli is proposed. However, the discriminative function of somatosensory cortex in pain processing in humans is still unclear.

**Participants and Methods:** In this study, one intensity (2w, around the threshold of pain, 30 ms duration) and two intensities (3w, 4w) of CO<sub>2</sub> laser stimulation were given to the dorsum of hand in 14 normal subjects. Single pulse transcranial magnetic stimulation (TMS) of the SI cortex was applied at 0 ms (control, without TMS), 150 ms and 300 ms after the onset of the laser stimulus. Subjects were instructed to rate visual analogue scales (VAS, 0-100) and localize stimulated spots after each laser stimulation.

**Results:** Subjects' VAS was significantly higher at 300 ms than control when applied supra-threshold (3w, 4w) intensities and it all increased significantly with intensity increasing at the three times. In addition, TMS at 300 ms with low intensity significantly impaired subjects' ability to localize receptive input.

**Conclusions:** Our finding indicated that TMS on SI with supra-threshold nociceptive stimuli seems to change pain perception and SI seems to play an importance role in discrimination of space localization. But there was no effect of TMS on SI for discrimination of pain intensity. This seems that pain processing of SI for discrimination of pain intensity may be different from that for localization and perception.

Correspondence: *Jen-Jui Hsueh, Cognitive Science, &nbsp;, Tainan 708, Taiwan. E-mail: u7697405@ccmail.ncku.edu.tw*

### W. WALENTOWSKA & E. WRONKA. Face Rotation Influences Subliminal Processing of Emotional Expression.

**Objective:** Selective brain responses to emotional faces can be elicited even when subject is not consciously aware that such stimulus was presented. Our research aim was to investigate ERP correlates of involuntary facial emotion processing influenced by face rotation.

**Participants and Methods:** ERPs were recorded in 31 healthy subjects (26F&5M) in response to subliminally (16 ms) presented faces and non-face objects in a task in which participants had to identify the abstract masking stimulus (displayed for 484ms).

**Results:** The amplitude of parieto-occipital N170 (140-185 ms post-stimulus) was larger when recorded in face trials when compared to non-face objects. The difference in amplitude of the same component was also obtained as the effect of face rotation, while no such differentiation was obtained for non-face objects. Additionally, the negative shift specific for emotional stimuli was observed at occipital and occipito-temporal locations, starting 240 ms after stimulus onset (Early Posterior Negativity, EPN). However, this effect was observed only when faces were presented in their usual up-right position but not when they were rotated.

**Conclusions:** Faces are processed differently than other stimuli even in the absence of conscious awareness. Additionally, our results demonstrate that face rotation changes face processing in essential way and importantly, involuntary differentiation of facial expression can be determined by the structural analysis of face configuration.

Correspondence: *Wioleta Walentowska, Institute of Psychology, Psychophysiology Laboratory, Jagiellonian University, Ingardena 6, Kraków 30-060, Poland. E-mail: w.walentowska@gmail.com*

### W. WALENTOWSKA & E. WRONKA. Attention Modulates Facial Emotion Processing.

**Objective:** There is growing evidence that at early stages (120-180ms post-stimulus) processing of facial emotional expression can be effectively modulated by attention. The aim of present study was to investigate ERPs in response to emotional and neutral expressions in condition of attention directed towards face feature relevant for facial emotion recognition or focused on face features relevant for identity recognition.

**Participants and Methods:** ERPs were recorded in 29 healthy subjects (18F&11M) while performing two tasks. In Face Expression Task, participants were asked to compare expression of two successively presented faces, while in Face Identity Task they were instructed to evaluate the identity of two faces.

**Results:** We observed higher amplitude of parieto-occipital N170 (140-200 ms post-stimulus) in response to emotional faces when compared to neutral ones. We also found that emotional expression influences brain activity at later stages, starting from 240 ms after stimulus onset (Early Posterior Negativity, EPN). In contrast to previous studies, these emotional expression effects were observed in both tasks. However, the stronger subjects were focused on face features relevant for expression comparison, the more pronounced were the expression-related differences in N170 and EPN.

**Conclusions:** Our findings show that different brain responses to emotional and neutral facial expressions can be observed at early (N170) and later stages (EPN) of face processing. However, strength of both effects is related to the amount of attentional resources available for facial emotion processing.

Correspondence: *Wioleta Walentowska, Institute of Psychology, Psychophysiology Laboratory, Jagiellonian University, Ingardena 6, Kraków 30-060, Poland. E-mail: w.walentowska@gmail.com*

### D. ASANOWICZ, W. WALENTOWSKA & E. WRONKA. Hemispheric Asymmetry in the Attentional Bias Toward Emotional Faces. Evidence from Human Electrophysiology.

**Objective:** Previous studies show that emotional expression could rapidly capture attention. We investigated the time course of the attentional biases for negative and positive facial expressions separately in each hemisphere.

**Participants and Methods:** ERPs were recorded while participants (26 F & 4 M; average age: 20.5) were exposed to a pair of faces in a dot-probe task.

**Results:** Attentional orienting to angry faces emerged very early (170-320 ms poststimulus, N2pc). This effect was not obtained for happy faces. However, when we separately analyzed brain responses recorded for the left and right-sided exposition of emotional face, we found that later phase of N2pc (220-320 ms poststimulus) depends on the location of emotional expression. Comparable interaction effects were noticed for both positive and negative expressions. Similar effect of the visual field was also obtained for the Sustained Posterior Contralateral Negativity (SPCN, 320-500 ms poststimulus).

**Conclusions:** These findings are consistent with results from recent studies that showed a similar temporal onset of attentional shift toward threat-related faces and slower emergence of attentional allocation toward positive expression. However, obtained results let us suggest that attentional shift triggered by facial emotion could be additionally modulated by the functional asymmetry of the brain.

Correspondence: *Wioleta Walentowska, Institute of Psychology, Psychophysiology Laboratory, Jagiellonian University, Ingardena 6, Kraków 30-060, Poland. E-mail: w.walentowska@gmail.com*

### D. ASANOWICZ, A. MARZECOVA, L. MICHALCZYK & P. WOLSKI. Spatial Attention and Neglect: Effects of Prism Adaptation on Exogenous Orienting and Inhibition of Return.

**Objective:** Hemispatial neglect is known to be deeper and more persistent following right hemisphere lesions. Symptoms of neglect involve deficits in attentional disengagement from objects in the right visual field (RVF), as well as an impairment of inhibition of return (IOR) to the RVF. Rosetti & Rode (1998) proposed a method of ameliorating neg-

lect symptoms by means of visuomotor adaptation to a prism-induced rightward displacement of the visual field. Conversely, leftward prism adaptation causes a “neglect-like” after-effect in healthy individuals. Recent evidence suggests that the prism adaptation affects attentional functioning; nevertheless, the precise nature of these effects is still unclear. We conducted three experiments in an attempt at specifying how the prism adaptation alters the orienting of attention in the “simulated neglect” in healthy participants.

**Participants and Methods:** Posner’s location-cueing task paradigm was used in order to differentiate processes of exogenous orienting and to assess the magnitude of IOR. Participants (average age: 21.8) performed the cueing task before and after the induction of the prism adaptation effect.

**Results:** Results revealed that the leftward prism adaptation, which induces attentional bias to the right, impairs the IOR effect, but only in the RVF (similarly to neglect symptom). As a consequence of attentional bias triggered by leftward prism adaptation, participants were less efficient in inhibiting return of the attentional orientation toward the right. After the rightward prism adaptation, no such effects were observed.

**Conclusions:** The results contribute to the understanding of mechanisms underlying the hemispatial neglect and may be useful in developing an effective therapy of the neuropsychological condition.

Correspondence: *Dariusz Asanowicz, Institute of Psychology, Jagiellonian University, al. Mickiewicza 3, Kraków 31120, Poland. E-mail: d.asanowicz@uj.edu.pl*

**K. PLUCINSKA, B. GREMBECKA, W. GLAC, D. MYSLINSKA, P. BADKE, G. JERZEMOWSKA & D. WRONA. Lesion and Stimulation of the Mesolimbic Motivational Dopamine System Influence Blood NK cell Percentage in Rats Differing in Locomotor Activity.**

**Objective:** Effect of manipulation in the mesolimbic motivational system on peripheral blood NK cell percentage in freely moving rats differing in locomotor activity to novelty (high responders; HR or low responders; LR) was investigated.

**Participants and Methods:** Peripheral blood was collected from rats exposed to both: VTA electrical stimulation (constant current 0.1 ms duration, 50 Hz, 30-min daily session) and Acb lesion (2mA for 15s): 3 weeks after electrode implantation, after a 2 week VTA stimulation, on the 2nd day after the Acb lesion and on the 14th VTA stimulation day following the Acb lesion. In blood samples NK cell percentage (flow cytometry, Beckman Coulter) was determined.

**Results:** There was a baseline difference ( $p \leq 0.05$ ) in NK cell percentage between the HRs and LR with the higher level in HR than LR groups ( $18.45 \pm 1.43\%$  vs  $9.77 \pm 3.29\%$ ). As compared to the respective sham animals, chronic VTA stimulation significantly increased blood NK cell percentage ( $16.72 \pm 5.66\%$  vs  $48.22 \pm 16.94\%$ ,  $p \leq 0.05$ ) in HR animals only and in a whole non-divided into HRs and LR group ( $15.09 \pm 3.72\%$  vs  $40.59 \pm 16.69\%$ ,  $p \leq 0.01$ ). In contrast to increased NK cell percentage in the non-divided animals ( $12.32 \pm 3.35\%$  vs  $23.86 \pm 3.36\%$ ,  $p \leq 0.01$ ), no significant differences between and among HRs and LR were observed on the 2nd post-Acb lesion day. Chronic VTA stimulation following the Acb lesion, caused a significant ( $p \leq 0.05$ ) increase in NK cell percentage in HRs ( $17.63 \pm 6.54\%$  vs  $32.44 \pm 6.84\%$ ), LR ( $10.36 \pm 4.73\%$  vs  $22.21 \pm 5.82\%$ ), and in non-divided group ( $10.35 \pm 4.1\%$  vs  $24.26 \pm 6.97\%$ ,  $p \leq 0.01$ ) as compared to the sham stimulated group. Again, significantly higher effect was observed in the HR than LR group ( $32.44 \pm 6.85$  vs  $22.21 \pm 5.83$ ,  $p \leq 0.05$ ).

**Conclusions:** The results indicate that mesolimbic system, especially its major terminal field - Acb influences the distribution of NK cells which are responsible for the natural innate and antiviral response. It seems that this immunomodulating effect depends on the individual difference in the behavioural activity.

Correspondence: *Karolina Plucinska, master, Department of Animal Physiology, University of Gdansk, Kladowki 24, Gdansk 80-822, Poland. E-mail: karoplakik@o2.pl*

**A. PLUTA, A. KIJEK & E. LOJEK. Dissociation between theory of mind and executive functions in patients with brain injury.**

**Objective:** Theory of mind (ToM) is the ability to represent mental states such as beliefs, intentions, desires of other people. ToM has often been

discussed as a single modular mechanism but there is also a plethora of studies that focus on cognitive skills such as executive functions (EF) in ToM processing. Existing studies gave rise to the three possibilities: 1. ToM capacity might rely on executive functions abilities and there may be no domain-specific component; 2. executive control do not play role in adult mental state inferences; 3. executive functions facilitate ToM capacities but do not constitute it. The present study aims to test abovementioned hypothesis.

**Participants and Methods:** Fifteen right-hemisphere damaged (RHD) patients and 15 healthy control participants (HC) (well-matched for age and education) took part in a study. The ToM abilities were assessed with 18 stories requiring mental states attribution. The EF were assessed with: the Trail-Making Test B (number of errors) and the Wisconsin Card Sorting Test (WCST) (number of categories, number of perseverative errors). Independent samples T-test was conducted on subjects’ performance on EF and ToM. Then within RHD group we conducted correlation between ToM and EF measures.

**Results:** The results showed that RHD participants performed significantly worse than HC participants in all tasks ( $p < 0.001$ ). No correlations were found between ToM scores and any of EF measures: perseverative errors ( $r = -0.483$ ,  $p = 0.08$ ); number of categories ( $r = 0.4$ ,  $p = 0.155$ ); Trail-making Test ( $r = -0.226$ ,  $p = 0.48$ ) in RHD group.

**Conclusions:** In summary, this study provides further support for dissociation between ToM and executive functions. The results are also consistent with fMRI study reporting lack of overlap in the brain regions implicated in executive control and in ToM tasks.

Correspondence: *Agnieszka Pluta, MA, Psychology, Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: agnieszka.pluta@interia.pl*

**E. BOLCEKOVA, J. FIALA & P. KULISTAK. The Cerebellar Cognitive Affective Syndrome: Further Evidence from Czech Patients.**

**Objective:** The aim of this study was to investigate the characteristics of the cerebellar cognitive affective syndrome (CCAS), a clinical unit designed to describe ‘higher functions’ deficits in patients with cerebellar damage.

**Participants and Methods:** We investigated 26 subjects: 13 with cerebellar lesion limited to right (R,  $n = 5$ ) or left (L,  $n = 6$ ) hemisphere or bilateral lesion ( $n = 2$ ) and 13 healthy, demographically matched controls. Methods included an interview, neurological assessment of ataxia, an extensive neuropsychological assessment of cognitive, executive and affective functions and single-photon emission computed tomography (SPECT).

**Results:** Results confirmed deficiencies in cognitive and executive functions in patients with cerebellar lesions. Affective changes, although clearly present in the clinical picture of the research sample, were not confirmed by questionnaire methods. SPECT revealed that hypoperfusion in one cerebellar hemisphere was accompanied by hypoperfusion in contralateral frontal lobe, thus giving support to their mutual relationship.

**Conclusions:** CCAS manifests predominantly with executive functions deficits (impaired planning, set-shifting, verbal and spatial fluency, divided attention), and deficits in visuospatial functions and memory are also present. Behavior of the patients indicates emotional lability; this, however, was not confirmed by questionnaire methods.

Correspondence: *Eva Bolcekova, Mgr., Charles University, Na Mokrine 24, Prague 13004, Czech Republic. E-mail: eva.bolcekova@gmail.com*

**I. ALMEIDA, F. BARBOSA, A.R. DORES, S. GUERREIRO, B.M. ROCHA, S. VICENTE & A. CASTRO-CALDAS. ABI and Brain Reorganization: Neuropsychological and fMRI Evidences – An Exploratory Study.**

**Objective:** Deficits in cognitive abilities are frequent after acquired brain injury (ABI), being one of the most important predictors of long-term disability. Attention and memory deficits are reported as being among the most common ones, imposing persistent disabilities on individual functionality and compromising rehabilitation outcomes. Comprehension of functional changes at neuropsychological performance and at neural networks related to ABI extreme importance for the planning of more efficient interventions.

In this study our goal is to: a) analyze difference on neuropsychological performance between ABI patients and controls, matched age, gender and level of education and b) investigate if there are altered brain activation patterns in Functional Magnetic Resonance imaging (fMRI) between the two groups.

**Participants and Methods:** After informed consent twenty subjects participated in this study: 10 had a history of ABI (Group I) and 10 were healthy controls (Group II). All subjects underwent a neuropsychological evaluation to assess cognitive performance and fMRI map brain activation patterns during selective attention and working memory tasks.

**Results:** We expect: a) cognitive performance of ABI patients to be poorer than healthy subjects; b) brain activation in both groups are to be found in similar regions of the prefrontal cortex, thalamus and parietal and occipital regions; c) more widely disperse brain activation in ABI subjects.

**Conclusions:** Adaptive mechanisms after ABI may result in recruitment of additional neural resources for cognitive performance, reflecting brain reorganization and plasticity.

Correspondence: *Isabel Almeida, Psychology, Centro Reabilitação Profissional de Gaia, Av. João Paulo II, Arcozelo VNG 4410-406, Portugal. E-mail: isabel.almeida@crpg.pt*

### P. WALECKI, W. LASON, S. BIEDRZYCKI & E. GORZELANCZYK. Inhibitory effects of $\mu$ -opioid receptor agonist on eyeball movements.

**Objective:** The aim of this study was to assess an impact of  $\mu$ -opioid receptor agonists on eyeball movements (saccades). In various diseases saccadic disorders are observed. In the nervous system, the natural ligands of opioid receptor agonists are endogenous peptides: endorphins, enkephalins and dynorphins. Opioid receptors are present in the cerebral cortex (layer III and IV), in the thalamus and the greatest density in striatal striosomes.

**Participants and Methods:** 23 people were examined. The researchers applied a non-invasive method of eye movements measuring using a Saccadometr (Ober), allowing frequency of 500 Hz.

Before the administration of methadone ( $\mu$ -opioid receptor agonist) was carried out two saccadic tests: Latency Test (LT) and Antisaccades Test (AT). Each test consisted of 20 trials for calibration and 50 actual study measurements. In total, each person made 140 responses to stimuli. Both tests were repeated after approximately 1.5 hours after administration of methadone.

**Results:** Results of LT and AT showed that after a single dose of methadone increased the duration (5%) and latency (18%) and decreased amplitude (-5%) and peak velocity (-8%).

Statistical analysis Wilcoxon matched-pairs signed-ranks test showed that changes are statistically significant ( $p < 0.05$ ). The AT was also studied inhibition of an incorrect response to follow the visual stimulus. After administration of methadone increased the number of correct responses and the number of incorrect responses decreased significantly statistically ( $p < 0.05$ ).

**Conclusions:** The results show a significant inhibitory effects of  $\mu$ -opioid receptor agonist. These effects suggest that the location of opioid receptors in the brain is associated with the oculomotor pathway.

Correspondence: *Piotr Walecki, Jagiellonian University Medical College, ul. Kopernika 7, Krakow 31-034, Poland. E-mail: pwalecki@cm-uj.krakow.pl*

### M. GUT, I. SZUMSKA & P. JASKOWSKI. SNARC effect is linked to orienting and executive attention, but independent on the hand dominance.

**Objective:** Brain representations of numbers are spatially organized according to the so-called mental number line (MNL). A simple demonstration of that is SNARC effect (Spatial-Numerical Association of Response Codes).

We investigated the relationship between SNARC and attentional processes. Moreover, because of differences between right- and left-handers in hands performance skills, we focused on interference of handedness with the reaction time in performance of each hand in SNARC tasks.

**Participants and Methods:** Thirty-eight right-handers and 21 left-handers participated in the study. In the Task 1 they responded to four-digit number (target) preceded by a single digit, indicating the position of occurrence (left/right) of this earlier displayed digit within the target. The digit position was either congruent with its localization on the

MNL (e.g. 8 on the right) or incongruent (e.g. 9 on the left). In Task 2 participants assessed the parity of a central digit within a five-digit number (right key=even; left=odd). The condition was referred to as congruent when the reaction side corresponded to the digit position on MNL and as incongruent in case of no such correspondence.

**Results:** The results showed more accurate and faster reactions in the congruent than in the incongruent conditions. Three-factorial ANOVA revealed significant main effects for congruency and magnitude, but not for hand dominance.

**Conclusions:** This confirms the interference between orienting attention shifting and spatial representation of digit. Moreover, the incongruence between the side of correct response and the digit's location in space induces the conflict, what proves that executive attention can be also evoked by digits. However, all obtained effects are not influenced by subject's handedness.

Correspondence: *Malgorzata Gut, Department of Cognitive Psychology, University of Finance and Management, Pawia 55, Warszawa 01-030, Poland. E-mail: m.gut@vizja.pl*

## Visuospatial Functions/Neglect/Agnosia

### R. SELLARO, B. TRECCANI, R. CUBELLI, S. DELLA SALA & C. UMILTÀ. Dissociation Between Space And Awareness In Unilateral Neglect.

**Objective:** According to the most influential accounts of unilateral neglect, the underlying deficit is the lack of spatial coding of contralesional stimuli, which prevents their conscious processing. To test this interpretation, we administered a neglect patient a task that allowed us to examine the (implicit) processing of both spatial and non-spatial attributes of contralesional stimuli.

**Participants and Methods:** A left-neglect patient was asked to judge the colour of a centrally-presented square by pressing a left or right key. The target was flanked by a coloured irrelevant square that was the same colour as the target or the alternative colour.

**Results:** Although the patient could not consciously perceive the flanker when it was presented in the left hemispace, we observed effects of target-flanker colour congruency and flanker-response position correspondence with both left- and right-sided flankers. In the intact hemispace, we found an interactive effect of colour and position of the flankers. This effect has been already observed with normal participants and shown to be critically dependent on the two irrelevant attributes being bound in the same object. In contrast, in the neglect hemispace, we observed additive rather than interactive effects of flanker colour and position, as if the two attributes were processed separately. These findings suggest that the location of neglected stimuli, as well as their non-spatial attributes, can be coded without stimuli entering consciousness and without the intervention of attention.

**Conclusions:** We conclude that in unilateral neglect contralesional stimuli do not enter consciousness because of the critical role of attention for binding object features.

Correspondence: *Roberta Sellaro, Center fo Mind/Brain Sciences, University of Trento, Corso Bettini 31, Rovereto 3806S, Italy. E-mail: roberta.sellaro@unitn.it*

### M. SOBANSKA & E. LOJEK. Double Dissociation between Multiplication and Subtraction in Brain Damaged Patients with Language or Spatial Disorders.

**Objective:** Different cognitive mechanisms are suggested to be involved in the processes of multiplication and subtraction. The aim of the present study was to investigate the hypothesis that language functions play a more important role in multiplication than in subtraction, whereas spatial skills are more crucial for subtraction than for multiplication.

**Participants and Methods:** Thirteen brain damaged (BD) patients with language disorders, 13 BD subjects with spatial impairments and 17 healthy controls were involved in the study. Each subject performed 81 multiplication problems (from 1x1 to 9x9), and 36 subtraction problems (from 2-1 to 9-8) four times. Reaction time and the error rates were controlled.

**Results:** When the data were subjected to the General Linear Model repeated measures, the interaction effect between groups and type of arithmetical problem (multiplication, subtraction) was statistically significant for reaction time. Further investigation of simple effects re-



vealed that patients with language disorders were significantly slower in multiplication but not in subtraction in comparison with healthy people. In turn they made more errors in both multiplication and subtraction. In contrast, patients with spatial disorders were considerably slower and made more mistakes than control group in subtraction but not in multiplication.

**Conclusions:** The above double dissociation supports previous studies showing that multiplication and subtraction involve different kinds of cognitive mechanisms. Language processing seems to be crucial for multiplication whereas subtraction may involve same kind of visuospatial processes like moving in mind on mental number line.

Correspondence: *Marta Sobanska, Faculty of Psychology, University of Warsaw, ul. Amundsena 4/14, Warsaw 02-776, Poland. E-mail: marta\_sobanska@yahoo.com*

**P. ANTOSZ, D. ASANOWICZ & P. WOLSKI. Does Covert Attention Focus on Spatial Locations or Objects in Space? Comparing the Effects of Leftward and Rightward Prism Adaptation.**

**Objective:** The main objective of the research was to determine whether covert attention is directed to spatial locations or to objects in space.

Patients with left spatial neglect respond slowly to a left-sided target when it is preceded by a right-sided "invalid" cue. It has been shown that rightward prism adaptation can ameliorate those clinical symptoms. Conversely, leftward prism adaptation can evoke mild transitory symptoms of neglect in healthy subjects. Rightward prism adaptation does not seem to have that effect. Recent findings suggest that the attentional bias in left-neglect might not concern spatial locations, but visual objects in space (Rastelli et al., 2008).

**Participants and Methods:** The changes of attention distribution after prism adaptation were examined in two groups (rightward and leftward prism adaptation) of 40 healthy individuals. Another between-subjects manipulation measuring disengagement of attention from objects in space or location regarded two different conditions of Posner's cueing task where non-informative peripheral cues involved either brightening of the contour of one of the lateral boxes (onset cue), or its complete disappearance (offset cue).

**Results:** The cueing effect for the left-sided target decreases after the leftward prism adaptation but only when the attention is disengaged from objects in space. Inhibition of return effect for the right-sided targets also decreases after leftward prism adaptation only for onset cues.

**Conclusions:** Distribution of attention is affected by prism adaptation only if the disengagement concerns objects in space, not space per se. The results are consistent with previous reports.

Correspondence: *Patrycja Antosz, Jagiellonian University, ul. Ogrodowa 16/55, Brzesko 32-800, Poland. E-mail: antosz.patrycja@gmail.com*

**I. HEBER, J. HAUKE, D. RAUSCH, T. KUHLEN, B. FIMM & J. MÜSSELER. Perception and Attention towards Moving Stimuli in Peri- and Extrapersonal Virtual Space.**

**Objective:** Attention towards peri- and extrapersonal space is processed by the dorsal and ventral visual pathways in the brain. Accordingly, attentional phenomena like pseudoneglect or neglect differ depending on the spatial depth of presentation. However, those phenomena were usually examined with stationary stimuli. We sought to explore whether visuo-spatial attention and perception of moving stimuli differ depending on spatial depth.

**Participants and Methods:** We used a Virtual Reality (VR) setup and presented fast moving stimuli (matched for retinal size) in peripersonal (40 cm) and extrapersonal (200 cm) virtual space using a rear projection screen and a stereo projector. 16 participants (10 male, 6 female) took part in the study. The task was to indicate the onset position (on the x-axis) of fast horizontally moving stimuli (either in foveofugal or foveopetal direction) with a mouse click. The dependent variable was computed as the difference between the perceived and the actual onset position of the stimulus.

**Results:** We found a general effect of mislocalization of stimulus onset, as well as a dissociation of onset mislocalization depending on viewing distance: While in extrapersonal space, participants' misjudgements were more pronounced with foveofugal than with foveopetal motions, no such difference occurred in peripersonal space. Differences in magnitude between the left and right visual hemifield were not observed.

**Conclusions:** The results indicate that moving stimuli are processed depending on spatial depth of presentation and that the processing of motion within the dorsal and ventral visual streams seems to be directionally biased.

Correspondence: *Ines Ann Heber, Dipl.-Psych., Neuropsychology, University-Hospital RWTH Aachen, Pauwelsstrasse 30, Aachen 52074, Germany; E-mail: heber@neuropsych.rwth-aachen.de*

**Basic Neuroscience / Molecular Biology of Brain Disorders**

**M. KUBIAK. Influence of AHP Reduction on Epsps in Hippocampal Pyramidal Cells – A Simulation.**

**Objective:** The goal of the study was to describe how amplitude and propagation of excitatory postsynaptic potentials (EPSPs) in CA1 hippocampal pyramidal cell is affected by reduction of the AHP.

**Participants and Methods:** For present simulation original model of the cell from Model DB was modified. Simulation was run with NEURON (an environment designed to precisely model single cells and small networks). The cell was tetanized with an impulse strong enough to induce a robust AHP and EPSPs caused by stimulation of proximal and distant synapses were measured.

**Results:** Reduction of AHP causes an increase of amplitude EPSPs recorded in cell body and it is hypothesized that it also affects signal integration therefore making induction of other forms of plasticity easier.

**Conclusions:** Reduction of the amplitude afterhyperpolarization (AHP) is a well described form of intrinsic neuronal plasticity and in hippocampal pyramidal cells it may be caused by learning.

(Neuropsychological Scientific Group Faculty of Psychology Warsaw University)

Correspondence: *Malgorzata Kubiak, Faculty of Psychology, University of Gdansk, Pomorska 68, Gdansk 80-343, Poland. E-mail: ins@neuropsychologia.org*

**A. CYBULSKA-KLOSOWICZ, A. BRZEZICKA, R. ZAKRZEWSKA & M. KOSSUT. Involvement of Retrosplenial and Anterior Cingulate Cortex in Classical Conditioning.**

**Objective:** The retrosplenial cortex (RSP) of rodents is implicated in many cognitive functions and is an important node in the systemic integration network. Several studies point to its role in learning that involves spatial stimuli and spatial navigation. Relatively little is known about its involvement in simple associative learning.

**Participants and Methods:** We examined activation of the two cytoarchitectonic divisions, agranular and granular, of the RSP and also anterior cingulate cortex (ACC) in a delay conditioning paradigm, where stimulation of the facial vibrissae in mice was paired with a tail shock. During the conditioning session the [14C]-2-deoxyglucose (2DG) brain mapping was performed. Effectiveness of conditioning was assessed with analysis of frequency of head movements, which decreased in the course of the conditioning session. 2DG uptake in RSP and ACC was examined in conditioned, pseudoconditioned and stimulated control groups.

**Results:** The metabolic labeling was elevated in RSP and ACC in the conditioned group, but not in animals which received CS or UCS alone. Comparison between conditioned and pseudoconditioned groups showed the specific activation by associative learning in both divisions of the RSP and rostral (but not caudal) part of ACC. Also functional associations between activity levels in RSP and ACC were shown.

**Conclusions:** These data support the concept of the RSP as structure that, besides its recognized role in visuospatial learning, monitors and reacts to activity of brain systems responsible for other types of learning. Also the results support the idea that the rostral part of ACC is of particular importance for aversive learning.

Correspondence: *Anita Cybulska-Klosowicz, Nencki Institute, 3 Pasteur St., Warsaw 02-093, Poland. E-mail: acybulska@yahoo.com*

**D. CANBAZ, E. KARACA & A. KARABAY. Characterization of the Transcription Factors Involved in Spastin Gene Expression.**

**Objective:** The most common cause of otosomal dominant hereditary spastic paraplegia is known to be mutations in the SPG4 gene which codes for spastin. However, regulation of SPG4 gene promoter region is not known yet. Therefore, we first aimed to identify putative transcription factor binding sites on spastin promoter to further characterize their interaction with and regulation on SPG4 gene promoter.

**Participants and Methods:** 1000 bp region of SPG4 gene promoter and shorter fragments were obtained by polymerase chain reaction.

These promoter deletion constructs were cloned into a luciferase reporter plasmid vector. Luminometrical measurements were performed by Dual-Luciferase® Reporter Assay System after 48 hours of transfection of these constructs into SHSY-5Y neuroblastoma cells by lipofection. The nucleic acid binding sites of Elk1 and PEA3 on the core promoter were predicted by PROMO bioinformatic tool from ALLGEN and their bindings were confirmed by Electrophoretic Mobility Shift Assay (EMSA).

**Results:** Analysis of deletion constructs by luminometrical measurements and statistical analysis showed that 700 bp TATA-less promoter was sufficient for high level of activity. While the overexpression of Elk-1 represses the promoter, PEA3 overexpression activates it. Elk1 and PEA3 binding sites on the promoter were determined by EMSA.

**Conclusions:** 700 bp TATA-less promoter act as "core" promoter for SPG4 gene. Elk1 and PEA3 transcription factors bind to SPG4 gene promoter and the promoter is activated by PEA3, but repressed by Elk1.

Correspondence: *Arzu Karabay, istanbul technical university, ayazaga campus, Istanbul 34469, Turkey. E-mail: karabaya@itu.edu.tr*

### S. KORULU & A. KARABAY. Understanding the Role of PKC in Neurons and Neurodegeneration.

**Objective:** In this study we aimed to investigate and identify the role of PKC in healthy and degenerated hippocampal neurons by analyzing cell cycle markers. Neurons are highly differentiated post-mitotic cells and under normal circumstances, these terminally differentiated cells stay in G0 phase of the cell cycle by down regulating their mitotic proteins. Yet, in neurodegeneration, especially in Alzheimer Disease (AD), neurons have been shown to avoid G1/S check point and continue to the cell cycle. In AD, Protein Kinase C (PKC) is one of the key proteins that have altered expression levels. Reduced activity and translocation of PKC have been shown in postmortem brain cortex of AD cases. PKC has also roles in the cell cycle as to have regulatory effects on cyclin D1. Some studies reported an abnormal appearance of the cell cycle markers like cyclin D1 in regions where cell death is extensive, especially in hippocampal regions of AD patients.

**Participants and Methods:** For PKC studies in neurons, we used both activation (PMA: PKC activator) and inhibition (Gö6976: PKC inhibitor) methods. In induced neurodegenerative model, we employed amyloid beta 1-42 (A $\beta$  1-42). For this purpose, hippocampal neurons were treated with A $\beta$  1-42. Cell cycle marker analysis for both studies were performed by using probe based quantitative RT-PCR, flow cytometry and immunocytochemistry methods.

**Results:** PKC activation resulted in dramatic changes in mRNA levels of cell cycle markers. For instance, cyclin D1 resulted in highly elevated mRNA expression level.

**Conclusions:** PKC could positively regulate cyclin D1 expression in hippocampal neurons.

Correspondence: *Arzu Karabay, istanbul technical university, ayazaga campus, Istanbul 34469, Turkey. E-mail: karabaya@itu.edu.tr*

### A. YILDIZ & A. KARABAY. Regulation of Activation of Mitotic Markers in Neurodegeneration.

**Objective:** Neurons are terminally post-mitotic cells which remain in G0 phase. While classic view holds that neurons are unable to re-enter the cell cycle, some studies demonstrated up-regulation of cell cycle markers in degenerating neurons. However, degenerated neurons cannot complete cycle and undergo apoptosis. It is unclear if cell cycle re-activation is the main reason for neurodegeneration or it is a survival effort as a result of neurodegeneration.

In order to answer this question, we treated neurons in non-degenerative way to reactivate cell cycle and analyze markers. This study will let us know whether healthy neurons can be re-directed into mitosis without apoptosis or they still cannot complete the cycle even under non-degenerative conditions.

**Participants and Methods:** We used a novel cell cycle regulator protein Speedy/Ringo, which activates cyclin-dependent-kinases with phosphorylation-free mechanism. Since, phosphorylation events tend to increase in degenerative conditions, this mechanism is advantageous to keep neurons away from chaos. First, primary hippocampal culture was prepared from newborn rats and neurons were electroporatically trans-

ected with Speedy/Ringo. After 48 hours, RT-PCR analysis was performed to analyze mRNA levels of cell cycle markers. Neurons were also analyzed immunocytochemically to observe protein levels. Finally, flow-cytometric analysis was performed to separate neurons according to different phases of cell cycle.

**Results:** Results showed increased level of CyclinD1 mRNA indicating G0-G1 transition. Immunocytochemistry results showed high levels of CyclinD1 and phospho-Retinoblastoma. In terms of cell cycle, transfected cells showed higher percentage of S phase.

**Conclusions:** Speedy/Ringo seemed to trigger cell cycle up to S phase in neurons without leading apoptosis

Correspondence: *Arzu Karabay, istanbul technical university, ayazaga campus, Istanbul 34469, Turkey. E-mail: karabaya@itu.edu.tr*

### M. ODAGIRI, K. UEDA, T. MURAI & Y. OHIGASHI. Visual Search Strategy in a Patient with Naturalistic Action Impairments.

**Objective:** To enable study of the mechanisms underlying naturalistic action impairments in patients with brain lesion, it is necessary to elucidate the nature of their visual search strategy. We presented a patient who showed visual exploration disturbances and errors in routine actions as progression of his primary disease, spinocerebellar degeneration.

**Participants and Methods:** The subject was a 68-year-old, right-handed male. In contrast to his preserved ability for single tool use, gesture, and gazing and pointing at dot stimuli on a monitor, he showed frontal syndromes including environmental dependency syndrome, stereotypic behaviors. We used an eye tracking system (nac-EMR8) to record his fixation points during a series of everyday tasks that had two conditions; with or without placing distractors. Error frequency and types under these two conditions were analyzed and compared to the performance data of healthy controls.

**Results:** 1) When the fixation that guided the current action was not appropriately allocated, an error was elicited; the excessive gaze to the distractor resulted in action addition, while the lack of gaze to the target resulted in object substitution (Schwartz et al., 1995). 2) The number of Look-Ahead fixation (Pelz and Canosa, 2001) which would help a future action rather than the present one was significantly fewer than in the controls, and had a tendency for negative correlation with the number of errors.

**Conclusions:** It was shown that the error pattern of this patient could be explained by his inability to appropriately apply a visual search strategy to on-going and future actions.

Correspondence: *Masashi Odagiri, master, Himeji Dokkyo university, 7-2-1 Kamiono Himeji-shi Hyogo-ken Japan, Himeji 670-8524, Japan. E-mail: odagiri@himeji-du.ac.jp*

### E. JAKUBOWSKA-DOGRU. Animal strain, age, gender and task demands: the confounding factors in the research of drug effects on behavior.

**Objective:** The literature on the effects of drugs on animal behavior brings many conflicting results. In search for the causes of these discrepancies, we analyzed our own data regarding the behavior of inbred and out-crossed, male and female Wistar rats of different age subjected to most commonly used behavioral tasks

**Participants and Methods:** Ewa Jakubowska-Dogru Dept. of Biological Sciences, Middle-East Technical University, 06531 Ankara, Turkey

The experiments were done in the plus maze, and in the spatial learning/memory tasks: Morris water maze (MWM) and the partially baited 12-arm radial maze (RAM), both under idio- and allothetic training conditions.

**Results:** There was a striking difference between juvenile and adult animals in their behavior in the plus maze task, with juveniles showing preference for closed and adults for open arms; slower acquisition of the idiothetic variant of RAM with task-dependent differences in learning rate correlating with frequency of reference, while within-group variation with frequency of working memory errors; in the MWM, the performance of juveniles was significantly poorer showing no gender-related differences, however, adult males showed better performance compared to age-matched females. This difference increased even more when a cue-oriented behavior should be favored over the construction of a referential mental map of environment. The analysis of day-to-day performance fluctuations in male and female Wistar rats subjected to the repeated acquisition training in the MWM did not reveal gender-dependent performance differences

**Conclusions:** The task-, strain-, age- and gender-related differences observed in intact animals create different reference frames for the evaluations of the potential effects of experimental manipulations i.e. drug treatment, and should be considered during the interpretation of the results.

Correspondence: *Ewa Jakubowska-Dogru, PhD, Biological Sciences, Middle-East Technical University, Inonu Blv., Ankara 06531, Turkey. E-mail: bioewa@metu.edu.tr*

## FRIDAY MORNING, JULY 2, 2010

### Symposium 5: Time and Cognition: From Behavioral Studies to Brain Imaging

Chair: Elzbieta Szelag

8:30–10:00 a.m.

#### E. SZELAG, A. VATAKIS, Y. BAO & P. BOGORODZKI. Time And Cognition: from Behavioral Studies to Brain Imaging.

**Symposium Description:** Temporal information processing provides the most fundamental component of many aspects of cognitive functioning, like language, memory, attention, motor control, and decision making. This area of research comprises an essential topic in neuroscience, as temporal constraints provide integrative mechanisms and structure for human cognition. Moreover, neuropsychological evidence indicates strong relationships between deteriorated timing and deteriorated cognition. In addition, research indicates that specific training focused on temporal processing has a great clinical impact in neuropsychological rehabilitation for both children and adults suffering from different neurodevelopmental or neurodegenerative disorders.

This Symposium aims to summarize the existing knowledge on neural mechanisms underlying timing. Four speakers from European and International laboratories concentrate on behavioural methods assessing timing abilities in norm and pathology, as well as on neuroimaging techniques which can give a direct inside into neuroanatomical basis underlying timing. In particular, Y. Bao will concentrate on cross-linguistic comparisons on timing, and A. Vatakis will talk about temporal perception and integration of complex stimuli in normal and pathological populations. P. Bogorodzki will present results of functional Magnetic Resonance to observe brain-in-action during temporal processing. The presentation of E. Szelag will focus on amelioration of both language and broader aspects of cognitive functions following different temporal trainings, using Fast forWord Program or other techniques. Overall, this symposium will provide new data and insights on timing through both behavioral and neuroimaging techniques in healthy and pathological populations. Finally, this Symposium will serve as a forum of idea-exchange on issues related to timing and other cognitive processes.

Correspondence: *Elzbieta Szelag, Professor, Laboratory of Neuropsychology, Nencki Institute of Experimental Biology, 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: szelag@nencki.gov.pl*

#### A. VATAKIS. Audiovisual temporal perception and integration: Acquired deficits in audiovisual temporal perception for complex stimuli.

**Objective:** Interactions of inputs of audiovisual speech have primarily been investigated in healthy participants with only a limited number of studies identifying patients with neurological deficits that are specific to the disruption of audiovisual perception. A specific disruption of audiovisual speech integration has, in fact, never been reported until recently through the patient AWF. AWF experienced a temporal mismatch in audiovisual speech in the absence of any language or sensory impairment (Hamilton, Shenton, & Branch-Coslett, 2006).

**Participants and Methods:** Similarly, patient RW reported perceiving auditory-speech as occurring earlier in time than the corresponding visual-speech. AWF is believed to be a clear case of a patient with disrupted ability to integrate audiovisual stimuli, while RW's results were inconclusive.

**Results:** We will discuss the specific testing procedures that RW underwent and we will compare RW's temporal data with that of normal individuals in various speech and musical stimuli using a temporal order judgment task (e.g., Vatakis & Spence, 2006).

**Conclusions:** The case of RW represents an example of how methodological problems in measuring temporal perception and stimulus integration can lead to patient misdiagnosis.

Hamilton, R. H., Shenton, J. T., & Branch-Coslett, H. (2006). An acquired deficit of audiovisual speech processing. *Brain & Language*, 98, 66-73.

Vatakis, A., & Spence, C. (2006). Audiovisual synchrony perception for music, speech, and object actions. *Brain Research*, 1111, 134-142.

Correspondence: *Elzbieta Szelag, Professor, Laboratory of Neuropsychology, Nencki Institute of Experimental Biology, 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: szelag@nencki.gov.pl*

#### Y. BAO & Y. FANG. Evidence for impact of language experience on temporal order discrimination.

**Objective:** The ability to discriminate the temporal order of two successive auditory events has been suggested as a fundamental basis for language processing. However, whether language experience also influences temporal order perception remains unclear.

**Participants and Methods:** In a recent study, we tested 18 Chinese and 18 Polish young adults with three temporal order tasks - one used two clicks, one used two near-frequency tones, and one used two far-frequency tones.

**Results:** Compared with the highest order threshold in clicks, the two tone tasks showed very interesting results. While Polish young adults were good at discriminating far-frequency tones with near-frequency tone performance similar to clicks, Chinese young people demonstrated significantly lower order thresholds in near-frequency tones with far-frequency tone performance similar to clicks. To further test this language effect, same temporal order tasks were examined in 13 native Chinese students who learned Russian language in university and had passed a high level Russian proficiency test. Consistent with a language impact, these Russian-learning Chinese showed significantly decreased order thresholds not only in near-frequency tones but also in far-frequency tones relative to clicks, although the decrease of order threshold in far-frequency tones was smaller than that in near-frequency tones.

**Conclusions:** These results seem to further suggest that language experience do have an impact on temporal order perception. Reasons underlying this language effect might be related to unique distinctions between tonal language such as Chinese and non-tonal languages such as Polish and Russian.

Supported by NSFC (China, no. 30670703)

Correspondence: *Elzbieta Szelag, Professor, Laboratory of Neuropsychology, Nencki Institute of Experimental Biology, 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: szelag@nencki.gov.pl*

#### P. BOGORODZKI. Methodological challenges in functional imaging of the auditory system: temporal information processing aspects.

**Objective:** The Functional Magnetic Resonance Imaging (fMRI) technique remains, alongside Positron Emission Tomography (PET), one of the most important imaging research methods for the in vivo research of human central nervous system activity. fMRI is based on the phenomenon of an increase in MR signal within areas with lowered blood oxygenation level. Blood oxygenation level drops due to an increased blood flow in areas with higher neuronal activity and is known as BOLD (blood oxygenation level dependent) signal. Changes in BOLD signal stimulated in the specific paradigm prove causal relationships between the applied stimulation and BOLD response obtained.

**Participants and Methods:** Among all functional studies, fMRI studies with the auditory system are of most complex nature and pose the largest number of problems. These cover either experimental limitations like loud noises from fast switched field gradients in EPI (Echo Planar

Imaging) sequence commonly used in fMRI experiments, or methodological issues related to statistical processing of the non-uniform presented stimuli data. The wide range of so called 'silent' techniques with relatively long repetition times uses this approach in order to overcome contamination from 123 dB SPL level noise at the 1.5T and 138 dB on 3T scanner

**Results:** The problem of scanner noise impact on the spatial extent of activated area, or of the amplitude of BOLD response, has not yet been unequivocally resolved, despite a relatively large number of works on this subject. A good example of auditory fMRI is a temporal-order-threshold project focused on temporal aspects of information processing.

**Conclusions:** An example experimental designs and post-processing methods dealing with mentioned problems will be illustrated with experimental data from auditory perception of temporal order project. Supported by grant no.G507/N-DFG/2009.

Correspondence: *Elzbieta Szlag, Professor, Laboratory of Neuropsychology; Nencki Institute of Experimental Biology; 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: szlag@nencki.gov.pl*

**E. SZELAG, M. LEWANDOWSKA, J. MEDYGRAL & A. SZYMASZEK. Training in temporal information processing ameliorates cognitive function: clinical and fMRI evidences.**

**Objective:** Neuropsychological evidence has indicated that many aspects of human cognition may derive from timing. Moreover, in LLI children parallel deficits in timing and language were reduced following the specific temporal training. Three studies presented here address following questions: (1) can the temporal training reduce auditory comprehension deficits in aphasic patients? (2) can temporal training ameliorate cognitive function in healthy volunteers? (3) are there any changes in brain activation after the training?

**Participants and Methods:** In study 1, aphasic patients participated in 8 sessions of either specific temporal training (n=18), or control nontemporal training (n=7). In study 2, Fast forWord training was applied for ca. 8 weeks with four 1-hour sessions per week in elderly listeners (n=9, age: 65-75 years). In study 3, during temporal-order judgments in young healthy volunteers (n=14) we verified changes in brain activation, following Fast forWord training.

**Results:** Only temporal training yielded improvements in timing, moreover, a transfer of improvement from time domain to language domain (which remained untrained) was observed (study 1). Significant improvements after the training in temporal-order judgment which was accompanied by improvements in new learning abilities (paired associates learning) and divided attention (study 2). In study 3, after vs. before comparisons indicated a shift of activations to typical 'timing structures', i.e. middle frontal gyrus (BA 10) on the right side (difficult task), or on the left side (moderate task).

**Conclusions:** These results clearly indicated that temporal training has neuroanatomical correlates and can be beneficial in improvements of cognitive function.

Supported by MNiSW grant no 1082/P01/2006/31, DFG-507 and Scientific Learning, Oakland.

Correspondence: *Elzbieta Szlag, Professor, Laboratory of Neuropsychology; Nencki Institute of Experimental Biology; 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: szlag@nencki.gov.pl*

**Symposium 6:  
Response to Intervention: Implications for  
Neuropsychology and Education**

**Chair: Jack Fletcher**

**8:30–10:00 a.m.**

**J.M. FLETCHER, D.M. RIS, C.A. DENTON, A.E. BARTH, S.R. VAUGHN & R. REZAL. Response to Intervention: Implications for Neuropsychology and Education.**

**Symposium Description:** Response to Intervention (RTI) models represent new frameworks for organizing the delivery of services for students at risk for learning disabilities. These models provide increasingly intense interventions to students based on their response to a series of

attempts to accelerate academic skills in both preventative and remedial modes. One by-product of RTI models is the identification of children who do not respond adequately to relatively intense interventions and are persistently intractable. These students are of special interest as they may epitomize definitions of learning disabilities focusing on the need to ensure adequate opportunity to learn as a core characteristic. We present a series of studies in which intervention is paired with assessment of neuropsychological characteristics and neural activation patterns. From the elementary and middle school intervention studies, children who respond adequately and inadequately to instruction are identified and then compared in neuropsychological performance and on functional neuroimaging assessments using magnetoencephalography. The results suggest that inadequate responders can be identified and that differences in the neuropsychological and neural correlates of inadequate response exist on a continuum of severity. Oral language skills are prominent correlates of inadequate response, but qualitative differences are not readily apparent. The discussion focuses on the implications of RTI models for research and practice, especially in the identification of children with learning disabilities.

Correspondence: *Jack M. Fletcher, Ph.D., Psychology, University of Houston, 2251 W Holcombe Blvd., 222 U of Houston TMC Annex, Houston, TX 77204-5053. E-mail: jackfletcher@uh.edu*

**A.E. BARTH & D.J. FRANCIS. Neuropsychological Correlates of Inadequate Response to Intervention.**

**Objective:** Response to intervention (RTI) models propose that children with learning disabilities should be identified on the basis of inadequate treatment response, low achievement, and traditional exclusionary criteria (Fuchs & Fuchs, 1998). However, limited research has focused on the unique neuropsychological attributes that differentiate inadequate responders from adequate responders.

**Participants and Methods:** We evaluated the neuropsychological and behavioral attributes of Grade 1 students who responded adequately and inadequately to a Tier 2 reading intervention. The groups included inadequate responders who met decoding and fluency criteria (n = 43), only fluency criteria (n = 64), responders (n = 85), and typically achieving students (n = 69). The neuropsychological measures included assessments of phonological awareness, rapid letter naming, spatial working memory, processing speed, oral language skills, vocabulary/verbal IQ, and nonverbal problem solving/nonverbal IQ.

**Results:** Comparisons of all four groups identified phonological awareness as the most significant contributor to group differentiation even when responder status was defined with fluency criteria. A measure of oral language comprehension/working memory also contributed to differentiation of inadequate and adequate responders. Rapid naming was a major contributor to differentiation of responder and typically achieving groups.

**Conclusions:** These results do not suggest qualitative differences among the groups, but are consistent with a continuum of severity associated with the level of reading skills across the four groups.

Correspondence: *Jack M. Fletcher, Ph.D., Psychology, University of Houston, 2251 W Holcombe Blvd., 222 U of Houston TMC Annex, Houston, TX 77204-5053. E-mail: jackfletcher@uh.edu*

**S.R. VAUGHN, J. WEXLER & G.J. ROBERTS. Remediation of Middle School Students with Reading Disabilities: Intensity of Intervention.**

**Objective:** We describe a three-year reading intervention implemented with students in Grades 6-7 screened and identified with reading disabilities and randomly assigned to treatment or comparison conditions.

**Participants and Methods:** From an initial Year 1 Grade 6 sample of several hundred students who did not meet school-based criteria on a reading comprehension test, a series of year-long, daily (50') reading interventions were provided to students in Grades 6-8. At the end of each year, students who passed the year end reading comprehension test were exited from intervention for the subsequent year and minimal responders were continued. We provide outcomes for each of three subsequent years in word reading, fluency, and reading comprehension. Latent Variable Analysis, including multilevel growth analysis, was used to describe findings over time.

**Results:** Treatment students provided standardized and individualized treatments demonstrated consistently small impact from the interven-

tion in word reading and reading comprehension measures. Students provided standardized approaches were associated with greater gains than those students provided individualized approaches though gains were not statistically significant. Overall, more students participating in treatment passed the state level assessment of reading comprehension though overall gains relative to the normative sample were minimal.

**Conclusions:** Middle school students with reading disabilities make small gains over time on reading outcomes. Implications of remediating reading disabilities with older students will be discussed.

Correspondence: *Jack M. Fletcher, Ph.D., Psychology; University of Houston, 2251 W Holcombe Blvd., 222 U of Houston TMC Annex, Houston, TX 77204-5053. E-mail: jackfletcher@uh.edu*

**C.A. DENTON, T.A. TOLAR, P.T. CIRINO & M.A. ROMAIN. The Effects of Intensive Reading Intervention for Children with Inadequate Response to Intervention.**

**Objective:** The purpose of this study was to evaluate the effects of intensive, individualized reading intervention for children with persistent reading difficulties and the influence of neuropsychological-behavioral characteristics on reading outcomes for these children.

**Participants and Methods:** Seventy-one children (age  $\approx$  7 years at onset), who had demonstrated inadequate response to reading intervention provided the previous school year, were randomized to receive individualized intervention (Tier 3, T3) or instruction typically provided in their schools (Business as Usual; BAU). For 24-25 weeks, T3 students received 45 minutes of daily supplemental small-group intervention. Assessments measured reading outcomes and neuropsychological-behavioral characteristics.

**Results:** T3 children performed significantly better than BAU in timed and untimed word reading and phonemic decoding, and in comprehension for some subgroups. The percentage of students in the T3 group who changed status from inadequate to adequate responders was significantly higher than in the BAU group based on decoding criteria; response rate did not differ significantly based on fluency or comprehension criteria. Significant interactions between time, intervention group, and neuropsychological variables were explored.

**Conclusions:** Findings suggest that providing intensive, individualized reading intervention is efficacious for improving decoding, fluency, and possibly comprehension, in primary grade children with reading difficulties that persist despite less intensive intervention, and that intensive intervention may interact with neuropsychological variables to impact outcomes for such children.

Correspondence: *Jack M. Fletcher, Ph.D., Psychology; University of Houston, 2251 W Holcombe Blvd., 222 U of Houston TMC Annex, Houston, TX 77204-5053. E-mail: jackfletcher@uh.edu*

**R. REZAI, A.C. PAPANICOLAOU & P.G. SIMOS. Brain Activation Profiles of Middle School Students as a Function of Response to Intervention.**

**Objective:** The objective of this study was to compare the brain activation patterns using magnetoencephalography of adequate and inadequate responders to a Grade 6-7 rereading intervention.

**Participants and Methods:** Spatiotemporal brain activation profiles were obtained from 35 students in Grades 6-7 experiencing reading difficulties during performance of a pseudoword naming task using Magnetoencephalography. Students were subsequently enrolled in small-group reading remediation programs and were classified as Responders if they showed significant gains in word-level reading skills after one school year of intervention and Inadequate Responders if they did not show such gains. Neurophysiological activity was modeled by a distributed source estimation algorithm (MNE).

**Results:** At baseline Responders' activation profiles featured increased activity in several posterior temporal, inferior parietal, occipitotemporal and anterior frontal regions as compared to Inadequate Responders. These differences persisted after controlling for group differences in baseline word-level reading skills.

**Conclusions:** Recruitment of brain areas, which typically serve as key components of the brain circuit for reading, may be an important factor in determining response to intervention in older students who experience reading difficulties. These results extend previous MEG findings on beginning readers. Implications for functional brain plasticity associated with systematic instruction will be discussed.

Correspondence: *Jack M. Fletcher, Ph.D., Psychology; University of Houston, 2251 W Holcombe Blvd., 222 U of Houston TMC Annex, Houston, TX 77204-5053. E-mail: jackfletcher@uh.edu*

**Paper Session 3:  
Epilepsy/Seizures**

**Moderator: Akira Midorikawa**

**8:30–10:00 a.m.**

**C. NADEBAUM, V. ANDERSON, F. VAJDA, D. REUTENS & A. WOOD. Antiepileptic Drug Use in Pregnancy: Impact on Brain Function of Exposed Australian Children.**

**Objective:** Despite the risk of major malformation or intellectual impairment due to fetal antiepileptic drug exposure, pharmacotherapy is typically continued throughout pregnancy because of the increased risk of complications due to recurrent seizures. This research aims to characterise the long-term impact of exposure to antiepileptic medications in utero by studying cognitive outcomes in children born to mothers with epilepsy.

**Participants and Methods:** One hundred and four school-aged children (six to eight years) exposed to antiepileptic medications during pregnancy participated in neuropsychological examination. Details of drug type and dose during each trimester of pregnancy was obtained from prospectively collected records. Children without reported major malformations were eligible for the study. All assessments were conducted blind to drug status. Preliminary results are presented.

**Results:** T-test comparisons indicated that children exposed to valproate or polytherapy performed significantly below the population mean on standardised tests of intelligence and language. Outcomes of children exposed to carbamazepine did not significantly differ from the mean. Regression analyses showed that valproate and polytherapy exposure significantly predicted outcomes, even when controlling for maternal IQ.

**Conclusions:** Preliminary findings indicate that fetal exposure to valproate or polytherapy impacts negatively on long-term intellectual and language outcomes. Further investigation of our data is required to determine whether specific doses or combinations of drugs are associated with poorer outcomes, and to better understand the underlying mechanisms. These findings will have major implications for clinical management of affected women. Ongoing longitudinal research on newer agents and their cognitive consequences is required.

Correspondence: *Caroline Nadebaum, Monash University, MCRI, Level 8, 369 Royal Pde, Parkville, VIC 3068, Australia. E-mail: caroline.nadebaum@med.monash.edu.au*

**M. GASCOIGNE, R. WEBSTER, B. BARTON, D. GILL & S. LAH. Everyday Memory in Children with Idiopathic Generalised Epilepsy: Behavioural and Cognitive Correlates.**

**Objective:** Children with idiopathic generalised epilepsy (IGE) have deficits on standardised memory tests, but whether they also experience difficulties with memory in day to day tasks (everyday memory) is unknown. In adults with epilepsy, everyday memory difficulties are common, but they more often relate to problems with mood than results obtained on standardised memory tests. This study aims to establish whether children with IGE have everyday memory deficits, and if so, determine their cognitive and behavioural correlates.

**Participants and Methods:** The study included children with IGE (n=13) and healthy control subjects (NC, n=10) aged six to fourteen. Groups did not differ in sex distribution, age, IQ or parental years of education. Participants were administered tests of intelligence, verbal and visual memory (leaning and delayed recall), attention and working memory. In addition, parents completed everyday memory and behavioural questionnaires.

**Results:** The IGE group had significantly poorer scores on the everyday memory questionnaire ( $p < .01$ ), verbal ( $p < .05$ ) and working memory tasks ( $p < .05$ ) relative to the control group. In addition, when compared to the NC group, the IGE group was found to have significantly more problems with behaviour and mood. Within the IGE group, poor everyday memory was only significantly correlated with parental ratings of difficulties in socialising.

**Conclusions:** Overall, these results indicate that children with IGE experience significant memory difficulties in everyday life, which are associated with difficulties in socialising, but not with problems in mood or cognition.

Correspondence: *Michael Gascoigne, School of Psychology, University of Sydney, Brennan MacCallum Building (A1S), Camperdown, NSW 2006, Australia. E-mail: michaelg@psych.usyd.edu.au*

#### E. KANTOLA-SORSA & E. LIUKKONEN. Epileptic Encephalopathy – How Fatal the Nightly Spikes and Waves?

**Objective:** Epileptic encephalopathy means cognitive deterioration caused to developing brain by epileptic discharge in certain epilepsy syndromes, continuous spike and wave during sleep (CSWS) being one. CSWS can complicate intractable epilepsy, often with symptomatic aetiology, which in itself can jeopardize cognitive development, making it difficult to assess the role of the discharges. It can also be idiopathic and sometimes occur without seizures, the cognitive problems being the only observed symptom. This study explores the relation of the degree and nature of cognitive difficulties to the epileptic disturbance.

**Participants and Methods:** 23 child patients with idiopathic CSWS, treated in HUCS 2000–2010 are presented. Assessments (using WPPSI-R, WISC-III and a selection of NEPSY) done at the beginning and at the end of follow-up are compared, with extent, duration, and age at the onset of CSWS, as well as seizures as background factors.

**Results:** Severity and irreversibility of the cognitive symptoms depended mostly on long duration of CSWS and on early onset. Generalized and regional CSWS, when persistent, seemed both to affect cognition equally. Presence of seizures had less effect. PIQ appeared more vulnerable than VIQ. Visual perception was predominantly affected in ten cases. Problems of attention and working memory were seen in nine cases, hand motor and oral motor function in four, and language in four cases.

**Conclusions:** The insidious onset and course of continuous EEG discharge make it difficult to define its duration, making conclusions tentative. Studying idiopathic CSWS can, however, offer a glimpse on what getting your wiring twisted can do to developing brain.

Correspondence: *Elisa Kantola-Sorsa, LicPsych, Pediatric Neurology, Helsinki University Central Hospital, Epilepsy Unit, PL 280, Helsinki 00029 HUS, Finland. E-mail: elisa.kantola-sorsa@hus.fi*

#### C. GROTE, J. ZUKERMAN, R. BYRNE, M. SMITH & A. KANNER. Memory outcome after tailored temporal lobe resection.

**Objective:** To measure changes in memory function following tailored temporal lobe resection for treatment of intractable seizures, and to determine if these outcomes are different than those reported by other epilepsy surgery centers using standardized or “en bloc” resection techniques.

**Participants and Methods:** 39 patients underwent left (n=23) or right (n=16) tailored temporal lobe surgery. These patients also completed pre- and post-operative neuropsychological testing, as well as “Wada” examination.

**Results:** Both the left and right temporal lobe groups had significantly fewer seizures following surgery. At an average of 6 month follow-up, the left temporal lobe group achieved verbal memory scores similar to those obtained pre-operatively, but significantly better visual memory scores. The right temporal lobe patients achieved significantly higher verbal and visual memory scores after surgery.

**Conclusions:** Tailored temporal lobe resection led to a significant reduction in seizures, and to either no change or an improvement in memory function. In contrast, reports from centers using “en bloc” resections report that approximately 40% of those patients had a significant decline in verbal memory following left temporal resections. Implications will be discussed.

Correspondence: *Christopher Grote, PhD, Behavioral Sciences, Rush Medical College, 3rd floor Rawson, 1750 W. Harrison, Chicago, IL 60612. E-mail: christopherlgrote@yahoo.com*

#### E. MEIEROTTO, C. SKIRROW, J.H. CROSS, F. CORMACK, F. VARGHA-KHADEM & T. BALDEWEG. Semantic Memory after Temporal Lobe Surgery in Childhood.

**Objective:** For patients suffering from medication-resistant temporal lobe epilepsy, temporal lobectomy often is the treatment of choice. Lit-

tle is known about semantic memory outcome in children after surgery. This study examined the relationship between temporal lobe (TL) resections and semantic memory performance in young adults who had undergone unilateral temporal lobectomy due to TL epilepsy in childhood.

**Participants and Methods:** Data of 25 patients (14 females) between the ages of 16 and 29 was analysed, all of whom had undergone unilateral temporal lobectomy in childhood. Patients had either been diagnosed with hippocampal sclerosis or a developmental tumour before surgery. Integrity of TLs was analysed, using volumetric measures for the hippocampus and a rating procedure for extrahippocampal gyri. To measure semantic memory different subscales of the WAIS III-R (vocabulary, comprehension, information) and verbal fluency tasks were analysed.

**Results:** First correlative analyses revealed a relationship between resection of temporal pole and category fluency, information and comprehension measures across all subjects. Regarding the factor side of resection a strong correlation between resection of the anterior temporal lobe, including the temporal pole, and the vocabulary subtest was found for left-sided resections. There were no significant correlations between resection and semantic memory outcome for right-sided lesions.

**Conclusions:** Preliminary results show that semantic memory outcome after temporal lobectomy might be influenced by the integrity of the anterior temporal lobe. However, further analyses will have to examine the impact of other variables, such as pre-existing pathology, hippocampal volume, age at epilepsy onset, age at surgery, and pre-operative verbal IQ.

Correspondence: *Ellen Meierotto, Experimental Neuropsychology, Saarland University, Johannisstr. 18, Saarbruecken 66111, Germany. E-mail: meierotto\_ellen@hotmail.com*

### Invited Address: Learning - Induced Brain Plasticity

**Speaker: Malgorzata Kossut**

**10:30–11:30 a.m.**

#### M. KOSSUT. Learning - Induced Brain Plasticity.

Even a simple learning task can affect organization of the cerebral cortex. In sensory cortices, representational maps react to a changing sensory load and increased neuromodulatory signals. We investigated reorganization of representational maps in the somatosensory barrel cortex of mice, following a short-lasting classical conditioning, in which stimulation of vibrissae was paired with a tail shock. The training resulted in freezing of head movement in response to CS, and in enlargement of the functional cortical representation of the vibrissae stimulated during the conditioning. This effect was dependent on activation of NMDA receptors. Changes in excitability of neurons in the modified cortical representation were accompanied by a homeostatic upregulation of the GABAergic transmission and by inhibitory synaptogenesis. Mapping the brain activity during learning with [<sup>14</sup>C]-2-deoxyglucose (2DG) autoradiography revealed changes of the patterns of brain activation in consecutive learning sessions and allowed to recognize the sets of structures specifically activated by learning. Brain pathways essential and accessory to a given learning tasks have been identified.

Correspondence: *Malgorzata Kossut, PhD, Nencki Institute of Experimental Biology, 3 Pasteur St, Warsaw 02-093, Poland. E-mail: m.kossut@nencki.gov.pl*

**Invited Symposium:  
Translational Issues**

**Chair: Peter Arnett**

**Presenters: Carlo A. Marzi, Carlo Semenza**

**11:45 a.m.–1:15 p.m.**

**C. A. MARZI. Conscious-Unconscious Dissociations in Neuropsychology**

**C. SEMENZA. When Clinical Work Drives Research in Cognitive Neuroscience. Examples in the Domains of Language and Math.**

One important aspect of clinical neuropsychology is its heuristic value. Unexpected clinical findings may contradict shared knowledge about a given cognitive domain. Existing theories about cognitive tasks may therefore have to be re-examined and adjusted to account for the new findings. This process may generate new hypotheses and stimulate searching for converging evidence with different methods, including,

besides experiments on non brain-damaged participants, neuroimaging, neurophysiology, TMS etc. Importantly, the location of the lesion can also stimulate reassessment of existing knowledge and new research about the anatomical underpinning of a given cognitive function. A few examples from the domains of language and math can illustrate these issues.

One example is selective anomia for proper names. Its discovery led to the following questions: are proper and common names processed separately in the brain? Is proper name processing intrinsically harder and why? Though significant progress has been made, neuroimaging and electrophysiological investigations still fail to provide a clear answer. A neural network located in the left frontotemporal regions has been shown to work for some proper name related tasks, but lesion data show a much more complicated story. Experiments on participants exposed to high altitude confirm the fact that proper name retrieval requires larger organic sources.

Other examples concern arithmetical operations, whose modular organization in the brain, suggested by operation-specific deficits, has been then studied with other neuroscience methods. Neuroimaging and TMS studies contributed to the understanding of neural networks specific for each operation located in both hemispheres.

Correspondence: *Carlo Semenza, M.D., Department of Neuroscience, University of Padova, via Giustiniani 5, Padova 35128, Italy. E-mail: carlo.semenza@unipd.it*

**FRIDAY AFTERNOON, JULY 2, 2010**

**Poster Session 3:**

**Emotion/Imaging/Neurodevelopmental/Psychopathology**

**12:45–2:00 p.m.**

**Psychopathology (Affective Disorders)**

**M. NOONE, M. SEMKOVSKA, M. CARTON & D.M. MCLOUGHLIN. Effects of Mood and Time on Retrospective Memory.**

**Objective:** Impairments in working memory are known to accompany major depressive episodes. However the effect of depression on retrospective memory is unclear. It is also unclear how the passage of time affects retrospective memory, in both healthy controls and depressed patients.

**Participants and Methods:** These are preliminary findings from an ongoing prospective case-control study in which participants are being followed-up over one year. A neurocognitive test battery was administered to in-patients (n=12) with a unipolar major depressive episode (DSM-IV criteria) and to age- and sex-matched healthy controls (n=12) at baseline and at 6 months. Both public events and autobiographical retrospective memories were assessed using a specially constructed Events Questionnaire and the Autobiographical Memory Inventory Short-Form (AMI-SF) respectively. Severity of depression in patients, and absence of depression in controls, was assessed using the Hamilton 24-item rating scale for depression (HDRS 24).

**Results:** The mean HDRS 24 score for depressed patients was 30.8 (SD=7) at baseline and 19.3 (SD=11) at 6 months. There was no difference between depressed patients and controls for public events memory at baseline (P=0.85) or at 6 month follow-up (P=0.90). In contrast, depressed patients were found to perform significantly worse than healthy controls on autobiographical memory recall at baseline (P=0.009) but there was no difference between groups on percentage autobiographical memory lost over 6 months (P=0.55).

**Conclusions:** Preliminary results indicate no difference between depressed patients and healthy controls on memory for public events, either at baseline or 6 months later. Depressed patients recalled significantly less autobiographical memories at baseline compared to controls. There was no difference between groups on proportions of memory lost over time.

Correspondence: *Martha Noone, Trinity College Dublin, St. Patrick's University Hospital, James's Street, Dublin 8, Ireland. E-mail: noonem@tcd.ie*

**P. MAZURKIEWICZ & G. SZPARECKI. Sadder but more accurate? Are depressives better at predicting their own abilities?**

**Objective:** The depressive realism phenomenon has been a controversial issue since its origins in the 1970s. The fact that depressive individuals perceive reality and predict future situations more accurately than non-depressives is questioned by many scientists. The problem whether this result is only an artifact or a valid psychological phenomenon is still unsettled - new researches are far from conclusive.

**Participants and Methods:** Our study analyses depressive realism in new research variables. This research was conducted to ascertain whether depression level, based on BDI (Beck Depressive Inventory) result, influences the precision of prediction of success in the task, defined by subjects both before and after its completion. The task given was Raven's Progressive Matrices Test (TMS), Standard Plus Version. Prediction of success in the task was examined by showing examples of parallel versions of the task - easiest, medium and hardest - one for each difficulty level. After completion of the test subject was asked to estimate his result. Furthermore, prediction of time necessary for task completion and the actual result achieved was examined. Research was conducted on 96 adults aged 19-24, in individual pattern. None of them had ever seen TMS before.

**Results:** Differences between depressives and non-depressives as far as estimation of number of points scored before and after the test were statistically significant and showed tendency for underestimation among depressives. Parameter showing prediction of time for task completion did not differentiate these two groups. Furthermore, weak negative correlation was noted between BDI and Raven's Matrices test result.

**Conclusions:** (Student's Society of Neurobiology, Warsaw University, Faculty of Biology)

Correspondence: *Pawel Mazurkiewicz, College of Inter-Faculty Individual Studies in Mathematics and Natural Sciences, Warsaw University, 93 Zwirki i Wigury, Warsaw 02-089, Poland. E-mail: sknn@tlen.pl*

**P. MAZURKIEWICZ, M. ZARZYCKA, S. PURCHLA, M. DENKIEWICZ, M. CHILINSKI, M. BLASZKIEWICZ, L. CHROBOK, K. CZAJKOWSKA, A. KARCZ, A. KLEMB, H. KWIATKOWSKA & K. ZYLKA. Depressive Realism in Neurobiological Context.**

**Objective:** Depressive realism phenomenon, described first by Alloy and Abramson in 1979, implies more precise situational analysis and less erroneous calculation of outcome probability in depressive patients. On the contrary, most healthy people show so called unrealistic optimism,

which leads to overestimation of positive outcome probability and underestimation of negative outcome possibility. It is known that estimation processes involve, among others, thalamus, medial prefrontal cortex, amygdala, caudate nucleus and accumbens nucleus. However, there is little research on how depressive brain works while analysing information involving estimation. The aim of our study is to establish how depressive brain analyses information during evaluation of outcome probability.

**Participants and Methods:** The cohort will consist of students aged 18 to 26, labeled as depressive or non-depressive, basing on Beck Depressive Inventory (BDI) result. The study will be carried out using electroencephalography (EEG). Three psychophysiological variables will be analysed: frontal lobes alpha range asymmetry, P300 potential amplitude (which is, according to many studies, engaged in ambiguous situation analysis) and N400 potential amplitude. The data will be collected during analysis of situation occurrence possibility and predicting the outcome of ambiguous situation. The N400 potential amplitude will be measured during the estimation of probability of given situation and during the reaction to humorous stimulus, based on dissociation theory in verbal and non-verbal variant.

**Results:** We suppose that brain structures involved in situation analysis differ in activity, depending on depression level. Results are yet to be expected.

**Conclusions:** Our results may provide a neurobiological explanation of depressive realism phenomenon and answer why depressive patients do not show unrealistic optimism.

(Student's Society of Neurobiology, Warsaw University, Faculty of Biology)  
Correspondence: *Pawel Mazurkiewicz, College of Inter-Faculty Individual Studies in Mathematics and Natural Sciences, Warsaw University, Zwirki i Wigury 93, Warsaw 02-089, Poland. E-mail: sknn@tlen.pl*

### Psychopathology/Neuropsychiatry (Other)

**E. CONNAUGHTON, R. LANGDON, S. COOPER, K. MARTIN, G. SAVAGE & M. COLTHEART. Person-identity Processing and the Development of Misidentification Delusions.**

**Objective:** Misidentification delusions involve the mistaken identity of a person or persons (e.g., the Capgras delusion – the delusional belief that a loved one has been replaced by an impostor). Previous research into misidentification delusions has established the role of face processing impairments in the development and maintenance of these delusions. However, limited research has investigated the role of other person-identity information, such as voice, in the genesis of these delusions. This study aims to investigate the contribution of both face and voice processing to the development of misidentification delusions.

**Participants and Methods:** Face and voice processing were investigated in a series of single cases. Cases PB and SM were experiencing the Capgras delusion and case DH believed that a member of the nursing staff was his ex-partner. Detailed investigation of face processing included tasks assessing famous and unfamiliar face recognition, and facial affect recognition. Voice processing tasks were individually tailored, including assessment of famous, personally familiar and unfamiliar voice recognition, accent identification, and vocal affect recognition.

**Results:** Patients' performance was compared to age matched control groups using single-case statistical measures. Performance of each patient varied: case PB demonstrated impaired face processing and intact voice recognition, case SM demonstrated intact recognition of facial identity and facial affect, while case DH demonstrated impaired face and voice processing.

**Conclusions:** These findings highlight that multi-modal impairments in person-identity processing are evident in some misidentification delusions. Furthermore, in cases where voice recognition remains intact, this information is insufficient to override the misidentification delusion.

Correspondence: *Emily Connaughton, BA (Hons), BBA, MACCS, Macquarie University, Sydney, Australia, MACCS, Macquarie University, Sydney, NSW 2109, Australia. E-mail: econnaug@maccs.mq.edu.au*

**A. ROSAEN, M. GOLLA, J. GATTUSO, R. PACIORA, P. EPSTEIN & L. KONOPKA. Use of Neuropsychological and Electrophysiological Measures for Acute Treatment and Longitudinal Assessment of Clinical Disorders.**

**Objective:** Many individuals are referred to outpatient clinics to be assessed for a variety of symptoms. Currently the link between brain ab-

normalities and clinical presentation poses significant unsolved difficulty in the fields of psychology, neuropsychology, and psychiatry. Difficult cases often require a multidisciplinary team approach as exemplified by Poprawski et al., (2007); Chennamchetty et al., (2009). Advances in objective assessments combined with clinical neurophysiological tools and multimodality neuroimaging provide the opportunity to enhance our diagnostic sensitivity leading to more precise and objectively developed outcomes. In this presentation we will demonstrate how electrophysiological and neuropsychological assessments were used in the clinical setting to enhance diagnosis, acutely assess treatment response (Hauser et al., 2009; Martin et al., 2009) and longitudinally assess patient's progress throughout therapy.

**Participants and Methods:** We evaluated 5 adults (3 males and 2 females) ranging from 22-60 years of age. As described in Konopka and Poprawski (2008), participants completed a baseline and follow-up study to examine brain electrophysiology through qEEG. We examined neuropsychological data including Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) and Integrated Visual and Auditory Continuous Performance Test (IVA+Plus) as well as archival data to analyze the clinical presentation the individuals upon intake.

**Results:** The combination of acute and longitudinally repeated neurophysiological and neuropsychological findings revealed that positive results can be achieved in an outpatient setting in variety of disorders.

**Conclusions:** These findings demonstrate the utility of the routine combination of well researched neuropsychological assessments and neuroimaging tools to the clinical setting thus enhancing overall patient care. Correspondence: *Ashley Rosaen, Master's, The Chicago School, 520 N. Halsted #615, Chicago, IL 60642. E-mail: aer2615@thechicagoschool.edu*

**L.T. FIKKE, A. MELINDER & N.I. LANDRØ. Learning is Impaired in Adolescents Engaging in Non-Suicidal Self-Injury (NSSI).**

**Objective:** Non-suicidal self-injury (NSSI) is the deliberate, direct destruction or alteration of body tissue with no conscious suicidal intent. NSSI is alarmingly widespread in adolescence, an important time period for education. However, the association between NSSI and verbal learning and memory remains unstudied. The main objective of this study was to investigate verbal learning and memory in adolescents engaging in NSSI as compared to healthy controls. Diagnostic characteristics were also examined to investigate their possible effects on learning and memory.

**Participants and Methods:** Based on their reported engagement in NSSI, ninety-eight adolescents (mean 14.8 years) from a community sample were classified into a NSSI group (n=62) and a control group (n=36). Verbal learning, recall, recognition and intrusions were measured by the Children's Auditory Verbal Learning Test-2 (CAVLT-2). Psychiatric diagnoses were evaluated by the use of Kiddie-Sads-Present and Lifetime Version (K-SADS-PL).

**Results:** One-way between-groups analysis of variance (ANOVA) revealed that adolescents engaging in NSSI had impaired learning ability as compared to healthy controls [ $F(1,96) = 5.84, p = .02$ ]. Significantly more adolescents in the NSSI group, as compared to the control group, met criteria for major depressive disorder (MDD) and social phobia. However, neither MDD nor social phobia predicted impaired learning. No group differences were found on recall, recognition or intrusions.

**Conclusions:** The results indicate that learning is impaired in adolescents engaging in NSSI. This might influence scholastic achievement negatively. Neither MDD nor social phobia predict impaired learning in adolescents engaging in NSSI.

Correspondence: *Linn T. Fikke, Department of Psychology, Postboks 1094, Oslo 0317, Norway. E-mail: Lt.fikke@psykologi.uio.no*

**E. GORZELANCZYK, P. WALECKI, M. MICHALAK & K. WŁODARCZYK. The influence of Deep Brain Stimulation of the left subthalamic nucleus (DBS-STN) on the saccadic refixations.**

**Objective:** The goal of this study was to assess changes of saccadic refixations parameters in case of left-sided Deep Brain Stimulation (DBS) of the subthalamic nucleus (STN) in Parkinson's disease.

**Participants and Methods:** Based on the subjective test, questions, and additional tests, including neuroimaging and neuropsychological tests, the patient was qualified for surgery: implantation of stimulating electrodes to the STN on the left side. Before and after treatment, the patient was examined using a saccadometer (Ober).



**Results:** Before surgery the patient showed an asymmetry of the dynamics of eyeball movements (saccades), depending on the direction of movement of the eyes. After the surgery saccadic parameters have changed.

The latency of left saccades was reduced by 14%, right was reduced by 7%. The duration of left saccades was increased by 5%, and right has not changed. The standard deviation of right saccades duration has declined by about 55%. The amplitude of left saccades has fallen by 9.5%, and right was increased by 29%. The standard deviation of right saccades amplitude has declined by about 50%. The peak velocity of left saccades was reduced by 19%, and right was reduced by 6%. The standard deviation of right saccades peak velocity has declined by about 66%. The ratio of peak velocity to the amplitude of left saccades was decreased by 10%, and right was decreased by 27%. The standard deviation of right saccades peak velocity has declined by about 76%.

**Conclusions:** The results show that left DBS-STN significantly impact on the saccadic refixations, in particular its asymmetry depending on the direction of eye movement. This study shows that the STN plays an important role in the control of eyeball movements. Its function is probably related to the determination of contralateral range of motion (amplitude) and velocity, as well as the ipsilateral latency.

Correspondence: Piotr Walecki, Jagiellonian University Medical College, ul. Kopernika 7, Krakow 31-034, Poland. E-mail: pwalecki@cm-uj.krakow.pl

#### P. WALECKI & E. GORZELANCZYK. Evaluation of eyeball movements in ADHD and non-ADHD individuals.

**Objective:** The aim of this study was to assess differences in the eyeball movements (saccades) between ADHD individuals and healthy subjects. The study analyzed following saccadic parameters: duration, amplitude, average velocity, peak velocity, sharpness, and skewness.

**Participants and Methods:** Saccadic dynamics change with age, therefore in the study took part person from a homogeneous age group, i.e. from 18 to 20 years. Based on the results of psychological tests TOVA and CAARS-S:L distinguished group of 35 people who had the highest score in the scales for diagnosing ADHD. The control group consisted of 75 persons.

In this study we made use of a head-mounted oculometer Jazz (Ober Consulting Poland) which measures parameters related to eyeball movement in response to stimuli displayed on the monitor screen.

**Results:** The results show the significant mean difference for two groups for the Mann-Whitney U test ( $p < 0.05$ ) in following saccadic parameters: duration (for saccades with amplitude 5 deg, 15 deg and 20 deg), peak velocity (10 deg, 15 deg and 20 deg) and sharpness (15 deg and 20 deg).

ADHD individuals have a shorter duration, higher velocity and sharpness of 15 deg and 20 deg saccades than those in the control group.

**Conclusions:** Some areas of the brain, such as basal ganglia and dorsolateral prefrontal cortex, related to a saccadic control are also involved in the pathogenesis of ADHD. Therefore, an examination of differences of eyeball movements may be an effective psychophysiological diagnosis of ADHD.

Correspondence: Piotr Walecki, Jagiellonian University Medical College, ul. Kopernika 7, Krakow 31-034, Poland. E-mail: pwalecki@cm-uj.krakow.pl

### Psychopathology/Neuropsychiatry (Schizophrenia)

#### C. CHIU, H. HWU, C. LIU, W. CHEN & M. HUA. An Exploration of Neurocognitive Pattern in Patients with Early Schizophrenia.

**Objective:** Impairments of memory, attention and executive function have been thought of the gauge of schizophrenia. However, most of these findings were documented by chronic samples. Recent studies on this issue with first-episode of schizophrenia (FEP) have been growing, but the results have been inconsistent. The present study, including a baseline and a follow-up, was thus to re-examine this issue.

**Participants and Methods:** Forty seven patients with FEP and 137 normal controls, were recruited in the baseline study. Each subject re-

ceived a comprehensive neuropsychological test battery bearing memory, attention, executive function, processing speed, and IQ measures. Before receiving a 1-year neuropsychological follow-up study, these subjects also took a follow-up evaluation of clinical symptom profile by experienced psychiatrists to confirm their psychiatric status.

**Results:** In the baseline study, patients with FEP evidenced significantly poor performances on verbal memory and IQ tests, and on parts of executive function and processing speed measures compared with their normal counterparts. In the follow-up, patients performed poorer than their normal mates on verbal memory and IQ tests, and parts of executive function, attention and processing speed tasks.

**Conclusions:** The present results of only verbal memory and intellectual dysfunctions steadily evident in our patients with FEP were thus partially consistent with previous findings from either early or chronic samples. Since nature of neurocognitive deficits is potentially intermingled with demographic and clinical variable, as well as the level of general mentality, we suggest that further investigation on this issue with a minimization of such confounding effects is needed.

Correspondence: Mau-Sun Hua, Ph.D., Psychology, National Taiwan University, Dept. of Psychology, National Taiwan University, #1, Sec. 4, Roosevelt Rd., Taipei 106, Taiwan. E-mail: huams@ntu.edu.tw

#### I. MAKOWSKA, A. PLUTA & K. RYMARCZYK. Olfactory Identification and Emotional Processing in Schizophrenia

**Objective:** Deficits in odor identification, as well as impaired emotional perception have been most frequently described in schizophrenia patients. However, it is not clear whether these impairments are linked. This study aims to replicate the finding of impaired olfactory identification in SZ, and to examine whether this is associated with impairment in emotion domain.

**Participants and Methods:** Patients with SZ ( $n = 50$ ) and normal controls ( $n = 30$ ) were tested by the PST (Pocket Smell Test). Clinical rating scales included the Positive and Negative Syndrome Scale (PANSS) and the Negative Symptom Assessment (NSA-16) scale. Additionally, subjects provided ratings intensity of their emotional response to the images (selected from International Affective Picture System).

**Results:** We found significantly lower PST scores in SZ patients compared to healthy controls well matched for age, education, and smoking status, which are consistent with the majority of published reports. Furthermore, it has been shown that subdomains of psychopathology scales (PANSS, NSA-16) such as anhedonia, blunted affect and apathy, are specifically correlated with the intensity ratings of the emotionally negative stimuli. However, no correlation was observed between negative symptoms and odor identification deficits.

**Conclusions:** In summary, this study provides further support for the observation that many people with schizophrenia have deficits in olfactory identification. Moreover, the present results indicate that schizophrenia patients with negative symptoms show a heightened sensitivity to emotionally negative picture. It seems that clinically our findings suggested that interventions targeted on the emotion domain may be fruitful.

Correspondence: Krystyna Rymarczyk, Nencki Institute of Experimental Biology, Pasteura 3, Warsaw 02-495, Poland. E-mail: kr@nencki.gov.pl

#### L.A. DENSON, C.A. GALLETTY, N.R. BURNS, B. HISEE & S.M. MOYLE. In People with Schizophrenia, How Much Variance in Neuropsychological Test Performance is Explained by Intelligence and/or Information Processing Speed?

**Objective:** Controversy (e.g. Nuechterlein et al., 2004; Dickinson et al., 2008) surrounds neuropsychological impairment in people with schizophrenia: is this a unitary or multi-factorial phenomenon? In a schizophrenia population, we investigated what proportion of variance in neuropsychological test performance on the Brief Assessment of Cognition in Schizophrenia (BACS - Keefe et al., 2004) is explained by intelligence and by processing speed.

**Participants and Methods:** A power analysis was conducted and 34 adults with DSM-IV diagnoses of schizophrenia or schizo-affective disorder were recruited from community mental health treatment centres. They completed the BACS, a short form of the Woodcock-Johnson III intelligence measure, and Inspection Time (IT) - a research measure of information processing speed which has no motor component. Stepwise regression was used to determine the contributions to BACS performance of intelligence and information processing speed.

**Results:** To be presented once data collection and regression analyses are complete.

**Conclusions:** The study contributes to the evidence-base for unitary or multi-factorial neuropsychological models of cognitive impairment in schizophrenia. There are implications for clinical assessment and rehabilitation of people with schizophrenia, and for the targeting of pharmaceutical interventions.

Correspondence: *Linley A. Denson, PhD, School of Psychology, University of Adelaide, North Terrace, Adelaide, SA SA 5005, Australia. E-mail: linley.denson@adelaide.edu.au*

**M. MIKOLAJCZYK, A. KARCZ, A. KLEMB, B. WICHOWSKI, M. MARCZAK, Z. KONARSKA, M. ROMANOWICZ, K. PALUCH, A. BOCHYNSKA, D. TOMCZYK, M. RIDEL, A. RUSZPEL, Z. DZIEWANOWSKA-STEFANCZYK, K. LUTER & A. WACHOWIEC. Source monitoring deficits in induced hallucinations conditions in schizophrenic patients, correlated with EEG.**

**Objective:** The aim of this study is to confirm the occurrence of those deficits during tasks involving visual modality and to observe specific features in the activation of the CNS while participating in these tasks. The issue undertaken in the following study will be source monitoring deficit that occurs in patients with schizophrenia. Source monitoring is defined as the function that allows to differentiate between external (environmental) and internal (subjective) source of stimuli.

**Participants and Methods:** The study will be carried out on 3 groups of subjects: schizophrenic patients experiencing positive symptoms, schizophrenic patients not experiencing positive symptoms, and a control group of healthy subjects, matched with the clinical groups in terms of demographic characteristics.

Subjects will be exposed to two kinds of experiences. The first one will be hallucinations induced by flashing light. The effectiveness of the presentation of a stimulus flashing in the rhythm of alpha brain waves in producing simple, typical hallucinations, is empirically proved. The second type of experience will be perceiving visual stimuli similar to those produced in the induced hallucinations.

**Results:** The analysis will concern both differences in the ability to identify the source of stimulus as well as differences in the EEG during perception of visual stimuli and experiencing hallucinations. We anticipate the results to show differences in accuracy of recognition of the source of the stimulus between the control group and clinical groups. We expect significant differences in the ability to recognize the source of hallucinations. We also expect to find a correlation between the subjects' experiences and their EEG record, which will document the relationship between source monitoring deficit and functioning of the CNS.

**Conclusions:** Results and conclusions are yet to be expected.

(Neuropsychological Scientific Group Faculty of Psychology Warsaw University)

Correspondence: *Michal Mikolajczyk, Faculty of Psychology, Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: ins@neuropsychologia.org*

### Behavioral Neurology

**A. DUMBRAVA, M. TATU, M. TOBA & C. BALUT. Line Bisection Performances in Depressives.**

**Objective:** The recent Theory of Group Cortical Organization and Activation (Carlstedt, 2004) suggests that depressive subjects, with their well-known left cerebral hypoactivity, will err more leftward on line bisection; in the present paper we try to test this prediction.

**Participants and Methods:** The performances using each hand in line bisection task have been compared in equivalent (in respect of relevant psycho-demographic variables) groups of right-handed, middle aged persons: non-depressive (euthymic) controls (n=19 female + 19 male), dysphoric subjects (n=17f + 15m), and depressive patients before the initiation of any treatment (n=16f + 16m). [All the diagnosis were based on DSM-IV criteria and clinical cut-off scores of common severity measures of depression.]

**Results:** Despite a relatively constant more leftward deviation of the estimations from objective midpoint in depressive and dysphoric as compared with euthymic subjects, the data analyses revealed no statistically significant difference in performances with each hand in neither pairs of groups.

**Conclusions:** Given the large heterogeneity of the depressive syndrome, such result pleads just for the need to develop more sophisticated evaluation of the visuo-spatial correlates of the influence of depression on hemispheric asymmetry.

Correspondence: *Andrei Dumbrava, IBCV, Copou Bvd, Iasi 6600, Romania. E-mail: rodumb@yahoo.com*

**A. DUMBRAVA, M. TOBA, M. TATU & C. BALUT. Line Bisection Performances in Apathy versus Depression.**

**Objective:** Given the well-documented left cortical hypoactivity in depression, several of its associated symptomatology could prove to result in corresponding bias in estimations of centers of lines.

**Participants and Methods:** The performance using each hand on line bisection task have been compared in equivalent (in respect to usual psycho-demographic parameters) groups of right-handed, middle-aged persons, corresponding to each combination of depression (according to DSM-IV criteria and clinical cut-off scores of common severity measures) and apathy (estimated with "The Apathy Evaluation Scale" of Marin, Biedrzycki and Firincogullari, 1991): with depression but no apathy (n= 31), with apathy but no depression (n= 29), with depression and apathy (n= 30), without any of the two (n= 35).

**Results:** A systematic bias in estimating the center of the lines was similar in depressives and non-depressives but was significantly larger in the presence, as compared with the absence of apathy (either alone or associated with depression).

**Conclusions:** It seems that apathy but not depression is related with relevant errors on line bisection.

Correspondence: *Andrei Dumbrava, IBCV, Copou Bvd, Iasi 6600, Romania. E-mail: rodumb@yahoo.com*

**C. ROMERO & F. OSTROSKY. Factor Levels of Psychopathy and Violent Behavior.**

**Objective:** The present study aimed to investigate the cognitive distortions about violence in offenders assessed by the Implicit Association Test (IAT) according to the two factor structure of psychopathy.

**Participants and Methods:** Participants: A sample of 95 inmates (mean age=36.05+10; mean years of education=10.6+3.44) divided into four groups according to their factor levels of psychopathy in: both factors low (n=66), high factor 1 (n=25), high factor 2 (n=29), and both factors high (n=75).

**Instruments:** A version of the IAT was developed (violent-IAT) to evaluate cognitive distortions about violence and possible disposition toward violent behavior.

**Results:** The ANOVA test showed that high factor 1 group had a significantly higher d score than high factor 2 and both factors high groups.

**Conclusions:** The results suggest the presence of cognitive distortions about violence that can increase disposition toward violent behavior in the offenders with high level of factor 2 and those with high components of psychopathy; factor 2 of psychopathy refers to people who begin their criminal lives at a very young age and who have poor behavioral control. It has been proposed that such subjects with antisocial behavior are more likely to violate social norms. If the high levels of factor 2 are combined with lack of empathy, inability to feel guilt and remorse, inability to feel fear, or self-justification, the subjects are at higher risk of committing both misdemeanors, as well as extremely violent acts.

Correspondence: *Cesar Romero, unam, copilco, Mexico City 14390, Mexico. E-mail: cesarromerorebollar@hotmail.com*

### Emotional Processes

**S. CASTRO & C. LIMA. Age and Musical Expertise Affect how we Recognize Emotions in Music.**

**Objective:** When listening to music, we are able to recognize the expression of different emotions. We examine how this recognition is affected by two experiential factors, age and musical expertise. Previous research has indicated age-related effects: fear or threat and sadness undergo a decline from young adulthood to middle age and older years (more than 60 years), but happiness and peacefulness remain stable. Here we investigate whether this change occurs from young adulthood to middle-age, and whether musical expertise has a modulating role.

**Participants and Methods:** Musically expert (at least 8 years of formal training) and musically naive adults from two age cohorts, young and middle-aged ( $N = 20 \times 4$ ), were presented with musical excerpts intended to express happiness, peacefulness, fear/threat and sadness (Vieillard et al., 2008). Subjects rated how much each excerpt expressed each of the four emotions in 10-point scales.

**Results:** The intended emotions were consistently recognized. Advancing age was associated with decreased responsiveness to fear/threat and sadness, but not to happiness nor peacefulness. A positive effect of musical expertise was observed only in the middle-aged group. However, years of musical training correlated with recognition accuracy. Global cognitive functioning and personality traits did not mediate these effects.

**Conclusions:** The expression of emotions in music, namely happiness, peacefulness, sadness and fear/threat, is consistently recognized by young and middle-aged listeners. Musical expertise appears to enhance recognition accuracy. The ratings attributed to positive and negative emotions are modulated by age.

Correspondence: *Sao Luis Castro, PhD, Psychology, University of Porto, Faculdade Psicologia, Rua Dr. Manuel Pereira Silva, Porto 4200-392, Portugal. E-mail: sleastro@fpce.up.pt*

### K.K. IMBIR & D. DEMICKA. Mapping of emotion based on homeostatic and transgressive mechanism of formation. An fMRI study.

**Objective:** The overall aim of the conducted research is to observe diversified brain mechanisms of emotions. The emotions are diversified by sign, which has been discussed and exploited numerous times in psychology and neurobiology. Emotions are also diversified by the mechanism of their formation. These mechanisms are homeostatic and transgressive. Homeostatic means defensive; not requiring participation of consciousness. Transgressive means that which can be activated only by thinking using cognitive standards of evaluation (Reykowski, 1985).

**Participants and Methods:** The pilot research was conducted using a 3 T fMRI (functional Magnetic Resonance Imaging) scanner on a group of 4 people. All participants were exposed to visually stimulating material containing emotionally charged words and sentences. Their task was to read with understanding the signs of emotion. The participants were to imagine experiencing the emotions indicated by these signs.

Hypotheses

1. Stronger activation of brain structures when negative emotions are triggered compared to the brain structures for positive emotions.
- 2.

Lack of lateralization of brain activation irrespective of affect sign.

**Results:** Results were analyzed with the use of Statistic Parametric Mapping version 7 (SPM7). Significant activation of the limbic system structure and frontal lobes was observed. This activation was true particularly during assessment of stimuli with negative connotations. No lateralization of activation regarding the influence of the sign was observed.

**Conclusions:** Formulated hypotheses were confirmed at the pilot study stage. In order to extend time resolution of results, the additional simultaneous employment of EEG equipment should be taken into account in the actual study. Increasing the number of participants will allow assessing the validity of a further hypothesis. The hypothesis is that there is a lack of changeability of activation pattern in the brain emotional regions.

Correspondence: *Kamil K. Imbir, Mgr, Department of Psychology, University of Warsaw, ul. Krakowskie Przedmieście 26/28, Warsaw 00-927, Poland. E-mail: kimbir@psych.uw.edu.pl*

### R. SZCZEPANOWSKI. Internal observer threshold mediates conscious reports of fear.

**Objective:** There is considerable interest in studying how fear-relevant information becomes conscious and research suggests accessibility and availability as critical cognitive mechanisms underlying conscious reporting of fear. The author proposed a novel methodological approach towards conscious perception of fear based on threshold vision, where conscious emotional contents were quantified at internal thresholds using a three state threshold model.

**Participants and Methods:** Twelve volunteers participated in this study, and performed two detection tasks with backwardly masked faces in which targets exhibiting fear had to be distinguished from neu-

tral or happy expressions. Subjects made binary decisions followed by 6-point confidence judgments. Behavioral Receiver Operating Characteristics were generated based on confidence ratings, and then fitted by the threshold model. The highest state of the model was identified with conscious accessibility, while its intermediate state with availability.

**Results:** For both masking experiments, two-limb threshold curves handled the behavioral ROCs well, and the best curves yielded fits to the masking data with coefficients of determination above 0.9 levels. Moreover, threshold model prediction of the masking data revealed patterns of the relation between availability and accessibility as suggestive of conscious reports of fearful targets.

**Conclusions:** The study demonstrated that the masking with confidence ratings can be a practical realization of measuring perceptual thresholds as well as a legitimate test of the three state threshold theory. Of major implication of the study was that fear-relevant information can be mediated by the global internal threshold in order to be accessible to consciousness. Therefore, the global threshold can be posited as a subject's intrinsic property mediating emotional contents between perceptual states.

Correspondence: *Remigiusz Szczepanowski, Dr, Wrocław Faculty of Psychology, Warsaw School of Social Sciences and Humanities, ul. Grunwaldzka 98, Wrocław 50-357, Poland. E-mail: rszczepanowski@swps.edu.pl*

### M.M. RUDZINSKI. The Dynamics of Rapid Emotional Changes in Physiological Terms. Comparison of the Mouse Paradigm and the Asymmetry of Alpha Oscillations in Prefrontal Cortex.

**Objective:** Both the dynamic concept used in social psychology called "mouse paradigm" and prefrontal cortical asymmetry index use the same underlying construct of attraction and repulsion reaction. The purpose of this study was to test whether indeed the two indices show the same reactions. Also sought to demonstrate the time accuracy with which prefrontal asymmetries can be measured.

**Participants and Methods:** The study involved 12 students aged 19-26 years.

We used in it the "mouse paradigm" which gives information about the reaction of attraction/repulsion with an accuracy of 1/10s during 100s study period and the prefrontal cortex asymmetry collected at the same time using 6 EEG electrodes, respectively F3, F4, T3, T4, P3 and P4. Study participants had to set their moment-to-moment feelings about the positive, negative and mixed-valence target.

**Results:** The survey shows a significant correlation of both methods at the level of  $r > 0.5$  but decreasing with increasing resolution - reduction of compared time periods length; remaining significant even for 2s intervals.

**Conclusions:** Study shows correlation of prefrontal asymmetry with "mouse paradigm. This gives the opportunity to study rapid emotional reactions with physiological indicators.

Correspondence: *Maciej M. Rudzinski, student, Szkoła Wyższa Psychologii Społecznej, Białozora 1c, Warsaw 02-817, Poland. E-mail: rudzinskimaciej@gmail.com*

### S. MCDONALD, S. LI, D. ARIELLE, R. JACQUELINE, C. JAMES & R.L. TATE. Impaired Mimicry to Angry Expressions in People with Severe Traumatic Brain Injury.

**Objective:** Introduction: A growing body of research since the 1980s has demonstrated that people with severe traumatic brain injury (TBI) have difficulty decoding emotional expressions, although the reasons for this are poorly understood. Some also report lessened emotional experience in general and, as a group they have been found to have lowered arousal when viewing distressing images. This raises the question as to whether affective responsiveness to emotional faces is linked to emotion perception.

In this study we examined whether automatic facial mimicry to expressions is impaired in people with TBI and whether this relates to accuracy in emotion recognition.

**Participants and Methods:** Twenty-one adults with severe TBI and 20 control participants viewed angry and happy facial expression. Facial movement of the Corrugator supercilii (brow) and Zygomaticus major (cheek) was monitored using EMG. Participants were also assessed for their ability to identify emotional expressions.

**Results:** The control group demonstrated increased brow activity to angry faces and increased cheek activity to happy faces. The TBI group showed mimicry to happy faces only. The TBI group were poorer than controls in their ability to recognise facial expressions, mainly negative expressions. Facial mimicry did not correlate with emotion perception accuracy for either group.

**Conclusions:** These results add to growing evidence for impaired automatic responses to emotion in people with TBI. The results did not support the view that simulation (mimicry) facilitates emotion recognition. Correspondence: *Skye McDonald, PhD, School of Psychology, University of NSW, UNSW, Sydney, NSW 2052, Australia. E-mail: s.mcdonald@unsw.edu.au*

#### H. KLIGER. Thee Intergenerational Effects of Trauma: Integrating Narrative and Neuroscience to Understand Adversity and Resilience.

**Objective:** The evidence for vulnerability and resilience as responses to traumatic events points to a range of long-term effects following trauma. The factors that modify the adaptation to trauma include the environment and prior experience. This study compares recent work in the field of neuroscience, particularly the application of epigenetic methods to trauma studies, with findings related to the transgenerative power of trauma narratives.

**Participants and Methods:** The Transcending Trauma Project has collected and analyzed 300 in-depth narrative and focus group interviews with trauma survivors and their family members. Our approach points to the influence of narratives shared about the memories of trauma on shaping the worldview of those who listen. These observations are compatible with recent epigenetic modifications that have been shown to correlate with the intergenerational transmission of posttraumatic stress disorder risk.

**Results:** When a particular attribute of a survivor parent is emotionally compelling, this attribute can become an organizing value system in the identity of the child. We have framed the process as the communication of transformative narratives. Integrating epigenetics into a model that probes the mechanisms through which the meaning of prior experience is expressed and transmitted is consistent with the approach we have used to track the impact of pivotal narratives.

**Conclusions:** Through this analysis, we underline the importance of a developmental view that evaluates the complex biological and psychological processes that contain both the elements of positive adaptation and negative consequences as they are experienced by trauma survivors and their offspring

Correspondence: *Hannah Klinger, Pennsylvania State University, 123 North Highland Ave, Bala Cynwyd, PA 19004. E-mail: hkp1@psu.edu*

#### M. KUNIECKI, S. WICHARY, S. GRZYBOWSKI & P. JASKOWSKI. Elements of Color Characteristic of Emotional Visual Stimuli Determining Their Attentional Advantage.

**Objective:** What makes us perceive a stimulus as an emotional one? Does color provide any clues in this process? According to some researchers, color has no role however, others postulate that color is an important stimulus characteristic, determining its valence and arousal.

**Participants and Methods:** In order to shed light on this issue, we conducted series of experiments using oculography and EEG. Experiments employed lateral presentations of intact and transformed IAPS pictures. Part of the stimuli were transformed to eliminate physical differences (e.g. luminance) between them in the way that pixels from an emotional picture were used in the neutral stimulus, and vice versa. In other experiment different manipulation was used, namely R and B components of RGB color space were shifted.

**Results:** Results clearly show that color is a significant factor in processing of emotional stimuli even at the very early stages of stimulus evaluation. We found that neutral stimuli with pixels from its emotional counterparts have higher probability of attracting attention than original neutral stimuli. We also established that if negative slides are devoid of their distinguishing and dominant their capability of attracting attention diminishes significantly. Moreover we also showed that early frontal evoked potentials linked to forced choice between emotional and neutral slide was significantly modulated by overall color palette of presented pictures.

**Conclusions:** Color is an important factor in evaluating emotional valence of the visual stimuli. Color changes account significantly for attentional advantage of emotional stimuli.

Correspondence: *Michal Kuniecki, PhD, Psychophysiology, Institute of Psychology, Jagiellonian University, ul. R. Ingardena 6, Krakow 30-060, Poland. E-mail: michal.kuniecki@uj.edu.pl*

#### Z. BASGOZE, A. GONUL, H. DEVRIMCI-OZGUVEN, B. BASKAK, T. OZEL-KIZIL & D. GOKCAY. Emotional Conflict Resolution in Healthy and Depressed Populations.

**Objective:** In this study behavioral differences between healthy and depressed populations are investigated for resolving emotional conflict. Depressed and healthy populations should show different behavioral patterns.

**Participants and Methods:** 19 healthy subjects (8 F, 11 M, age 25±3.8) and 25 depression patients (25 F, age 32.08±9.3) participated. Patients (Hamilton Score (HS)=22.9±7.9) have not been under medication for at least 3 months. Word-Face Stroop task is used with a new Turkish affective word list. Both valence and concreteness of words are manipulated. In congruent situations, positive words were on positive faces, negative words on negative faces; while in incongruent situations positive words were on negative faces and vice versa. Subjects evaluated the valence of emotional words.

**Results:** For healthy subjects, 2x2x2 (congruency, valence, concreteness) repeated measures ANOVA revealed a significant main effect of congruency  $F(1,18)=9.467, p<.01$  and valence  $F(1,18)=5.476, p<.05$ ; whereas the same design showed no significance for patients (Only 15 depressed patients with Hamilton scores over 20 were analyzed in ANOVA, since they are shown to significantly differ from patients with lower Hamilton scores in RT's (Basgoze, 2008)). In contrast to healthy population, MDD patients responded faster to incongruent stimuli than congruent stimuli. For 25 patients, a significant negative correlation between Hamilton scores and mean RT differences for congruent versus incongruent cases is observed ( $r=-.494, p<.05$ ).

**Conclusions:** Normal population reacted slower to incongruent stimuli, whereas Depressed population reacted slower to congruent stimuli. This may indicate that the process of resolving the emotional conflicts differs in the patients. Moreover, after further testing, our Word-Face Stroop task may be used in future to identify the level of depression, because within our limited sample, a significant negative correlation is observed. Correspondence: *Zeynep Basgoze, Cognitive Sciences, Informatics Institute, METU, Middle East Technical University, Inonu Bul. Informatics Institute Room: Z16, Ankara 06531, Turkey. E-mail: zeynep.basgoze@gmail.com*

#### N. TORUN YAZIHAN, Z. YELBOGA & C. CELIK. Combat Related Nouns and Their Emotional Impressions.

**Objective:** The aim of this study is to explore the emotional differences of PTSD and non PTSD samples using a noun list.

**Participants and Methods:** The study conducted on 40 PTSD patients that had combat trauma, 40 non-PTSD soldiers worked at the back side of combat and 40 healthy male participants whose years of age and education were similar. We prepared a Turkish noun list which had been discussed with clinicians, literary profecians and students of psychology before administration. The list was included also some combat related nouns. The noun list were rated by all the participants according to their emotional effect they felt.

**Results:** The PTSD group was totally different from that of non-PTSD and healthy group. The most clear difference was in describing the nouns. PTSD negatively rated even some nouns which were neutr for the healthy sample; And the most negatively rated nouns were the words related to the combat. Non-PTSD soldier group resembled to the PTSD sample according to the negatively rated combat related nouns and similar with the healthy group according to the neutr and positively rated nouns.

**Conclusions:** This study shows that even the soldiers who do not have core PTSD symptoms and clinically accepted healthy might show some PTSD like emotional perceptions. They were inbetween the PTSD group and healthy group according to their ratings.

Correspondence: *Koray Yazihan, Msi, Psychiatry, Gulhane School of Medicine, GATA, Psikiyatri, Etilik, Ankara 06090, Turkey. E-mail: iyazihan@hotmail.com*

#### A. WIECZOREK. The Basolateral Amygdala as a Part of Neural Circuitry Activated During Learning.

**Objective:** The aim of this experiment was to examine the activity of basolateral amygdala under Pavlovian conditioning in which stimulation of vibrissae is paired with tail shock, leading to representational plasticity.

**Participants and Methods:** Four experiment groups of mice were tested, 5 mice in each group. The experiment groups were the group with conditioning (CS+UCS), the stimulated group (CS), the group that underwent only the habituation procedure and naïve control group. Each of the group, except for the naïve control group, were habituated to head restraint for 3 weeks previous to training. Mice were anaesthetized an hour after the training or habituation. Immunoreactivity of c-Fos protein was assessed after a single pairing session lasting 20 min and consisting of 80 pairings.

**Results:** One-way analysis of variance (ANOVA) displayed differences between CS group and naïve group,  $F(3,16) = 75.3$ ;  $p < 0.001$ . Differences were also noticed between group with conditioning (CS+UCS) and control groups - habituated -  $F(3,16) = 85.4$ ;  $p < 0.001$  and naïve  $F(3,16) = 129.1$ ;  $p < 0.001$ . Conditioned group differed from stimulated group (CS) in the level of c-fos protein -  $F(3,16) = 53.8$ ;  $p < 0.05$ .

**Conclusions:** Restraining apparatus increased c-Fos count after conditioning (CS+UCS group) but did not increase after stimulation (CS group).

The results show that the well habituated restraint is still a strong stressor, inducing c-fos in the basolateral amygdala (immobilization stress). They are also the first to show that the BLA shows increased activation after Pavlovian conditioning with tactile stimulus used as conditioning stimulus.

Correspondence: *Anna Wieczorek, ICACS, Warsaw School of Social Sciences and Humanities, Maltanska 9, Leszno 64-100, Poland. E-mail: nwwieczorek@gmail.com*

#### M. SENDERECKA, J. SZEWCZYK & A. GRABOWSKA. Event-Related Potentials to Emotional Auditory Stimuli within an Oddball Task.

**Objective:** The present study was undertaken with two major purposes - firstly, to investigate event-related brain electric activity to standard/target oddball stimuli, presented after negative and positive emotional sounds, secondly, to compare such ERPs to oddball stimuli presented after neutral sounds of everyday life.

**Participants and Methods:** The study was run in two phases. In the first experiment 10 participants performed a classic two-tone active oddball. In the second experiment they completed a novelty emotional active oddball with sounds, selected from the International Affective Digitized Sounds (IADS), differing on emotion scale.

**Results:** The electrophysiological data analysis for two phases of experiment was performed within subjects. In the classic oddball significantly larger P3b amplitude was observed in response to target sounds in comparison to standard sounds. In the emotional oddball task P3b effect was significantly reduced. The amplitude of LPC, elicited by target stimuli presented after negative and positive sound, was different from the amplitude obtained for target stimuli presented after neutral sound.

**Conclusions:** The study demonstrated that the cognitive load caused by the count vs ignore instruction, resulted in an evident P3b with maximal amplitude over parietal locations. This effect was smaller when additional emotional sounds were presented before oddball stimuli. These findings might support the thesis that available resources were assigned to the analysis of emotional sounds, and thus were not available to analyze subsequent oddball stimuli.

Correspondence: *Magdalena Senderecka, M.A., Institute of Psychology, Psychophysiology Laboratory, Jagiellonian University, ul. Ingardena 6/60S, Krakow 30-060, Poland. E-mail: magdalena.senderecka@uj.edu.pl*

### ADHD/Attentional Functions

#### M. SENDERECKA, J. SZEWCZYK, K. GERC, R. CHMYLAK & A. GRABOWSKA. Inhibitory Dysfunction in ADHD Children: A Behavioral and ERP Study.

**Objective:** The stop-signal task is a laboratory measurement of inhibitory control of an ongoing motor response. We used the stop-signal paradigm to determine whether deficient inhibitory control distinguishes children with a diagnosis of attention deficit hyperactivity disorder (ADHD) from normally developing children.

**Participants and Methods:** 48 participants from two groups, matched on age and sex, performed a standard visual two-choice task with an auditory stop-signal stimuli, while EEG was recorded.

**Results:** The behavioral results indicated that the ADHD group had significantly impaired inhibitory control compared to the performance of normal children. Relative to controls, the go-stimulus reaction time (RT) and the stop-signal reaction time (SSRT) were prolonged in children with ADHD. The amplitude of N1 and P3 components to auditory stop-signal were more pronounced for successful than for unsuccessful stop-signal trials in both groups. However, the successful-unsuccessful difference was larger in normal control subjects. Additionally, the amplitude of response-locked EPRs, contained ERN-Pe complex related to error-detection, was smaller in ADHD children.

**Conclusions:** These results support the hypothesis of core deficit in inhibitory control in ADHD and corroborate the utility of the stop-signal task in distinguishing hyperactive from normal children.

Correspondence: *Magdalena Senderecka, M.A., Institute of Psychology, Psychophysiology Laboratory, Jagiellonian University, ul. Ingardena 6/60S, Krakow 30-060, Poland. E-mail: magdalena.senderecka@uj.edu.pl*

#### M. SENDERECKA, J. SZEWCZYK, K. GERC, R. CHMYLAK & A. GRABOWSKA. An ERP Auditory Oddball Study of Attention Deficit Hyperactivity Disorder.

**Objective:** The aim of the study was to investigate electrophysiological differences between children diagnosed with attention-deficit hyperactivity disorder (ADHD) and normally developing children.

**Participants and Methods:** 48 participants from two groups, matched on age and sex, performed a standard auditory two-tone oddball task. Event-related potentials (ERPs) elicited to target and non-target stimuli were analyzed for between-group differences.

**Results:** The ADHD group showed reduced N2 and P3b components to attended target stimuli compared with controls, particularly over the right hemisphere. The difference in P3b amplitude between targets and non-targets was smaller in the ADHD group.

**Conclusions:** These results suggest deficiencies in both automatic and controlled processing in children with ADHD.

Correspondence: *Magdalena Senderecka, M.A., Institute of Psychology, Psychophysiology Laboratory, Jagiellonian University, ul. Ingardena 6/60S, Krakow 30-060, Poland. E-mail: magdalena.senderecka@uj.edu.pl*

#### H. HALLELAND, J. HAAVIK & A. LUNDERVOLD. The Color Word Interference Test as a Measure of Set-shifting in Adults with ADHD.

**Objective:** Several studies have examined set-shifting in ADHD, but the results are inconsistent. Delis-Kaplan Executive Function System (D-KEFS) is a test battery measuring different aspects of executive functioning. Measures of set-shifting are obtained by controlling for more basic functions, such as motor speed. The aim of the study was to improve our understanding of the executive dysfunction associated with ADHD by including measures of set-shifting generated from D-KEFS. Based on a former study (Wodka et al., 2008), we focused on the set-shifting condition from the Color Word Interference Test (CWIT).

**Participants and Methods:** Patients (N=55, mean age 34.6 years, 51.9% men) and controls (N=46, mean age 28 years, 34.8% men) were assessed according to a neuropsychological test battery including subtests from D-KEFS. Two subtests (Word Comprehension and Matrices) from the Wechsler Abbreviated Scale of Intelligence were used to estimate intellectual function.

**Results:** Univariate ANCOVA (controlling for gender) revealed a significantly lower performance in the ADHD than the control group on the set-shifting condition ( $P=0.001$ ). The performance in the ADHD group was significantly lower on the contrast score inhibition/shifting versus inhibition condition ( $P=0.023$ ). Both the summary score and the contrast score were still significant after controlling for IQ.

**Conclusions:** The results demonstrate that the group of adults with ADHD is impaired on the set-shifting measure when compared to the controls, even after controlling for more basic functions, gender and IQ. This confirms that at least the CWIT subtest from D-KEFS represents a measure that may clarify the role of set-shifting in ADHD.

Correspondence: *Helene Halleland, Psychologist, Department of biological and medical psychology, University of Bergen, Sundtsvei 18B, Nesttun 5221, Norway. E-mail: helene.halleland@psybpb.uib.no*

### A.R. BORKOWSKA & T. JADCZAK - SZUMILO. Language and Communicative Functioning in FAS and ADHD Children.

**Objective:** The main goal of the research was to investigate differences between language functioning between FAS and ADHD children. In clinical practice, psychologists have often problems with differential diagnosis, and because of that, children after prenatal exposure on alcohol get ADHD diagnosis. Specially, that kind of mistake is done, when FAS children didn't have special and typical face dysmorphic features and normal intelligence. Symptoms of impulsive and hyperactive behavior are common in ADHD and FAS. The wrong diagnosis results in ineffective corrective treatment and help.

**Participants and Methods:** In our research we used three methods: WISC-R to assess intelligence profile, Right Hemisphere Language Battery – polish version (RHLB-PL) to assess language and communicative abilities due to right hemisphere and verbal fluency. 30 FAS children, 16 ADHD children and 30 control aged 12 – 14 years old.

**Results:** There were no found significant differences between groups in intelligence profiles, but FAS children obtained lower intelligence scores in verbal, nonverbal and full scales than control group. ADHD children didn't have language and communicative problems typical in FAS children. FAS children had difficulties in some subtests: Inferential Meaning, Humour, with Picture metaphors. Inconsistent results were obtained in subtests: Linguistic and Emotional Prosody. Some of FAS children have difficulties in those trials and some not.

**Conclusions:** Results of the research suggest that language and communicative tests could be a good tool for differential diagnosis between ADHD and FAS children.

Correspondence: *Aneta R. Borkowska, Ph.D., Clinical Psychology and Neuropsychology, Institute of Psychology, University of M. Curie-Skłodowska, Pl. Litewski 5, Lublin 20-080, Poland. E-mail: aneta.borkowska@autograf.pl*

### A. MARZECOVÁ & D. ASANOWICZ. The Modulatory Effects of Alerting and Orienting Attentional Networks on Conflict Resolution and Conflict Adaptation.

**Objective:** Attention can be described as a system of anatomical areas carrying out the functions of conflict resolution, spatial orienting and alerting. Empirical evidence demonstrates convincingly that the attentional networks constitute three anatomically and functionally independent systems. Although there is a systematic body of evidence on functional separation of the networks, recent research have revealed an interaction and integration of the networks on behavioral level. Importantly, the efficiency of executive network as reflected by costs of conflict resolution was shown to be influenced by the alerting and orienting network. However, the precise nature of the interaction remains unclear.

The aim of our study was to investigate the influence of alerting and orienting networks on two aspects of executive functioning: conflict resolution and conflict adaptation.

**Participants and Methods:** In present study, we employed a lateralized version of the Attention Network Test in order to measure the efficiency of executive, orienting and alerting networks and the interactions between the networks. Furthermore, the modulatory influence of orienting and alerting on conflict adaptation pattern (so called "Gratton effect") was analyzed. 110 young adult healthy volunteers participated in the study.

**Results:** The preliminary results show that alerting and orienting networks modify the functioning of executive network in an independent manner. The findings are in line with recent evidence on interaction of attentional networks.

**Conclusions:** The results support the hypothesis of functional interaction and integration of the attentional networks. Moreover, they cast new light on processes that are measured by the popular and extensively used measure- the Attention Network Test.

Correspondence: *Anna Marzecová, M.A., Institute of Psychology, Jagiellonian University, Mickiewiczza 3, Kraków 31-120, Poland. E-mail: anna.marzecova@gmail.com*

### P. GONZALEZ-PEREZ, S. HERNANDEZ, A. DOMINGUEZ, R. MARTIN, E. VERCE, I. QUINTERO & L. ARTILES. Developmental delay in executive functions in Attention-Deficit Hyperactivity Disorder (ADHD).

**Objective:** Neuropsychological approaches evidence the existence of deficits in executive functions (EF) in ADHD, probably associated with

delay in neurodevelopmental (Seidman, 2006). Longitudinal structural neuroimaging studies have shown delay in cortical development in this population (Shaw et al., 2007), and differences in the developmental trajectory of micro-structural organization of the caudate nucleus (Silk et al., 2009). **Objective:** To study the development of executive functioning in a population with ADHD.

**Participants and Methods:** We assessed 43 controls and 62 ADHD subjects, grouped into three age ranges: children (7-9 years, n=29), preadolescents (10-13 years, n=41) and adolescents (14-19 years, n=35), without other neurological or psychiatric disorders and normal IQ. EF were assessed by a neuropsychological protocol which consist of: Working Memory Sentences Test, Digit Span, Visual Tapping Span, COWAT, Stroop Test, and WCST

**Results:** The MANOVA show significant differences for the main factors Group and Age, without interaction between them. The ANOVA saw a significant worse performance of ADHD children in verbal and visual working memory, verbal fluency, inhibition, abstract reasoning/concept formation, and cognitive flexibility. In turn we saw an increase in performance with the age both in controls as ADHD.

**Conclusions:** Results suggest a delay in the acquisition of executive functioning in ADHD, which can improve with age but does not reach the performance of the normal population. These results could be interpreted in terms of a delay in the maturation of cortical thickness (Shaw et al. 2007) and basal ganglia (Silk et al., 2009), indicating a dysfunction of the fronto-striatal circuits (Himelstein et al., 2000).

Correspondence: *Pedro Gonzalez-Perez, Psychobiology & Methodology, University of La Laguna, Campus de Guajara, La Laguna 38207, Spain. E-mail: pedagon@ull.es*

### M.J. WOZNIAK-PRUS, M. GAMBIN & M. SWIECICKA. Executive Functions in Preschool Boys at Risk of ADHD.

**Objective:** ADHD is a neurodevelopmental disorder that arises in early childhood, but there is still a lack of studies concerning preschool children at risk of ADHD. The first aim of the study was to investigate deficit in executive functioning in preschool boys at risk of ADHD. The second objective of this project was to design and test measures of executive functions appropriate for preschool children.

**Participants and Methods:** The group of 25 boys at risk of ADHD aged 4.5 – 6 years were compared with aged-matched control boys on three domains of executive functioning: response inhibition, working memory and planning. Inhibition is measured by the five versions of computer go/nogo task that differ in a kind of stimuli designed to manipulate emotional impact. Working memory is tested by the eight series of abstract or real pictures to remember for children. Planning ability is measured by the three mechanical and by the three social puzzled stories that need to be matched in chronological order and by the puzzled story that needs to be matched in reverse.

**Results:** Statistical analyses concerning between groups comparisons were performed. Outcomes indicate that preschool boys at risk of ADHD differ from control group in response inhibition and planning. Differences in performance on working memory tasks were not found.

**Conclusions:** Our findings could suggest that deficits in some of executive functions emerge early in the development of ADHD children. Secondly these results could reveal a validity of the designed methods to measure executive functioning in preschool children.

Correspondence: *Malgorzata J. Wozniak-Prus, M.A., Psychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: malga77@poczta.onet.pl*

### Learning Disabilities/Academic Skills

#### A.E. BARTH, M. BARNES, C. DENTON, K. STUEBING & J.M. FLETCHER. Language Profiles of Treatment Nonresponders, Treatment Responders, and Typically Developing Students.

**Objective:** Students with accurate decoding in the presence of poor reading comprehension are impaired on a wide range of language tasks (Cain & Oakhill, 2006). The purpose of this study is to compare the language profiles of second grade poor comprehenders who failed to respond to a multi-component reading intervention, students who responded to intervention, and typically developing readers.

**Participants and Methods:** The sample comprises 32 poor comprehenders who failed to respond to intervention (TXNR), 88 students who

responded to intervention (TXR), and 52 typically developing readers (TYP). All students performed above 93 on the WJ-III Basic Skills composite. Poor comprehenders obtained standard scores of less than or equal to 93 on the WJ-III Passage Comprehension. The following skills were assessed: decoding, passage comprehension, phonological awareness, listening comprehension, syntax, vocabulary, verbal working memory, and bridging inference making.

**Results:** A mixed model ANOVA was conducted to obtain profiles for students' language abilities. Using Wilk's criterion, a significant shape effect was observed  $F(14, 294) = 2.91, p < 0.0004, \eta^2 = .21$ . Follow-up pairwise contrasts with group status as the between subjects factor indicated that TXNR performed significantly lower on phonological awareness, syntax, listening comprehension, vocabulary, and verbal memory than TXR and TYP and also lower than TYP on bridging inferences. TXR performed lower than TYP on phonological awareness, syntax, listening comprehension, and vocabulary.

**Conclusions:** These findings suggest that poor comprehenders, who fail to respond to intervention, continue to present deficiencies on a wide range of language tasks.

Correspondence: Amy E. Barth, Ph.D., Texas Institute of Measurement Evaluation and Statistics, University of Houston, Location: 2151 West Holcombe Blvd., 222 Texas Medical Center Annex, Houston, TX 77204. E-mail: aebarth@uh.edu

### S. FERNANDEZ, B. GUTIERREZ, A. CUIXART & M. JODAR. Atypical Neuropsychological Profile in Adults with Myelomeningocele with Hydrocephalus and Normalized IQ.

**Objective:** Heterogeneous cognitive status has been described in patients with myelomeningocele and hydrocephalus. Learning and memory, reaction speed and executive functions deficits have been found in young adults with myelomeningocele and normalized IQ and, although non-verbal learning disabilities have been fully described in children with myelomeningocele, different authors have reported its absence in adults. The aim of this study is to define a neuropsychological pattern in myelomeningocele in adults with shunted hydrocephalus and normalized IQ.

**Participants and Methods:** 8 adults (5 females, 3 males) aged 19-38 years with myelomeningocele were measured with a completed neuropsychological assessment. All patients had normal-functioning shunt implanted in childhood.

**Results:** All patients had normalized IQ (>75). Just one patient shown significant discrepancy (>15) between verbal and performance IQ. Verbal and visual memory problems were observed in our sample (62,5%) improving results with recognition (87,5%). We found deficits in information processing speed (62,5%) and executive functions problems (87,5%) with planning and verbal fluency the most frequent frontal disfunctions. Alteration in visuospatial ability were presented in 6 of the 8 patients (75%)

**Conclusions:** A neuropsychological profile with deficits in verbal and visual memory that improved with recognition, information processing speed, executive functions and visuospatial ability we observed in our study of adults with myelomeningocele and normalized IQ.

Although a complete nonverbal learning disabilities profile is not present in these type of patients, visuospatial difficulties might be found.

A neuropsychological following-up is needed in order to determinate the specific cognitive deficits of patients with myelomeningocele, even when they present a normalized IQ.

Correspondence: Sol Fernandez, Vall d'Hebron Hospital of Barcelona, c/ Lepant 325 50 4a, Barcelona 08025, Spain. E-mail: soleilsonne@hotmail.com

### M. LIPOWSKA, E. CZAPLEWSKA & D. DYKALSKA-BIECK. Visuospatial Deficits of Dyslectic Children.

**Objective:** The visuospatial deficit is recognized as typical for dyslexia only in some definitions. However problems with visuospatial orientation may manifest as difficulties with letter identification or memorizing and recalling sequences of signs, which are frequently experienced by dyslexics.

**Participants and Methods:** 62 children with developmental dyslexia and 67 pupils with no deficits diagnosed, matched to the clinical group in terms of age took part in the study. In order to measure their visuospatial functioning we used the Clock Drawing Test (CDT), the Spatial Span subtest from Wechsler Memory Scale – third edition (WMS – III) and the Rey-Osterrieth Complex Figure Test.

**Results:** The results show that dyslexics experienced problems with visuospatial functioning, however only during performing difficult tasks. Significant group differences were found for Clock Drawing Test, Spatial Span – Backward and precision of figure coping in the Rey-Osterrieth Test. What's more, results of dyslexic boys were lower than obtained by all other groups.

**Conclusions:** Our findings provide support for the hypothesis concerning visual deficit as characteristic for dyslexia.

Correspondence: Malgorzata Lipowska, Instytut of Psychology, University of Gdansk, ul. Liczmerskiego, Gdansk 80-322, Poland. E-mail: psymil@univ.gda.pl

### F.C. INÁCIO, S. ARAÚJO, A. FRANCISCO, F. LUÍS, K.M. PETERSSON & A. REIS. Understanding rapid naming deficits in dyslexia: A response time analysis.

**Objective:** Rapid naming tasks (RAN) are good predictors of later reading achievement/competence, and have been proved to consistently discriminate dyslexic from non-dyslexic readers. However, it is still unclear which cognitive processes underlie impaired rapid naming performance (phonological and/or non/extra-phonological processes) and how they are related to reading failure. The present study aimed to investigate which of these processes might explain rapid naming deficits in dyslexic readers.

**Participants and Methods:** We compared the performance of 30 dyslexics and age-matched controls in two rapid-naming tasks, with letters and objects. Two time measures were extracted from the RAN tasks: articulation and pause times (inter-articulation intervals). Subjects also performed a Reading task, where word frequency and lexicality were manipulated.

**Results:** Articulation and pause times were analysed and revealed differences between groups. Dyslexics performed slower than controls in both measures; however, differences between groups were more prominent for pause times. Furthermore, correlation analysis revealed for dyslexics that pause times are more negatively related with reading performance when compared to articulation times.

**Conclusions:** RAN pause durations were differentially related to reading competence, indicating that dyslexic children need an extra cognitive time to perform RAN tasks, rather than showing only a slower articulation. Overall our results suggest that cognitive components related to visual decoding and/or lexical retrieval involved in rapid naming are compromised in dyslexics.

Correspondence: Filomena C. Inácio, master student, Universidade do Algarve, FCHS - Universidade do Algarve - Campus de Gambelas, Faro 8000, Portugal. E-mail: fcinacio@ualg.pt

### R.H. RISS & P. RAY. Effect of Auditory Processing Training on Neural Substrates of Reading Readiness in Dyslexic Readers.

**Objective:** Convergent neuropsychological, neuroimaging and electrophysiological evidence has implicated a central role for phonological processing dysfunction in dyslexia. In the present pilot study we examine the impact of an auditory processing intervention on the neural substrates of reading readiness in young dyslexic readers.

**Participants and Methods:** As a component of a larger pilot study, we analyzed surface qEEG and low resolution magnetoencephalographic (LORETA) activation patterns during reading in 2 children (ages 6 and 8 years old) with documented reading disability. The children received 60 hours of training, consisting of exposure to gated and filtered sound, tailored to each child's specific auditory processing pattern, embedded in a classical musical recording (EnListen method). We identified pre-post training changes in qEEG and voxel-level neuroelectric source localization (LORETA) patterns during reading, and measured the impact of training on psychometric indices of reading readiness.

**Results:** We observed increased activation during reading in left temporo-parietal cortex and left inferior frontal regions, similar to patterns observed in normal readers. We noted a shift from right frontal to bilateral frontal activation consistent with patterns reported for well compensated dyslexic readers. Increased regional activation in the anterior cingulate gyrus was interpreted to reflect enhanced activation of an attentional circuit during task. While overall reading gains were modest, gains of up to 1 S.D. on measures of phoneme discrimination, working memory and reading fluency, suggested enhanced reading readiness.

**Conclusions:** Preliminary findings suggest that auditory processing training may have potential to positively impact neural correlates of reading reading in dyslexic readers, providing a therapeutic foundation for subsequent remedial educational interventions.  
Correspondence: *Roger H. Riss, Psy.D., Neuropsychology, Madonna Rehabilitation Hospital, 5401 South Street, Lincoln, NE 68506. E-mail: rrriss@madonna.org*

**V.D. VAITSES & C.S. GOLBERT. Logical Reasoning, Executive Function and Academic Performance in Children of second year of Elementary School.**

**Objective:** This study aims to investigate cognitive aspects involved in academic performance.

**Participants and Methods:** There was applied a logical-mathematical piagetian task and a neuropsychological test of executive function in 17 students aged 7 to 9 years, taking the third trimester of the 2nd year of elementary education at a public school in Porto Alegre.

**Results:** The results obtained in the piagetian task and in the neuropsychological test of executive functions, were compared with results obtained in the academic achievement tests. From this comparison, we analyzed the cognitive aspects involved in these three dimensions and discussed their roles in academic performance.

**Conclusions:** The academic performance is associated with several factors. We investigated the role of logical reasoning and executive functions in academic performance. We found that a better result on a test of logical reasoning, coincides with highest scores in the evaluation activities of the school. The executive functions wasn't so important, and this was interpreted as related to the test chosen to test these functions.  
Correspondence: *Virian D. Vaitses, physician, Education, UFRGS, Fernandes Vieira, 140/14 BomFim, Porto Alegre 90035-090, Brazil. E-mail: virian.vaitses@ufrgs.br*

**P. CZARNECKI & J. OBER. Classroom photography of reading development.**

**Objective:** Widely used methods for evaluating the reading development status are targeted on defining absolute measure of reading development. Its absolute value depends mainly on two factors: the initial reading instructions and child's individual response to it. The first one does not depend on the child predisposition to learn but entirely on external factors like physiologically justified and structured introduction into the written code as well as it's implementation adjusted according the feedback from the child's individual progress. It means that the absolute measure of reading development can reflect mainly the quality of initial reading instruction to the higher degree then the child's individually dependent response to it. Thus the judgement of reading development is based on the assumption that the every child was exposed on the same quality reading instruction. We can assume that this condition is fulfilled if we will test all children in the classroom and evaluate the relative reading skill development.

**Participants and Methods:** Research was made with a help of Polish edition of Prolexia-Tests which was developed by Jan Ober. Words chain test measure the word reading efficiency and sentences chain test reading understanding. Examination was done on two groups of children at 3rd and 4th grade of primary school in November 2007. Tests was repeated on the same groups of children in November 2008 and 2009. Two minutes limited time was foreseen for solving every test.

**Results:** The photography of reading skill development is represented on the two dimensional space. Horizontal decoding efficiency axis and vertical reading understanding axis are presented with percentage values of correctly solved test.

**Conclusions:** Tests differentiate children's reading efficiency in both measured dimensions. Tests can be very useful for monitoring children's reading skills development. Unlimited combination of words and sentences can be generated. Therefore examination can be taken in short time intervals.  
Correspondence: *Pawel Czarnecki, Master of Science, Institute of Biocybernetics and Biomedical Engineering Polish Academy of Sciences, Szezechy 132, Poznan 60-195, Poland. E-mail: pawel.czarnecki@ibib.waw.pl*

**S. ARAÚJO, I. BRAMÃO, L. FAÍSCA, K. PETERSSON & A. REIS. The Electroencephalographic Components of Reading in Dyslexia: More than a Phonological Deficit?**

**Objective:** Recent studies have shown that impaired reading in dyslexia could not be exclusively explained by a phonological deficit, suggesting

that other non-phonological processes might also be impaired, namely at the earlier orthographic/visual processing level. Considering this hypothesis, in the present study we assessed to which extent dyslexics differ from normal readers on event-related potentials (ERPs) evoked by orthographic/visual and phonological processes triggered during an implicit reading task.

**Participants and Methods:** Event-related potentials were recorded during an implicit reading task where the phonological, semantic and orthographic representations of the stimulus were manipulated in five conditions: high-frequency words, low-frequency words, pseudowords, consonant-strings (have neither phonological nor semantic representations) and symbol-strings. The performance of twenty dyslexic children and twenty age-matched controls was compared.

**Results:** Control readers showed an increased negative-polarity activity around 100-200ms, over posterior sites, for the comparisons between orthographic and non-orthographic stimuli. However, such sensitivity to the orthographic nature of stimulus was not observed for dyslexic readers. The same electrophysiological pattern was found for both groups for phonological processing, when consonant-strings were compared against phonological pronounceable stimuli (between 250-370ms at more anterior sites).

**Conclusions:** Overall, our ERP results support the hypothesis that reading deficits might be associated to a less efficient orthographic/visual analysis of the stimulus. In addition, our data suggest that in less opaque orthographies compared to English, the importance of phonological skills to successful reading seems to be less critical.

Correspondence: *Susana Araújo, PhD student, Psychology, University of Algarve, Campus de Gambelas - FCHS, Faro 8000, Portugal. E-mail: smaraujo@ualg.pt*

**E. GARCIA, J. JIMENEZ, R. MARTIN, D. GONZALEZ, S. HERNANDEZ & F. RIVERO. Structural brain abnormalities in adolescent with dyslexia: a Voxel Based Morphometry Study.**

**Objective:** Neuropsychological studies show deficits in phonological processing in individuals with dyslexia. However, little is known about the neuroanatomy underlying to this cognitive dysfunction in dyslexia, especially in adolescents with dyslexia.  
**Objective:** To analyze cortical thickness including the supramarginal cortex (BA 40; BA: Brodmann area), fusiform cortex (BA 37) and inferior frontal cortex (BA 44/45) areas of the left hemisphere in a population of Spanish adolescent dyslexics by a Voxel Based Morphometry (VBM) procedure.

**Participants and Methods:** Magnetic resonance imaging was performed with a General Electric 3 Test scanner on dyslexics (48; 25males) and normally achieving readers age-matched group (47; 24males) without other neurological or psychiatric disorders and normal IQ. For each subject, an axial 3D T1 acquisition was obtained with the following parameters: TR=10.3fs, TE=10.7fs, FOV=26mm, matrix size=320x224, 152 slices. The anatomical 3D data were analyzed with SPM5. Statistical analysis was performed using VBM procedure and applying a General Linear Model.

**Results:** We expect that dyslexics in comparison to control group will show a significant minor cortical thickness in supramarginal cortex (BA40), fusiform cortex (BA37) but not in inferior frontal cortex (BA44/45) areas of the left hemisphere.

**Conclusions:** A confirmation of these findings could suggest the existence of neuroanatomical abnormalities in two brain areas in dyslexics classically linked with language processing.

Correspondence: *Eduardo Garcia, Doctor, Developmental and Educational Psychology Department, University of La Laguna, Campus de Guajara s/n, La Laguna 38200, Spain. E-mail: egarciam@ull.es*

**E. GARCIA, J. JIMENEZ, D. GONZALEZ, R. MARTIN, S. HERNANDEZ & F. RIVERO. Pattern of neural activation related to phonological processing in adolescents with dyslexia: an fMRI study.**

**Objective:** Dyslexia is primarily associated with a phonological processing deficit and reduced parietal space. In functional neuroimaging studies, individuals with dyslexia frequently exhibit both hypoactivation, often in the left parietotemporal cortex, and hyperactivation, often in the left inferior frontal cortex. Anomalies of acti-



vation of the posterior temporoparietal areas in the left hemisphere seem to be associated with phonological disorders in dyslexics. **Objective:** The main aim of this study was to investigate functional activation related to a phonological processing (single word and pseudoword reading) and picture-naming in a population of Spanish adolescent dyslexics.

**Participants and Methods:** fMRI was performed with a 3T scanner in dyslexics (48; 25males) and normally achieving readers age matched group (47; 24males) without other neurological or psychiatric disorders and normal IQ. A total of 9065 images were then obtained for each experimental run, using 37 4-mm thick axial slices. The EPI volumes with no gap were acquired (TR/TE = 2000/10 ms, flip angle =90, matrix=64x64, FOV = 240x240mm) for each functional imaging session. Functional regions of interest (ROIs) were defined by regions of the supramarginal cortex (BA9), BA: Brodmann area), fusiform cortex (BA37) and inferior frontal cortex (BA44/45) areas of the left hemisphere. The paradigm acquisition time was 8 min 30s.

**Results:** We expect that dyslexics will show on the left hemisphere a significant BA44 and BA 37 hypoactivation, and BA 44/45 hyperactivation.

**Conclusions:** A confirmation of these findings could suggest the existence of functional disorder in areas classically linked with language processing.

Correspondence: *Eduardo Garcia, Doctor, Developmental and Educational Psychology Department, University of La Laguna, Campus de Guajara s/n, La Laguna 38200, Spain. E-mail: egarciam@ull.es*

**C. TOLEDO PIZA, E.C. MACEDO, T. BARBOSA, C.C. RODRIGUES, E.M. PINHEIRO, G.V. ZANINI & O.A. BUENO. Reading Skills in Dyslexics and Good Readers: An Analysis Based on the Brazilian Reading and Writing Battery - BALE.**

**Objective:** The present study aims to compare the performance of dyslexic children with two individually matched control groups in a Brazilian Reading and Writing Battery.

**Participants and Methods:** Participants were: 28 dyslexics of both genders, with mean age of 9,82 (SD: 1,44) years, studying in public and private schools. These were matched to: 1) an Age Control Group (AC): composed of 26 good readers, with mean age of 9,77 (SD: 1,44) years, matched by age, sex, years of schooling and type of school. 2) Reading Control Group (RC): composed of 28 younger controls, with a mean age of 7,82 (SD: 1,06) years, matched by sex, type of school and reading level. All groups were tested on 4 tasks of the brazilian battery 'BALE' that measure sentence reading comprehension, oral sentence comprehension, spelling and reading of single words and pseudowords.

**Results:** Results showed dyslexics obtained lower total scores and a higher execution time, when compared to AC. When compared to RC, no differences in total scores of reading tasks or oral comprehension tasks were observed. However, dyslexics presented a slower reading speed, with a higher execution time and a lower score in spelling tasks, even when compared to younger controls. Detailed analysis of types of errors on word and pseudoword reading, demonstrated that dyslexics obtained lower scores in the reading of pseudowords, when compared to both groups.

**Conclusions:** Such findings suggest that overall scores of dyslexics were similar to the younger readers. However, specific deficits in phonological and visual decoding, showed both groups have different underpinning reading strategies.

Correspondence: *Carolina Toledo Piza, Psychobiologist, UNIFESP, R. Embau, 54, Sao Paulo 04039-060, Brazil. E-mail: carolap@terra.com.br*

## Autism Spectrum Disorders

**A.M. ZMIJEWSKA & E. PISULA. Temperamental Covariants of the Autistic Characteristic of Behaviour.**

**Objective:** The growing number of cases of autism has caused an increased interest in the autistic characteristic of behaviour – a variable that is continuously distributed in the population. Previous research showed that this characteristic coexists with some of the temperamental traits. These temperamental covariants of the autistic characteristic of behaviour might constitute a risk factor, and the "poorness-of-fit"

between a subject with these traits and the environment can substantially decrease the subject's quality of functioning (Schwartz et al., 2009). The aim of this study was to examine the relationship between the autistic characteristic of behaviour and temperamental traits included in the Regulatory Theory of Temperament (Strelau, 1985).

**Participants and Methods:** Two questionnaires were used: the Autism Spectrum Quotient (Baron-Cohen et al., 2001) and the FCZ-KT (Strelau and Zawadzki, 1993). One hundred students of Warsaw Universities participated in this study.

**Results:** The results showed many correlations between the autistic characteristic of behaviour and temperamental traits, e.g. perseveration and emotional reactivity showed positive correlations with the autistic characteristic of behaviour, whereas activity and endurance correlated negatively with this characteristic.

**Conclusions:** Discovering the temperamental covariants of the autistic characteristic of behaviour might shed a new light on the processes involved in the etiology of autism.

Correspondence: *Anna M. Zmijewska, master, Warsaw University, Długa Street 30/34/17, Warsaw 00-238, Poland. E-mail: annazmijewska@poczta.onet.pl*

**P. ELING. Attentional Set Shifting in Autism Spectrum Disorder: Role of Perseveration, Learned Irrelevance, and Novelty processing.**

**Objective:** Autism spectrum disorders (ASD) are associated with impaired attentional set-shifting abilities, which may reflect enhanced perseverative responding, enhanced learned irrelevance, and/or reduced novelty processing. This study assessed the contribution of each of these potential sources of erroneous responding in attentional set shifting in ASD participants.

**Participants and Methods:** Seventeen ASD and 19 matched comparison individuals first solved a two-choice discrimination learning task, which implied the selection of the task-relevant stimulus attribute from stimuli consisting of one task-relevant and one task-irrelevant stimulus attribute. Thereafter, the participants faced three types of attentional shift that were specifically designed to isolate the effect of the three possible error sources. This was achieved by replacing either the previous task-relevant or task-irrelevant stimulus attribute by a novel attribute, or by simply reversing the task relevance of the two stimulus attributes.

**Results:** The ASD participants made more perseverative errors, but less errors due to learned irrelevance than the controls.

**Conclusions:** These results were interpreted as suggesting that the performance difference between ASD and comparison individuals, at least in the present shift task, is caused by reduced novelty processing, rather than by a difference in perseveration or learned irrelevance.

Correspondence: *Paul Eling, PhD, Psychology, Radboud University Nijmegen, PO Box 9104, Nijmegen 6500 HE, Netherlands. E-mail: p.eling@donders.ru.nl*

**R. KAWA & E. PISULA. The effects of physical environment characteristics on the behavior of children with autism.**

**Objective:** Autism is a neurodevelopmental disorder with unknown etiology. It is distinguished by a characteristic triad of symptoms: impairments in social interaction, impairments in communication, and restricted interests and repetitive behavior. Besides these symptoms, many children with autism experience cognitive deficits, non-typical processing of sensory information and high level of anxiety. Those characteristics determine the strategies in creating a therapeutic environment for children with autism. So far, there is a lack of empirical data to help define such strategies.

The aim of this study was to compare the behavior of children with autism, children with Down syndrome and typically developing children in an environment with differing stimulation characteristics.

**Participants and Methods:** 27 children took part in 15 experimental sessions. Every five-minute-session took place in an experimental room split into 3 zones. Every zone varied in regard to complexity and intensity of stimulation.

**Results:** Behaviors such as looking at objects; locomotion; and manipulating objects were analyzed. The intensity of stereotypical behavior was also measured.

**Conclusions:** The results indicate that there are differences among time characteristics and the intensity of measured behavior.

Correspondence: *Rafal Kawa, M.A., Faculty of Psychology, University of Warsaw, ul. Stawki 5/7, Warszawa 02-183, Poland. E-mail: rkawa@psych.uw.edu.pl*

**M.J. NESTER, M. AL-DOSARI, A. MUSLAMANI, M. GHANNAM, N. AL-TASSAN, H. KHALAK, B. MEYER & B. MEYER. Regressive vs Early Onset Autistic Spectrum Disorder in a Saudi Arabian Sample.**

**Objective:** Autistic spectrum disorder (ASD) is of great concern in the Kingdom of Saudi Arabia with estimates suggesting an incidence as great as that in Western countries. This presents severe difficulties in management as services for this group are extremely limited. A high degree of consanguinity and large sib-ships suggests that, as in other groups of genetic-based disorders, the Saudi population may differ from those in other countries; affecting diagnosis and treatment. This study is the first major attempt to systematically investigate the Saudi ASD population.

**Participants and Methods:** A selected sample of 100 ASD subjects were evaluated using a variety of approaches including genetic, neurological, and neuropsychological. Of particular concern was the issue of how ASD subjects who showed marked regression, differed from those who were impaired from the outset.

**Results:** We found significant differences in male to female ratio (2:1 for regressed vs >6:1 for non-regressed); higher cognitive function (47.4% normal/borderline in regressed vs. 32.1% in non-regressed) and motor milestones. In the latter, the regressed group were within, or close to, normal range while the non-regressed group showed substantive delay. The groups did not differ in consanguinity, parents' education, presence of seizures, history of CNS complications, or pre/peri-natal difficulties.

**Conclusions:** Some of these findings are in concert with previously published studies; others appear to be unique to the local population. These data are being used to plan further investigations in this area as well as to aid in program planning. The discussion includes these issues as well as the limitations of this study.

Correspondence: *Michael J. Nester, PhD, Neurosciences, KFSH&RC, MBC 76, Bx 3354, Riyadh 11211, Saudi Arabia. E-mail: mikeyjn44@hotmail.com*

**K. KONOPKA & E. PISULA. The significance of context in the reproduction of memorized words in children with autism.**

**Objective:** According to the weak central coherence hypothesis, individuals with autism have difficulty in using context to decode meanings (Frith, 2006). The results obtained by Beversdorf (2004) show that those with autism make fewer mistakes than controls when recalling presented words because they do not choose items semantically related with the words on the list they memorized.

**Participants and Methods:** The present study used a modified version of the procedure employed by Beversdorf. High-functioning children with autism aged 7-9 years were presented with a list of words, and then a set of pictures showing: two objects matching the words on the list, two objects in the same category, two objects related to words in a given category and two objects unrelated to the words in the list. Participants were asked to select the objects whose names were presented earlier. Five lists were used, with objects from the following categories: clothes, sharp objects, animals, means of transport and fruits.

**Results:** The evidence of using context was selecting objects in the same category as the words in the list but not presented or words semantically related to presented words. In the "clothes" category, children with autism indicated objects incorrectly, merging them into one experience-based category.

**Conclusions:** The results may suggest the significance of experience in the process of categorisation and in decoding meanings of stimuli in individuals with autism.

Correspondence: *Katarzyna Konopka, Department of Rehabilitation Psychology, University of Warsaw, ul. Stawki 5/7, Warsaw 00-183, Poland. E-mail: kkonopka@psych.uw.edu.pl*

**A. ROZGA, S. ANDERSON, T.Z. KING & D.L. ROBINS. Impact of Data Reduction Methods on Identifying Atypical Facial EMG Responses to Emotion Displays among High-Functioning Individuals with Autism Spectrum Disorders.**

**Objective:** Studies of facial EMG (fEMG) response to emotional expressions among individuals with autism spectrum disorders (ASDs) in-

dicating conflicting results, from lack of or undifferentiated responses (Beall et al., 2008; McIntosh et al., 2006) to intact or even enhanced responses (Wilbarger et al., 2009; Magnee et al., 2007). Notably, these studies differ in data reduction and analysis procedures. We examined the impact of data reduction methods on the likelihood of identifying atypical patterns of fEMG in ASD.

**Participants and Methods:** Seventeen individuals with ASD (mean CA=16.6yo) and 17 neurotypicals (mean CA=15.2yo) were matched on age, IQ, and face perception. Participants viewed dynamic emotional stimuli containing facial expressions and affective prosody portraying happiness, anger, and fear while sensors recorded zygomatic and corrugator muscle activity. Based on previous research, we examined (a) average levels of muscle activity in a window 500 to 1000ms post stimulus onset, (b) peak magnitude of activity over the full 1300ms post stimulus onset, and (c) latency to peak magnitude on the congruent muscle through 1300ms, using two data reduction methods: log-transformed percent change scores and change scores of log-transformed, standardized raw data.

**Results:** For analyses (a) and (c) above, both data reduction methods yielded identical results: unlike the neurotypical group, the ASD group showed undifferentiated fEMG responses to happy and fearful expressions, and there were no group differences in latency to peak. However, for analysis (b) above, we found a significant, 3-way (emotion by muscle by group) interaction using the z-score method but not using the percent change score method.

**Conclusions:** These findings suggest methodological choices affect the likelihood of identifying atypical fEMG responses in ASD. Implications for the advancement of our understanding of emotion perception in ASD and the importance of utilizing standardized approaches across studies to understand fEMG in ASD will be discussed.

Correspondence: *Agata Rozga, PhD, School of Interactive Computing, Georgia Institute of Technology, 85 5th Street, NW, Atlanta, GA 30332-0760. E-mail: agata@gatech.edu*

**M. PUDLO. Adenylosuccinate lyase deficiency (ADSL) – a rare autosomal disorder, a study of a 5 years old girl.**

**Objective:** Adenylosuccinate lyase deficiency (ADSL) is a very rarely diagnosed recessive autosomal disorder related to aberrations in the purine metabolic pathways (approx. 60 patients worldwide). Patients show an excess of SAICAr i S-Ado in body fluids, urine and cerebrospinal fluid. As a consequence of illness developmental retardation may occur, autistic symptoms, early childhood epilepsy, brain atrophies, changes in white matter, retardation of myelination and encephalopathy.

**Participants and Methods:** The goal of this study is to present a case study of a five years old girl diagnosed with ADSL. Neuroimaging performed at the age of one year has shown slight changes in the cerebral cortex. Studies have used Children Development Scale (DSR), Munich Functional Development Diagnostics, and Gunzburg PAC Inventory. Also the child's behaviour during various rehabilitation tasks (individual therapy with a psychologist and therapeutic horseback riding) was observed for a period of 20 days (for approx. 5 hours per day).

**Results:** Results of examination and observation data show psychomotor retardation and slight autistic symptoms in the observed child. The development of the studied girl is uneven; she achieves better results on motor development scales than on social development and communication scales. Also on the basis of observation data it is possible to establish that her sensory threshold is low, her attention is distracted, stereotyped movements and avoiding eye contact were also found.

**Conclusions:** The studies show that the girl presents type 2 of the disorder, with psychomotor retardation and autistic symptoms. It is more rarely diagnosed than type 1 (with significant neurological disturbances and brain structure anomalies).

(Neuropsychological Scientific Group Faculty of Psychology Warsaw University)

Correspondence: *Monika Pudlo, Faculty of Psychology, Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: ins@neuropsychologia.org*

**H. CYGAN & H. OKUNIEWSKA. Asperger Syndrom with associated prosopagnosic deficits.**

**Objective:** The first goal of our study was to confirm the AS diagnosis on the basis of his developmental history and current level of verbal-

and non-verbal communication skills (e.g. prosody, expressive language, comprehension of literal and conveyed meaning, humour competence, use of gestures and facial expression), social interactions (e.g. ability to interact, appreciation of social cues), stereotyped patterns of behavior and face recognition impairment. The second goal of neuropsychological examination was to assess the main cognitive functions (attention, intellect, memory and learning, language, visuospatial perception and organization, executive functions) to find out the background for his specific complaints.

**Participants and Methods:** This poster presents a single case study of a 33-year-old man, unemployed IT specialist, who has been first diagnosed with Asperger's disorders three years ago and wished to undergo neuropsychological evaluation because of his difficulty in recognizing familiar faces and people's emotions. His medical history included also a short episode of depression few years ago but no serious neurological or psychiatric problems. Asperger's Syndrome (AS) is thought to be an inherited condition and the family history indicated his father to have similar symptoms.

**Results:** Battery of tests: WAIS-R-PL; WMS III (subtests); TMT; D2; BNT; WCST; The Names and Colours Interference Test, Rey CF; BVRT; RHLB (subtests); Verbal Fluency Test and experimental tasks (e.g. facial matching, famous facial recognition, age, affect and gender of faces recognition) were applied.

**Conclusions:** Evaluation enabled to propose strategies to compensate for failing to recall the visual image.

Correspondence: *Hanna Cygan, master of science, University of Warsaw, Lachmana 2 m 72, Warsaw 02-786, Poland. E-mail: bronkacygan@wp.pl*

## Genetics/Genetic Disorders

**I. CHOJNICKA, S. FUDALEJ, M. FUDALEJ, P. KRAJEWSKI, M. WOJNAR & R. PLOSKI. No Association between the Candidate Genes for Autism and Suicide.**

**Objective:** Many of psychiatric disorders have some common features, which suggest shared molecular mechanisms lying beneath. Autism is neurodevelopmental disorder characterized by impairment in social interactions, communication and restricted patterns of interest and behavior. The long term studies showed that patients with autism spectrum disorders (ASD) attempt suicide more often than average. We decided to investigate presence of the association of DNA polymorphisms connected with ASD with suicide. We tested two single nucleotide polymorphisms (SNPs) - rs930752 in the neurexin 1 gene (NRXN1) and rs4307059 between cadherin 10 (CDH10) and cadherin 9 (CDH9). NRXN1 play role in synaptogenesis and bind neurotrophins. The neurexin/neurotrophin complex is required for neurotransmission. CDH10 and CDH9 encode adhesion molecules, involved in the formation of synaptic contacts in the developing brain. We searched subsequently for associations between genotypes and clinical variables such as gender, suicide method, blood ethanol concentration, history of psychiatric treatment and evidence for serious somatic disease.

**Participants and Methods:** The rs930752 and rs4307059 polymorphisms were genotyped in 400 completed suicide victims and 400 controls in Polish sample using real-time PCR.

**Results:** No significant association was observed between the analyzed SNPs and suicide (for rs930752: OR=0.90,  $\chi^2=0.62$ ,  $p=0.43$ ; for rs4307059: OR=0.91,  $\chi^2=0.49$ ,  $p=0.48$ ). We found weak association between the rs930752 and blood ethanol concentration ( $R=-0.096$ ,  $p=0.08$ ).

**Conclusions:** We found no significant association between both analysed SNPs and suicide. The association between the rs930752 and blood ethanol concentration is potentially interesting and should be further analysed.

Correspondence: *Izabela Chojnicka, PhD student, Medical Genetics, Medical University of Warsaw, Pawinskiego 3c, Warsaw 02-106, Poland. E-mail: izabela.chojnicka@wum.edu.pl*

**R.P. KESSELS, K. FRERIKS, Y. DE KLEIJN, C.M. VERHAAK & T.J. TIMMERS. Intelligence, Visuospatial Working Memory and Executive Function Deficits in Women with Turner Syndrome and Their Relation with Psychosocial Variables.**

**Objective:** Turner syndrome (TS) is the result of complete or partial deletion of one X-chromosome. Most studies on TS focus on children or

adolescents and studies in adults do not take mood and anxiety into account, which may affect cognitive function. We examined intelligence, executive function and visuospatial working-memory in a group of young adults with TS. We included measures of depression and psychological complaints.

**Participants and Methods:** We investigated 27 women with TS (mean age=23.9, SD=4.0) and 20 women without TS (mean age=24.9, SD=4.4). All participants performed the Ward abbreviation of the WAIS-III, executive function was assessed with the Zoo Map (BADS) and the Brixton Spatial Anticipation Test, and visuospatial working memory with a computerized spatial search task (Box Task). The Symptom Checklist (SCL-90-R) and the Beck Depression Inventory (BDI-II) were administered.

**Results:** The TS group had a lower performal IQ than the controls ( $p<0.05$ ), but did not differ on verbal IQ. Impaired subtests relied on either speed of processing or working memory. No significant differences were found on the Brixton test or the Zoo Map. On the spatial working memory task, TS patients did not perform worse on the spatial search aspect within trials, but were impaired on maintenance of object-location associations across trials ( $p<0.001$ ). No differences were found on the SCL-90-R or the BDI-II.

**Conclusions:** In a group of non-depressed TS patients, we demonstrated a cognitive profile that is characterized by deficits in working memory and speed of processing. No deficits were found on crystallized verbal abilities, planning and concept-shifting. Our findings extend recent studies suggesting that deficits in working memory function may be the core of the cognitive impairments in TS.

Correspondence: *Roy P. Kessels, PhD, Department of Medical Psychology, Radboud University Nijmegen Medical Centre, PO Box 9101, Nijmegen 6500 HB, Netherlands. E-mail: r.kessels@mps.umcn.nl*

## Electrophysiology/EEG/ERP

**A.K. CZYZ. Neural and Behavioral Correlates of 'Looking but Not Seeing' Effect.**

**Objective:** It has been reported that despite direct fixations, obvious scene changes remain undetected [Caplovitz, G. I., Fendrich, R., Hughes, H. C. (2008). Failures to see: Attentive blank stares revealed by change blindness. *Consciousness and Cognition*, 17, 877-886]. The new methodology was tested to study hypothesis about neural and behavioral correlates of this controversial 'looking but not seeing' effect.

**Participants and Methods:** The experiment was conducted by means of FRP (Fixation Related Potentials), which combines eye-tracking (ET) and event-related potentials (ERP) recordings. This technique has the advantage of coupling accurate time measures from ERPs and the location of the eye on the stimulus, so it can be used to disentangle cognitive factors affecting visual awareness. In the present research 30 subjects took part in FRP individual sessions and the next day they completed the automated version of a working memory span task (Automated Symmetry Span Test).

**Results:** The results of comparing fixation-related potentials on the changing locations under conditions where a change was noticed or not show significant differences in mean amplitude of P100, positive component with latency of about 100 ms from onset of a fixation ( $F=5.88(1,29)$ ,  $p<0.05$ ). Furthermore, there was significant negative correlation between the number of 'attentive blank stares' and the working memory capacity ( $r=-0.65$ ,  $p<0.05$ ).

**Conclusions:** The P100 is the predominant FRP component and is considered to be associated with the level of attention. This data shows that the phenomenon of 'looking but not seeing' effect can be understood in terms of attention and working memory capacity.

Correspondence: *Agnieszka K. Czyn, Master's degree in Psychology, Department of Experimental Psychology, John Paul II Catholic University of Lublin, ul. Junoszy 47A/18, Lublin 20-058, Poland. E-mail: aczyn@wp.pl*

**P. STROZAK. The Encoding and False Recognition of Common and Abstract Nouns. An Event-Related Potentials (ERP) Study.**

**Objective:** Two experiments were held in order to assess the influence of the nature of encoded words (common vs. abstract nouns) on the number of false recognitions and on the event-related potentials (ERP) recorded both during encoding and recognition.

**Participants and Methods:** In the first experiment 26 subjects judged 744 nouns as to whether they were common or abstract. Then 288 words were chosen, half of which obtained the highest concrete scores and half obtained the highest abstract scores. In the second experiment 10 subjects encoded these 288 nouns and then made the recognition test. During encoding and recognition event-related potentials (ERP) were recorded using 128-channel EGI system.

**Results:** Behavioral results show that more false recognitions were made to abstract than to concrete words. ERP results at encoding show that common nouns elicited more positive brain responses from 80 to 130 ms, 150 to 190 ms and 350 to 400 ms after stimulus onset. ERP results at recognition show familiarity effect, i. e. more positive-going ERP waves for correct recognitions and false recognitions than for correct rejections. This effect was seen from 300 to 500 ms after stimulus onset in left posterior superior site, but only for abstract words. Also the effect of recollection was observed, i. e. more positive brain response for correct recognitions than for false recognitions and correct rejections. This effect was seen from 500 to 700 ms after stimulus onset in left anterior superior site and was more vivid for abstract words.

**Conclusions:** The results suggest that referring to a physical object or to a general quality or an idea is a major factor influencing familiarity and recollection processes in human memory and their electrophysiological correlates.

Correspondence: *Paweł Strózak, Ph. D. student, Department of Experimental Psychology, The John Paul II Catholic University of Lublin, Al. Raclawickie 14, Lublin 20-950, Poland. E-mail: p.strozak@gmail.com*

#### **K.O. KLIMAS. Helplessness as the first stage of depression - affective and cognitive deficits caused by informational helplessness training.**

**Objective:** Informational helplessness training is considered as an experimental model of cognitive impairment in depression. The purpose of this study was to examine whether the informational training causes similar processes that are the main deficits in depression, especially at the cognitive and affective level (frontal asymmetry index, Davidson 1994). Three questions were asked: can we observe deterioration in performance of tasks requiring generative thinking? Does the helplessness training elicit changes in hemispheric asymmetry (left frontal hypoactivation), as in studies on depressed subject? Finally, does the alpha asymmetry changes explain lower results in cognitive tasks?

**Participants and Methods:** 40 subjects were assigned to two groups, the experimental group was subjected to informational helplessness training, using the procedure designed by Hiroto and Sligman (1975). Then, both groups solved a task requiring the creation of a mental model (linear orders paradigm). EEG data was recorded from electrodes: Fp1, Fp2, F3, F4, F7, F8, P3, P4. Two pieces of resting EEG were analyzed, before and after helplessness training.

**Results:** The eeg data demonstrated a trend consistent with predictions, that informational helplessness training increases the left frontal activation in alpha band. At the behavioral level we expected a similar pattern of worsening cognitive task results, like in depressed subjects in other studies, but it appears to be true only in the most difficult tasks.

**Conclusions:** The most interesting result is that increasing alpha asymmetry does not explain the cognitive changes, which suggests that following helplessness training cause predicted changes, however they are independent processes.

Correspondence: *Katarzyna O. Klimas, student, Warsaw School Of Social Sciences and Humanities, Fryzjerska 5, Wroclaw 51-150, Poland. E-mail: katarzyna.klimas@gmail.com*

#### **I. KHACHIDZE. Compare of EEG patterns in Epileptic Children at the background of Antiepileptic Drugs.**

**Objective:** Understanding the correlation between clinical and neurophysiological effects has been receiving appreciation in clinical epileptology more recently. Electroencephalography is thought to be an efficient not only controlling ongoing effectiveness of the treatment but also to be an efficient tool to predict potential clinical and psychocognitive adverse effects of the treatment. Valproate acid (VPA) and Carbamazepine (CBZ) are widely used antiepileptic drugs (AED). Selection of AED is determined by the type of seizures, effect on basic neurophysiological processes of CNS is not fully investigated. The aim of study was to compare the effect of CBZ and VPA on EEG to assess both epileptic activity and overall functional state of the brain.

**Participants and Methods:** Epileptic patients aged 3 to 9 years were examined. 53 patients treated by VPA and 47- by CBZ. Patients underwent EEG recording for three- times: before administration of AED in 3-4 and 6-8 months after the initiation of treatment. EEG signals were digitally recorded using scalp electrodes according to International 10-20 system. 10-15 fragments for each patient were performed for the evaluation of background activity also spectral analysis absolute value of power (AVP).

**Results:** Qualitative characteristics of EEG under VPA revealed reduce the degree of disorganization of basic rhythmicity EEG of reduction of high amplitude mono-poly-morph waves in low frequency range, significantly reduce AVP spectra practically in all zones brain especially in occipital areas. VPA efficient to suppress spike-wave complex with substrate in thalamus. During CBZ therapy increase of AVP dynamics is caused by growth of the low frequency range, predominantly in the parietal-occipital areas. CBZ mostly affect the neural population of the cortex.

**Conclusions:** The difference in the effect this drugs on bioelectrical activity of the brain could be related to region-specific differences within the loci of maximal neuropharmacological effect.

Correspondence: *Irma Khachidze, PhD, Department of Behavior, Cognition functions and Human Psychophysiology, Beritashvili Institute of Physiology, Tbilisi, 0160, GEORGIA, 14 Gotua str, Tbilisi 0160, Georgia. E-mail: irmakha@yahoo.com*

### **Imaging (Functional)**

#### **A. ONDRUCH, A. MARYNIAK & M. ROSZKOWSKI. Hemispheric Speech Dominance in Children with Focal Brain Lesions – Clinical Neuropsychological and fMRI Assessment.**

**Objective:** Functional magnetic resonance (fMRI) is a routine procedure of preoperative diagnosis in patients with focal lesions in “eloquent areas” of brain. The aim of the study was assessment of fMRI results compliance with clinical evaluation of lateralization and neuropsychological outcomes in pediatric patients.

**Participants and Methods:** 18 children, aged 8-17;9, with cortical focal brain lesions (tumor, dysplasia, angioma) participated in the study. Neuropsychological evaluation focused on speech and lateralization, but also memory, attention and spatial functions were evaluated. Procedure of fMRI was matched to patients individually, concerning neuropsychological outcome, age and lesion localization.

**Results:** 11 patients were right-handed, 5 left-handed, there was no hand preference in 2. fMRI study indicated left hemispheric dominance for language in 6 children, right in 8 and bilateral representation in 4. More than a half of patients with left-side lesions had right hemispheric dominance for speech (8), in 2 it was bilateral. Left-handedness was connected with right (4) or bilateral (1) speech representation, while in right-handed patients there was a significant diversity (6-left hemisphere, 4-right, 1-bilateral). Speech disorders were more common in patients with language representation in undamaged hemisphere (5) than in hemisphere with lesion (2).

**Conclusions:** Results obtained indicate that behavioral laterality assessment does not let to determine hemispheric language dominance. The principle of contralateral to preferred hand language hemispheric dominance was not confirmed especially in right-handed patients with left-side lesions.

In children with brain lesion there is a need for distinguishing between aphasia and speech dysfunctions connected with process of brain plasticity.

Correspondence: *Agnieszka Ondruch, Children's Memorial Health Institute, Al. Dzieci Polskich 20, Warsaw 04-730, Poland. E-mail: a.ondruch@hotmail.com*

#### **E. KLAASSEN, L. EVERS, R. DE GROOT, W. BACKES & J. JOLLES. Fatiguing the Brain: The Effect of Induced Fatigue on Brain Function During Working Memory.**

**Objective:** Mental fatigue is a common complaint with large quality of life implications. fMRI research demonstrating that patients with fatigue complaints (chronic fatigue syndrome, multiple sclerosis, traumatic brain injury) have increased and more dispersed activation dur-

ing cognitive tasks lead to the suggestion that the exertion of more cognitive effort underlies increased mental fatigue. We hypothesised that inducing fatigue in healthy participants would lead to increased effort, especially in middle-aged participants already compromised by age-related cognitive decline.

**Participants and Methods:** Participants (14 young and 16 middle-aged males) were tested once after a cognitively demanding and once after a non-demanding intervention. fMRI data was collected during a memory scanning task with varying working-memory loads. Encoding, maintenance and retrieval were examined in an event-related design. Subjective measures of effort and fatigue were collected.

**Results:** Repeated measures ANOVAs showed that subjective fatigue, mental demand and effort were higher following the cognitively demanding intervention. Increasing memory load was associated with lower accuracy and slower reaction time. Whole brain analysis across memory loads showed bilateral activations in the occipital and superior parietal regions during encoding. These regions were also modulated by memory load. During maintenance, bilateral post-central, left precentral and paracentral gyrus task-related activations were found, and load-dependent activity was found in the bilateral insula, dorsolateral and ventrolateral prefrontal cortex.

**Conclusions:** Task-related activation was consistent with previous literature. However, no effects of the fatigue intervention or age on load-dependent activity were found using whole brain analysis. Further analysis will include the retrieval phase, region of interest analysis and correlations with subjective measures.

Correspondence: *Elissa Klaassen, Masters Neuropsychology, current PhD student, Cognitive neuropsychiatry and clinical neuroscience, Maastricht University, Postbus 616, Maastricht 6200 MD, Netherlands. E-mail: elissa.klaassen@np.unimaas.nl*

**C. FINNERTY, U. CLARK, L. SWEET, R. MULLIGAN, B. JERSKEY, S. DAVID, R. COHEN & R. NIAURA. fMRI Response to Emotional Stimuli: Effects of Nicotine.**

**Objective:** Emotional factors are known to contribute to nicotine dependence. fMRI offers an objective method to quantify these factors. This study was designed to examine the effects of nicotine abstinence on emotional processes among dependent smokers.

**Participants and Methods:** Eleven 15-hour abstinent cigarette smokers (mean=14.36 cigarettes/day, 7 female, mean age=40.6) were administered a placebo or nicotine patch during each of two scanning sessions. Participants viewed images from the International Affective Picture System (IAPS) during fMRI. Significant IAPS-related activity ( $p<.005$ ) was quantified individually using voxel-wise multiple regression and region of interest analyses were performed in resulting clusters. Brain response associated with positive and negative IAPS images were averaged separately in each region.

**Results:** While viewing negative images in the abstinent state, activity in the inferior parietal lobule (IPL) decreased ( $t(10)=-2.13, p<.06$ ) whereas anterior cingulate (AC) activity increased ( $t(10)=2.48, p<.05$ ) relative to the satiated condition. IPL activity also decreased relative to the satiated condition ( $t(10)=-2.53, p<.03$ ) while viewing positively valenced images in the abstinent condition. Positive and Negative Affect Schedule (PANAS) self report ratings indicated a significant decline in positive, but not negative, mood during abstinence.

**Conclusions:** These findings suggest that smokers who report lower positive mood in an abstinent state exhibited a shift in brain response to emotional stimuli, from regions associated with exogenous attention to regions associated with endogenous mood regulation. Changes in the AC were not observed during the positive condition, suggesting that the negative images may specifically require more emotional regulation during a negative emotional state related to smoking abstinence.

Correspondence: *Colleen Finnerty, B.A., Transdisciplinary Research Group, Butler Hospital, 345 Blackstone Blvd., Providence, RI 02906. E-mail: CFinnerty@butler.org*

**S. JABLONOWSKI, B. BACZKOWSKI, M. DYBALA, B. HELFER, K. KANIEWSKA, M. KARBOWA, P. MARCINIAK, N. SKRZYPSKA, A. SWADZBA & M. WILINSKI. fMRI Scanned – Capacities and Limitations of Functional Magnetic Resonance Imaging.**

**Objective:** Functional Magnetic Resonance Imaging is used worldwide, often makes headlines and attracts enormous funding, but there is still too little knowledge of its limitations. Our research, inspired by Logothetis' article (2008), aims to review the scientific literature on fMRI weaknesses.

**Participants and Methods:** The review is based on a selection from topical articles published in the last decade in high-impact neuroscientific journals. We look at the issue in three intertwined contexts: philosophical, methodological and sociopolitical – and relate them to a timeline of an fMRI study.

**Results:** The philosophical foundations underlying such studies are visible at the start of this timeline. One question here is that of the specific nature, scale and universality of the purported brain (and mind) modularity. Methodology plays part mostly in research planning, sampling, execution and post-processing of the scan. Among them, the meaning of BOLD signal, that indicates aggregate regional metabolic activity, and may include different events – both inhibitory and excitatory, processing, relaying or by-product. Another issue, brain standardization, comes with the problem of precisely delimiting normality in anatomy and psychology. Lastly, the sociopolitical context of neuroimaging studies which are seen as reliable and worthwhile, when in fact the publicity may seem out of proportion to the results quality and certainty.

**Conclusions:** Despite having limitations, fMRI, when accounted for imperfections, can be managed. Good remedies include triangulation (cross examination) – combining MRIs with other techniques, like EEG, TMS and lesion study.

(Student research group “closer to neuropsychology”)

Correspondence: *Slawomir Jablonowski, Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: ins@neuropsychologia.org*

**L.H. SWEET, M.E. BODZY, D. MECHANIC-HAMILTON, C.E. FINNERTY, R.C. MULLIGAN, B.A. JERSKEY, S.P. DAVID, R.A. COHEN & R.S. NIUARA. Brain response to a working memory challenge as a function of nicotine use and nicotine dependence.**

**Objective:** Previous literature has reported cognitive enhancing properties of nicotine and dependence may be maintained to avoid cognitive deficits associated with withdrawal. This study examined the effects of nicotine and withdrawal on cognitive function.

**Participants and Methods:** Fourteen overnight-abstinent smokers, ten former smokers, and twelve nonsmokers performed a 2-Back fMRI paradigm on two separate days. Four hours prior to scan a patch was applied, counterbalanced nicotine or placebo. 2-Back-associated activity ( $p<.005$ ) was quantified individually using voxel-wise multiple regression, and region of interest analyses were performed in resulting clusters. 2-Back response associated with nicotine conditions were averaged separately in each region for group contrasts.

**Results:** Of 16 regions exhibiting 2-Back effects, activation differed by group in five. Current smokers and former smokers showed greater response than nonsmokers in the left precentral gyrus ( $p<.05$ ) and bilateral supplementary motor area ( $p<.03$ ), regardless of nicotine condition. The right cerebellum was more active in current smokers versus nonsmokers ( $p<.02$ ), regardless of condition. Current smokers and former smokers showed more activity off nicotine compared to nonsmokers in the left superior temporal gyrus ( $p<.02$ ).

**Conclusions:** Current and former smokers exhibited greater activation of the motor/motor planning systems than nonsmokers. Regardless of nicotine condition, effects found in both current and former smokers suggest individual differences associated with vulnerability to nicotine dependence. Given a lack of group differences in performance, over-activation of the motor/motor planning systems may be related to compensatory cognitive mechanisms that either predisposes individuals to dependence, or reflects consequences of nicotine exposure.

Correspondence: *Lawrence H. Sweet, Brown University, 345 Blackstone Blvd., Providence, RI 02906. E-mail: Lawrence\_Sweet@Brown.edu*

**M. MIYAHARA, A. SASAKI, Y. OKAMOTO, R. KITAJA, H.C. TANABE & N. SADATO. Verbal Labels Reduce Neural Activity for Memorizing Sequential Hand Movements: A Preliminary Finding from an fMRI Study.**

**Objective:** This study aimed to identify the neural substrates involved in the effect of verbal labeling on sequential memory for hand movements.

**Participants and Methods:** 10 young healthy adults participated in this study. We used the Kaufman Hand Movement Test (KHMT) (Kaufman & Kaufman, 1983) as an immediate imitation task, and modified it to suit the purpose of our study and the fMRI protocol. To facilitate the spontaneous formation of verbal labels, the hand movement items were ordered in such a way that the movement complexity (i.e., sequence

and variety) increased progressively over 6 blocks. In each of the 6 blocks, individual contrast files of the 16 participants were divided into two subgroups, according to the postdictum indicating whether each participant used verbal labels (VL+) or not (VL-). Then we performed second-level factorial analyses of VL (+/-) vs. movement complexity (Block 1-6).

**Results:** The contrast of (VL-) - (VL+) revealed significant activity in the right parieto-frontal and left Broca areas. Plots of contrast estimate in these regions showed greater activation as a function of increasing movement complexity in the (VL-) condition, whereas in the (VL+) condition, the activity of the same regions was constantly low, regardless of movement complexity.

**Conclusions:** We demonstrated reduced cortical activity in the motor control network as an effect of verbal labeling.

Correspondence: *Motohide Miyahara, PhD, Movement Development Clinic, School of Physical Education, University of Otago, POBox 56, Dunedin 9054, New Zealand. E-mail: motohide.miyahara@stonebow.otago.ac.nz*

### Imaging (Structural)

**M.A. GARCIA-BARRERA, J. HATTER, K. GICAS & G.W. HYND. Small Scale Volumetric Differences in the Prefrontal Cortex of Children with ADHD and Dyslexia. Part 1: Gray Matter Subregional Differences.**

**Objective:** Our study used a calibrated parcellation protocol to examine structural differences in TBV, PFC, and PFC subregional gray matter in ADHD and Dyslexia. Our null hypothesis was that the distribution of compartmental PFC-gray matter would be the same across groups.

**Participants and Methods:** Our protocol included manual tracing following a semi-automated extraction of each parcellated Region of Interest (Total Brain Volume-TBV, Prefrontal Cortex-PFC, and gray orbitomedial, orbitolateral, dorsomedial, and dorsolateral subregions), in three matched groups of children aged 8-11: ADHD (n=5), Dyslexia (n=5), and Controls (n=5).

**Results:** Kruskal-Wallis test was used to compare absolute volumes. Significant differences in Gray Right Dorsolateral (GRDL) and Gray Right Dorsomedial (GRDM) areas were found. Paired group comparisons using Mann-Whitney U test with a Bonferroni correction (used as post hoc tests) demonstrated significant differences between the ADHD and the Dyslexia groups (GRDL,  $p = .016$ ; GRDM,  $p = .009$ ). Hierarchical ratios (e.g., GRDL/TBV) were calculated and used to control for the potential effect of larger compartments on subregional volumes. No significant contributions were identified. Intra and inter-rater tracing reliabilities were above our criterion ( $> .90$ ) for all areas.

**Conclusions:** No significant differences in TBV, full-PFC, and Inter-hemispheric PFC were detected. Our protocol served to detect small-scale gray matter thickness differences within PFC, characterized by a pattern of smaller GRDM compartments in the ADHD and Dyslexia groups (ADHD/Dyslexia<Controls), while the GRDL compartment was larger in the Dyslexia group (Dyslexia/Controls>ADHD). In our protocol, dorsomedial areas are closely associated to Anterior Cingulate Cortex (ACC), which plays a significant role in ADHD. Correlations with behavioral data are discussed.

Correspondence: *Mauricio A. Garcia-Barrera, Ph.D., Psychology, University of Victoria, PO BOX 3050 STN CSC, Victoria, BC V8W 3P5, Canada. E-mail: mgarcia@uvic.ca*

**J. HATTER, M.A. GARCIA-BARRERA, K. GICAS & G.W. HYND. Small Scale Volumetric Differences in the Prefrontal Cortex of Children with ADHD and Dyslexia. Part 2: White Matter Subregional Differences.**

**Objective:** Several studies using structural MRI have reported a range of brain volumetric differences in children with neurodevelopmental disorders. This study used a highly calibrated parcellation protocol to examine PFC-subregional white matter in ADHD and Dyslexia. Our null hypothesis was that the distribution of compartmental PFC-white matter would be the same across groups.

**Participants and Methods:** Manual tracing was performed following a semi-automated extraction of each parcellated Region of Interest (Total Brain Volume-TBV, Prefrontal Cortex-PFC, and white orbitomedial, orbitolateral, dorsomedial, and dorsolateral subregions), in three matched groups of children aged 8-11: ADHD (n=5), Dyslexia (n=5), and Controls (n=5).

**Results:** The Kruskal-Wallis test failed to detect significant differences in absolute volumes across the three groups. A significant difference in White-Left Dorsolateral (WLDL,  $p = .028$ ; ADHD vs. Controls) and a trend towards a significant difference in White-Left Orbitomedial (WLOM,  $p = .076$ ; Dyslexia vs. Controls) areas were identified using paired group comparisons with Mann-Whitney U test (before Bonferroni correction). No significant contributions were identified when the effect of larger compartments on smaller subregional volumes was examined. Intra and inter-rater reliabilities were above criterion ( $> .90$ ).

**Conclusions:** The sensitivity of the protocol was consistently demonstrated. This study showed compartmental white matter volumetric differences within PFC, detected in spite of the small samples cells. These differences were not found with examination of integrated white/gray areas, only after segmentation was performed. A pattern of larger WLDL compartments in the Dyslexia and ADHD groups (Dyslexia >ADHD >Controls), and smaller WLOM compartments in the Dyslexia and ADHD groups (Dyslexia<ADHD<Controls) was identified.

Correspondence: *Mauricio A. Garcia-Barrera, Ph.D., Psychology, University of Victoria, PO BOX 3050 STN CSC, Victoria, BC V8W 3P5, Canada. E-mail: mgarcia@uvic.ca*

**M. MUSZKAT, C.B. DE MELLO, R. NOGUEIRA, A. JACKOWSKI, F. VARGENS, S. BEATRIZ, S. FELDBERG & O. BUENO. Challenges in systematization and integration of neuropsychological and neuroimaging data in brain damaged children and other developmental disorders.**

**Objective:** Methods of structural and functional neuroimaging have been combined to facilitate the identification of subtle ruptures in neural connections and to provide a simultaneous analysis of both structure and neuropsychological impairments in these cases. Nevertheless, there is still a lack of standardized criteria for classification and parameterization of the structural and functional changes detected by these methods, what poses serious challenges for the interpretation of these findings into neuropsychological and behavioral terms. The aim of the present study was to establish protocols and criteria for analysis and description of morphological data in pediatric brain injuries and neurodevelopmental disorders and its integration with those data obtained in neuropsychological, behavioral and academic assessments.

**Participants and Methods:** Data of Magnetic Resonance, spectroscopy and DTI imaging from samples of brain damaged children, Dyslexia and Attention Deficit Disorder, as well as normally developing children, were obtained following established protocols for image acquisition and post processing.

**Results:** Criteria for morphometric descriptions focused mainly on lobar distribution, volume differences of white and gray matter and segmental measures of amygdala and hippocampus. Criteria for functional descriptions included measures obtained by a neuropsychological battery (NEPSY) and the Child Behavioral Checklist (CBCL). Data was integrated in a database with Internet access, allowing discussions among multidisciplinary team.

**Conclusions:** The integration of data from neuroimaging and neuropsychological assessment provided standardized procedures for quantitative and interdisciplinary analysis of the relationship between specific brain dysfunctions and functional impairments, as well as of neuroplasticity processes in brain damaged children and other neurodevelopmental disorders.

Correspondence: *Claudia B. de Mello, PhD, Centro Paulista de Neuropsicologia/AFIP, Rua Embaú, 54, São Paulo 04039-060, Brazil. E-mail: cberlimmello@gmail.com*

### HIV/AIDS/Infectious Disease

**E. TALBOT, A. STARZA-SMITH & A. HART. Health-related Quality of Life (HRQL) of Children and Adolescents following Encephalitis and its Relationship with Everyday Memory and Executive Function.**

**Objective:** Following encephalitis, children can experience neuropsychological, psychological and medical consequences, making health-re-

lated quality of life (HRQL) of particular interest in this clinical population. A study was designed to investigate whether relationships exist between the two most frequently reported neuropsychological consequences of encephalitis (executive function and everyday memory problems) and parent/carer reported HRQL. In addition, it explored to what extent these and other illness specific factors are predictors of parent/carer reported HRQL.

**Participants and Methods:** This study took an exploratory cross-sectional design. Correlations and multiple linear regression were applied to explore primary and exploratory hypotheses. Thirty-eight parents/carers of children/adolescents, aged 8 – 15 years old, who had a history of encephalitis responded to an invitation to take part. Participants were recruited through the Encephalitis Society. Each parent/carer completed a Pediatric Quality of Life Inventory™ (PedsQL™), a Behaviour Rating Inventory of Executive Function (BRIEF), a Children's Memory Questionnaire (CMQ), and a demographic/illness specific questionnaire in relation to their child.

**Results:** Everyday memory, executive function and sleep difficulties were found to significantly correlate with parent/carer reported HRQL. Combined, these sequelae were found to account for up to 71% of the variance of parent/carer reported HRQL, with everyday memory being the most significant predictor.

**Conclusions:** Frequently reported neuropsychological impairments and sleep difficulties following childhood encephalitis are found to relate significantly to parent/carer reported HRQL. Important implications for children post-encephalitis are identified and specific areas for rehabilitation are highlighted. Recommendations for future research are proposed.

Correspondence: *Emily Talbot, Faculty of Health, Life and Social Sciences, University of Lincoln, Trent Doctorate in Clinical Psychology, University of Lincoln, Court 11, Satellite Building S, Brayford Pool, Lincoln LN6 7TS, United Kingdom. E-mail: emily.talbot@students.lincoln.ac.uk*

**D. BERTENS, S.P. VAN DER WERF, I. VAN BALKEN, M. BOSCH, A. VAN DER VEN, R.A. ESSELINK, R.P. KESSELS & P.P. KOOPMANS. Assessment of Cognition in Relation to Brain Imaging and HIVRNA in HIV-1 Infected Patients: A Pilot Study.**

**Objective:** Studies investigating neuropsychological functions of HIV+ patients on HAART show a gradual cognitive impairment in 30-50% of patients. Although suppression of peripheral viral replication is successful, HIV replication may continue in the central nervous system (CNS). This ongoing study investigates cognitive functioning in relation to brain-imaging and CSF viral load of non-demented HIV+ patients.

**Participants and Methods:** Cognitive functioning was assessed in HIV+ patients using a comprehensive neuropsychological battery. Mean domain scores were calculated using age- and education adjusted normative data. Scores were classified as impaired if more than 1.5 SD below the normative mean and as below-average if between 1.0 and 1.5 SD below the normative mean. Mood disorders were taken into account. Participants underwent magnetic resonance imaging of the brain (T2-weighted MRI, 1.5T) and CSF puncture to evaluate HIV replication in the CNS.

**Results:** So far, 20 HIV+ patients enrolled in the study (16 males, mean age=45.2, sd=10.7). Results showed that 8 patients performed impaired on at least 2 cognitive tests. Moreover, MRI abnormalities were found in 2 of these 8 patients. Worst performance was found on tests of attention, verbal memory, executive function and psychomotor function. In 9 patients, HIVRNA in the CSF was detectable (mean=3926, sd=4006 copies/ml.)

**Conclusions:** These findings extend previous results on cognitive dysfunction in HIV+ patients and indicate that cognitive decrements in HIV+ patients are related to brain abnormalities and may have a direct link with CSF viral load. Larger longitudinal studies combining assessment of cognition, CSF viral load and brain abnormalities are warranted. Correspondence: *Dirk Bertens, MSc, Medical Psychology, Radboud University Nijmegen Medical Centre, Geert Grooteplein zuid 10, PO 9109, Nijmegen 6500 HB, Netherlands. E-mail: d.bertens@mps.umcn.nl*

**U. CLARK, R.A. COHEN, A. GONGVATANA, B.A. JERSKEY, L.H. SWEET, R.C. MULLIGAN, T.L. WHITE & K.T. TASHIMA. Combined Effects of HIV and Early Life Stressors on Brain Structure and Neuropsychological Function.**

**Objective:** HIV is known to be associated with brain abnormalities. A disproportionate number of individuals with HIV come from an im-

poverished socioeconomic background, which places these individuals at greater risk for experiencing significant life stressors. Exposure to repeated stressors, particularly early life stress (ELS), can also have significant neuropathological consequences. This study sought to examine the contribution of ELS to brain morphometric and neuropsychological changes in HIV.

**Participants and Methods:** Participants included 49 non-demented HIV+ and 48 age-matched HIV- adults (mean age=45). ELS exposure was quantified using the Early Life Stress Questionnaire; responses were used to define four ELS groups (HIV+ Low=24; HIV+ High=25; HIV-Low=21; HIV- High=27). Volumes of brain structures known to show HIV-related or stress-related effects were measured using an automated anatomical segmentation tool.

**Results:** HIV+ participants displayed significant volume reductions in the anterior cingulate and enlargements in the putamen, hippocampus, and amygdala compared with HIV- participants. A significant interaction between HIV and ELS was observed for amygdala volumes, which was driven by enlargements in HIV+ high ELS participants. Analyses of neuropsychological data indicated that HIV+ high ELS participants demonstrated significant reductions in psychomotor speed compared with HIV- low ELS individuals. Regression analyses in the HIV+ group revealed that amygdala hypertrophy was associated with higher rates of ELS, lower CD4 nadir counts, and reduced psychomotor speed. Hypertrophy in the hippocampus and putamen was associated with lower current CD4 levels.

**Conclusions:** Our results suggest that high ELS exposure may amplify HIV-related changes in amygdala structure and function.

Correspondence: *Uraina Clark, PhD, Centers for Behavioral & Preventive Medicine, Brown University, The CORO Building, 1 Hoppin Street, Ste 500, Providence, RI 02903. E-mail: urainac@yahoo.com*

## Symposium 7: FTD Symposium

Chair: Maria Pachalska

3:00–4:30 p.m.

**P. MARIA & H. MICHAL. FTD Symposium.**

**Symposium Description: GOAL:**

In the last ten years, our understanding of frontotemporal dementia (FTD) and associated syndromes has been significantly advanced by numerous scientific discoveries. The goal of this symposium is to highlight these advances and to show how research findings from the areas where the greatest progress has been made (neuroimaging, histopathology, molecular genetics) have influenced our thinking about the clinical and neuropsychological aspects of FTD/Pick Complex.

**CONTENT:**

In the lead paper, Andrew Kertesz and co-authors show how the various FTD syndromes (e.g. the behavioral and aphasic variants of FTD, Motor Neuron Disease, the extrapyramidal syndromes) overlap with one another, complicating proper diagnosis.

Prof. Maria Pachalska and co-authors will present the case of a patient with semantic dementia (diagnosis confirmed post mortem); the course of the disease represents a unique combination of abnormalities occurring in both the clinical picture and the neuroimaging results.

In the next paper, Michal Harciarek will show how FTD can be differentiated clinically from Alzheimer's dementia. The differences in behavior, memory, language, attention, and executive functions will be discussed.

Emilia Sitek and co-workers will describe clinical and neuropsychological features of the first Polish family to be diagnosed with FTD and Parkinsonism linked to chromosome17.

The last paper, delivered by Andrzej Urbanik and Izabela Herman-Sucharska, will address the problems of neuroimaging in FTD. The paper will show how MR spectroscopy can be used to differentiate FTD from AD.

Correspondence: *Pachalska Maria, Institut of Psychology, Imbramowska 1/34, Krakow 31-212, Poland. E-mail: neuropsychologia23@o2.pl*

**M. PACHALSKA, M. BIDZAN, B. LUKASZEWSKA & A. RASMUS. Semantic Dementia: A Case Study.**

**Objective:** This paper presents the case of a patient with a 5-year history of progressive language deterioration, who met the clinical criteria for semantic dementia, a variant of fronto-temporal dementia.

**Participants and Methods:** case study: The patient (JZ, age 54 at onset) initially displayed selective disturbances in semantic memory. JZ was evaluated with a range of specific neuropsychological tests.

**Results:** At baseline we found disturbance of semantic memory, difficulties in naming, and disturbance in understanding individual words and phrases. Other components of language production and comprehension were relatively well preserved. Two years later the naming disturbances had intensified, with semantic paraphasias. Fluency was much reduced, as was general knowledge. Autobiographical memory for recent events was relatively well preserved, but there was marked difficulty in recalling events from the more distant past. An MRI exam showed atrophy of both temporal lobes, significantly greater on the left. After three years of illness the patient displayed profound aphasia, with considerable difficulty in finding and comprehending words and in finding words. Autobiographical memory for recent events was now disturbed, and personality and behavioural problems characteristic of frontal syndrome had appeared. Within a year Klüver-Bucy syndrome had also appeared, along with verbal and motor perseverations. Vocabulary had decreased to a few words and phrases, yet grammatical structure was preserved. Five years after onset, the patient stopped talking all together, and died three months later. Neuropathological tests confirmed Pick's disease.

**Conclusions:** The course of symptomatology will be discussed in the light of microgenetic theory.

Correspondence: *Pachalska Maria, Institut of Psychology, Imbramowska 1/34, Krakow 31-212, Poland. E-mail: neuropsychologia23@o2.pl*

**I. HERMAN-SUCHARSKA & A. URBANIK. The Problems of Neuroimaging in FTD.**

**Objective:** In various parts of the world, Frontotemporal dementia (FTD) accounts for anywhere from 7% to 15% of all dementias. In some cases, when the neurodegenerative pathology takes on a purely autosomal dominant form, a mutation is found on chromosome 17 (FTDP-17), in the MAPT gene, coding the tau protein. In the remaining cases (including some FTD patients in Poland), the etiology has not been determined.

**Participants and Methods:** The paper will present an analysis of neuroimaging in FTD, with particular attention to MR-spectroscopy. Spectroscopic examination makes it possible to detect pathologies in vivo, at a very early phase, facilitating the differentiation of morphological changes and making it possible to evaluate the pathological process dynamically and monitor the progress of therapy. Due to its non-invasiveness and the possibility of evaluating the patient's status at a metabolic level, MR-spectroscopy has been called "a non-invasive biochemical biopsy."

**Results:** Based on the analyses of the results of MR-spectroscopy in patients with FTD, authors will show how FTD can be differentiated from AD. The difference consists in the localization of the lesion. In the cases of FTD, such lesions occur in the frontal lobes, whereas in AD they are mostly in the parietal-occipital region. However, these differences can be detected easily only in early stages of the disease. In more advanced stages, when the neurodegenerative process has involved very large areas, the differences are not as evident or even detectable.

**Conclusions:** The paper will present case studies illustrating the possibilities of differential diagnosis of FTD and AD.

Correspondence: *Pachalska Maria, Institut of Psychology, Imbramowska 1/34, Krakow 31-212, Poland. E-mail: neuropsychologia23@o2.pl*

**M. HARCIAREK. Differential Diagnosis of Frontotemporal Dementia: a Neuropsychological Update.**

**Objective:** Frontotemporal dementia (FTD) has been recognized for a number of years as one of the most common non-Alzheimer's neurodegenerative dementias. Despite recent advances in neuroimaging and genetics, however, the early differential diagnosis of FTD is still mainly based on the results of clinical interviews and neuropsychological testing

**Participants and Methods:** This presentation surveys the neuropsychological similarities and differences between FTD and other dementia syndromes, Alzheimer's disease (AD) in particular. Specifically, findings from studies on behavior and affect, memory, language, attention/executive function, and visuospatial abilities are discussed. The cause of specific cognitive deficits is also considered.

**Results:** Overall, based on empirical research as well as the author's own clinical experience, it will be demonstrated that FTD is predominantly characterized by various behavioral abnormalities (e.g. disinhibition, asocial behavior) and executive dysfunction, whereas early memory loss remains the first presenting symptom of AD. Nonetheless, mild to moderate memory deficits may be also present in FTD, although they are typically qualitatively different from those seen in AD (e.g. well-preserved recognition memory is characteristic for patients with FTD). Similarly, language impairment is also frequently seen in both AD and FTD, though when progressive and relatively selective, with no episodic memory problems, the diagnosis of FTD is more likely. In contrast, visuospatial difficulties and misidentification syndromes (e.g. reduplicative paramnesia) seem to be typical for AD as well as Lewy body dementia, while excluding FTD.

**Conclusions:** FTD is characterized by a specific pattern of neuropsychological functioning that significantly helps the early differential diagnosis of this syndrome.

Correspondence: *Pachalska Maria, Institut of Psychology, Imbramowska 1/34, Krakow 31-212, Poland. E-mail: neuropsychologia23@o2.pl*

**A. KERTESZ, P. MCMONAGLE, S. JESSO., M. HARCIAREK & D. MUNOZ. The Overlapping Syndromes of Frontotemporal Dementia.**

**Objective:** The diagnosis of Frontotemporal dementia (FTD/Pick complex) remains challenging despite several recent clinicopathological and epidemiological studies. The behavioural and aphasic manifestations, Motor Neurone Disease and the extrapyramidal syndromes of CBD or Progressive Supranuclear Palsy (PSP) overlap to a significant extent. The tau-ubiquitin (TDP-43) dichotomy in FTD pathology is becoming standard, although new protein and genetic abnormalities are being described every year (FUS protein in 2009)

**Participants and Methods:** The purpose of this presentation is to follow a substantial cohort of FTD/Pick complex patients prospectively to clarify the issues in diagnosis, the relationship of the clinical presentations and the evolution of the illness. The emphasis is on longitudinal clinical study; substantial pathological material is also updated and discussed

**Results:** Over half of the patients with the behavioural variant (FTD-bv) developed progressive aphasia (PA), and semantic dementia (SD), and corticobasal syndromes (CBDS/PSP) in smaller numbers. Primary non-fluent progressive aphasics in turn often developed CBD/PSP. Triple syndromes were relatively common. The Frontal Behavioural Inventory showed high specificity, sensitivity and predictive value in the diagnosis of bvFTD. Visuospatial function was preserved except in CBDS/PSP. Survival and sex distribution was similar in all groups. Clinical diagnosis showed a sensitivity of 100% and specificity of 76.9% compared to autopsy.

**Conclusions:** Diagnostic and nosological confusion is reduced when the evolution and relationships of the syndromes of FTD/Pick complex are quantified. The clinical associations follow the tau vs TDP-43 distinction, but there is too much overlap for a definite dichotomy.

Correspondence: *Pachalska Maria, Institut of Psychology, Imbramowska 1/34, Krakow 31-212, Poland. E-mail: neuropsychologia23@o2.pl*

**E. SITEK & A. XX. Frontotemporal Dementia and Parkinsonism Linked to Chromosome 17 – the First Polish Family.**

**Objective:** Frontotemporal dementia and Parkinsonism linked to chromosome 17 (FTDP-17) is a neurodegenerative disorder of variable phenotype, characterized by behavioral, cognitive and motor symptoms

**Participants and Methods:** The first Polish family (from Gdansk) with FTDP-17 is presented, with emphasis on its atypical features. This family, diagnosed with FTDP-17 due to a P301L mutation in MAPT, consists of 80 family members, of whom 25 were evaluated clinically and 39 genetically. The disease course in two affected siblings is discussed with reference to clinical, neuropsychological, laboratory, and neuroimaging (MRI and SPECT) examination. Repeated neuropsychological testing addressed memory, language, executive, and visuospatial function.



**Results:** Two affected siblings presented with the behavioral variant of frontotemporal dementia with subsequent Parkinsonism. The neuropsychological profile, with predominant executive dysfunction, accompanied by working memory impairment and impoverished speech, was relatively similar in the two siblings. In one patient unilateral neglect syndrome was diagnosed, accompanied by right-sided hypoperfusion in SPECT. New features included Parkinsonism responsive to levodopa, hemispatial neglect and unilateral resting tremor as the initial symptom. Apart from FTDP-17, early onset multiple sclerosis (3/74 individuals) and psoriasis (10/74 individuals) were diagnosed in different family members.

**Conclusions:** The reported family is the first FTDP-17 family described in Central-Eastern Europe. Unilateral neglect syndrome may appear in FTDP-17. The heterogeneity of initial symptoms (predominant Parkinsonism in case no.1 and cognitive and behavioral disturbances in case no.2) may have delayed the final diagnosis. FTDP-17 affects patients worldwide, but due to its heterogeneous clinical presentation may remain under-diagnosed.

Correspondence: *Pachalska Maria, Institut of Psychology, Imbramowska 1/34, Krakow 31-212, Poland. E-mail: neuropsychologia23@o2.pl*

### Symposium 8:

## Hot and Cold Executive Functions in Eating Disorders: Basic Findings and Treatment Implications

Chair: Antonio Verdejo-Garcia

3:00–4:30 p.m.

**A.J. VERDEJO-GARCÍA, K. TCHANTURIA, R. CSERJERSI & L. SERPELL. Hot and cold executive functions in eating disorders: Basic findings and treatment implications.**

**Symposium Description:** The aim of this symposia is to discuss the role of hot and cold aspects of executive functions in eating disorders (including obesity, anorexia nervosa and bulimia). Due to drastic changes in environment and lifestyles, currently, in Western societies food is readily available and when and what to eat (or when to stop) has become a matter of choice (i.e., we choose our preferred menus at restaurants, or design our own diets when feeling overweight). The interplay between brain systems controlling interoceptive/emotional signals (e.g., insular cortex), motivational systems controlling reward (e.g., striatum) and higher-order brain systems supporting executive control and decision-making (e.g., the prefrontal cortex) must play a key role in food consumption and dieting, sometimes even overriding metabolic regulation systems. Therefore, neuropsychological tools are relevant assets to understand and characterize the basic deficits underlying different eating disorders, and to develop and provide better treatment interventions that facilitate compliance and minimize relapse. In this symposia, we will discuss several topics germane to the neuropsychology of eating disorders, including: (i) the differential impact of eating disorders on hot (e.g., inhibition of reward-driven responses or decision-making) vs. cold (e.g. working memory) executive skills (see abstracts from K. Tchanturia, R. Cserjersi, A. Verdejo-García), (ii) the possibility that deficits on cognitive flexibility and perseveration are common to different eating disorders (K. Tchanturia, R. Cserjersi, L. Serpell, A. Verdejo-García), (iii) the interplay between interoceptive and affective status and higher-order cognitive skills (R. Cserjersi, L. Serpell), (iv) the role of executive functions in the treatment of eating disorders (K. Tchanturia, A. Verdejo-García), and (v) the neural substrates of executive deficits across different eating disorders (K. Tchanturia, A. Verdejo-García).

Correspondence: *Antonio J. Verdejo-García, Pharmacology, Institut Municipal d'Investigació Mèdica, Dr.Aiguader 80, Barcelona 08002, Spain. E-mail: averdejo@imim.es*

**K. TCHANTURIA. Hot and cold cognition in anorexia nervosa (AN): What we know and what could be translated in treatment?**

**Objective:** Inflexible thinking and extreme attention to detail are possible maintaining factors in anorexia nervosa (AN), and is likely to affect treatment outcomes (Tchanturia et al 2005, Schmidt and Treasure 2006). In terms of “cold cognitions” poor flexibility and weak central

coherence are relatively robust findings (e.g Roberts et al 2007; Lopez et al 2008 systematic reviews). “Hot” cognition or social cognition, however, is relatively less explored experimentally although clinical observations and self report literature allows us to conclude that people with AN have problems in recognising and labelling own emotions, regulating and expressing emotions (Oldershaw et al 2010; Davies et al under review).

This presentation will outline recent main findings from the Maudsley eating disorder group which allow us to provide some insights into which research findings could be translated in treatment interventions and how they could be done so.

**Participants and Methods:** Here I will review results from different studies conducted in samples of anorexia and bulimia nervosa patients that include results from neuropsychological assessments, neuroimaging and cognitive remediation programs in these disorders.

**Results:** A small scale case series, for example, was successfully piloted using a Cognitive Remediation intervention (Tchanturia et al 2008). The main focus of the intervention involves reflecting on own thinking styles, exploring alternative ways of thinking and applying to real life behaviours. A psychological intervention addressing affective cognition is currently under development.

**Conclusions:** Neuropsychological factors contribute to explain and successfully treat eating disorders.

Correspondence: *Antonio J. Verdejo-García, Pharmacology, Institut Municipal d'Investigació Mèdica, Dr.Aiguader 80, Barcelona 08002, Spain. E-mail: averdejo@imim.es*

**R. CSERJESI, N. VERMEULEN, L. LENARD & O. LUMINET. Cognition and emotional processing in obesity.**

**Objective:** Introduction: There is a growing evidence that obesity is not only an increased calorie intake and weight management problem, but it is linked to adverse neurocognitive outcomes, including reduced cognitive functioning, specifically prefrontal lobe based executive functions and affective information processing.

**Aim:** Our aim was to investigate the interactions between possible cognitive deficits, and different aspects of emotional processing such as mood, alexithymia and automatic affective information processing in adult female patients with obesity.

**Participants and Methods:** Adult female patients with obesity (n = 30) and age and SES matched normal-weighted female controls (n = 30).

Neuropsychological tests were used to assess cognitive functions (D2 attention, Hayling, TMT, Digit span and Verbal fluency). Self-reported questionnaires (STAI, TAS20, PANAS and BDI-II) were administered to assess mood, affectivity and alexithymia. Affective Priming Task was used to evaluate automatic processes of facial expressions.

**Results:** Patients with obesity performed more poorly on measures of sustained attention (D2) and mental flexibility (Hayling). They reported significantly more depression (BDI), state anxiety (STAI) and more difficulty on identifying emotion (TAS20). Affective priming revealed that patients with obesity had a difficulty in automatic processing of negative emotions (sadness) independently from mood and cognitive functioning. Depression had a mediating role between BMI and inhibition. The difficulty on identifying emotion was mediated by depression and anxiety in the patient group.

**Conclusions:** Our results are suggesting that obesity can be associated both with conscious control and unconscious processing problems. These findings and their possible application in the obesity management will be discussed.

Correspondence: *Antonio J. Verdejo-García, Pharmacology, Institut Municipal d'Investigació Mèdica, Dr.Aiguader 80, Barcelona 08002, Spain. E-mail: averdejo@imim.es*

**L. SERPELL, H. BOLTON, P. BURGESS & S. GILBERT. Findings from Computerised Study of Perseverative Task Performance under Fasting and Non-Fasting Conditions.**

**Objective:** Rigid thinking, conceptualised in the literature as perseveration, is a possible maintaining factor in anorexia nervosa (AN), and is likely to impede treatment. Perseveration is likely to be exacerbated by starvation in AN. Hence this study examines the relationship between perseverative thinking and starvation in a non-clinical group.

**Participants and Methods:** A repeated measures design was used over 2 testing sessions, healthy females were required to fast for 16 hours before one testing session, and to be satiated for the other. At each session, participants undertook two computer tasks measuring perseveration and completed the Hospital Anxiety and Depression Scale [HADS]; Persistence, Perseveration Perfectionism Questionnaire [PPPQ]; and the Eating Disorders Examination Questionnaire [EDE-Q].

**Results:** We hypothesise that the tendency to perseverate (as measured by the PPPQ) will be exacerbated by starvation and that those with high EDE-Q scores will have impaired performance on food trials of the computer task. Full results will be reported.

**Conclusions:** Anorexia nervosa cognitive deficits relate to the interplay between interoceptive status and abnormal flexibility.

Correspondence: *Antonio J. Verdejo-García, Pharmacology, Institut Municipal d'Investigació Mèdica, Dr.Aiguader 80, Barcelona 08002, Spain. E-mail: averdejo@imim.es*

**A. VERDEJO-GARCIA, E. DELGADO-RICO, J. SCHMIDT, N. ALBEIN, F. CRUZ, M. PÉREZ-GARCÍA, C. CAMPOY & C. SORIANO-MAS. Hot and cold executive functions in adolescents with obesity: brain substrates and prediction of treatment outcomes.**

**Objective:** The aims of this study are: (i) to assess hot and cold executive functions in obese adolescents, (ii) to examine brain activation during emotional processing and decision-making in obese adolescents using functional Magnetic Resonance Imaging (fMRI), and (iii) to explore the role of executive functions in the prediction of treatment outcome in excess weight adolescents.

**Participants and Methods:** We have administered a comprehensive assessment of hot and cold executive functions before and after a multidisciplinary treatment program for adolescent obesity including psychological trainings, nutritional counseling and physical activity in overweight (BMI range 24-51 kg/m<sup>2</sup>) vs. normal-weight adolescents (BMI range 17-24 kg/m<sup>2</sup>). fMRI scanners are conducted before treatment onset and during actual treatment.

**Results:** Between-group comparisons showed significant differences between groups on indices of response inhibition, cognitive flexibility, and decision-making (excess-weight participants performed poorer than controls), but not on tests of working memory, planning, and reasoning. Moreover, executive functions modulate prediction of treatment results. fMRI pattern of activations in obese adolescents and healthy controls will be also reported.

**Conclusions:** These results are indicative of selective alterations in hot aspects of executive functions in overweight adolescents. These alterations may play a key role on treatment prognosis and clinical outcome.

Correspondence: *Antonio J. Verdejo-García, Pharmacology, Institut Municipal d'Investigació Mèdica, Dr.Aiguader 80, Barcelona 08002, Spain. E-mail: averdejo@imim.es*

#### Paper Session 4: TBI

Moderator: David Andrewes

3:00–4:30 p.m.

**J. PONSFORD, A. MCLAREN, D. RUDZKI, R. BURKE, M. SCHONBERGER, J. OLVER & M. PONSFORD. The Relationship Between ApoE Genetic Status and Injury Severity and Outcome Following Traumatic Brain Injury.**

**Objective:** In recent years there has been growing interest in the role of the Apolipoprotein (ApoE) gene in influencing outcome following TBI. ApoE plays a role in cell maintenance and nervous system response to injury. Its three isoforms, e2, e3 and e4, show differing responses to brain injury. Some previous studies have found poorer outcomes in e4 allele carriers, but others have not. Most have had small samples and not controlled for the impact of other factors on outcome. The current study examined whether presence of the ApoE e4 allele was associated with lower Glasgow Coma Scores (GCS), longer post-traumatic amnesia (PTA) duration and poorer long-term functional outcome.

**Participants and Methods:** Participants comprised 654 individuals with TBI (67.4% male). Functional outcome was measured on the Glasgow Outcome Scale –Extended (GOS-E) at follow-up 1-5 years post-injury. ApoE genotyping was determined from saliva by one-stage PCR method.

**Results:** The ApoE e4 allele was carried by 166 (25.3%) participants, most having the 3/4 allele combination. The GOSE was completed a mean of 1.9 years post-injury (SD=1.3). Results of Generalised Estimating Equations analysis, controlling for age and gender, showed the hypothesized negative relationship between ApoE e4 status and functional outcome on the GOSE. There was no significant relationship between initial injury severity, measured by GCS or PTA duration and genetic status.

**Conclusions:** It appears that presence of the ApoE e4 allele may have a negative effect on long-term recovery due to its differential effects on inflammatory and cellular repair processes and /or amyloid deposition. Correspondence: *Jennie Ponsford, PhD, School of Psychology and Psychiatry, Monash University, Wellington Road, Clayton, Melbourne, VIC 3800, Australia. E-mail: jennie.ponsford@med.monash.edu.au*

**J. DOUGLAS, E. WHITE & S. VASSALLO. Visual Scanning and Impaired Interpretation of Facial Expression after Severe Traumatic Brain Injury.**

**Objective:** As a result of neurological damage, interpretation of facial expression may breakdown at various stages of processing from encoding the stimulus through to accessing semantic information. Visual scanning and feature extraction underpin the encoding process and enable the generation of an adequate percept for subsequent processing. In this study, the objective was to compare the eye movement patterns displayed by an individual with impaired ability to interpret facial expression subsequent to TBI to the patterns displayed by neurologically normal matched controls.

**Participants and Methods:** Participants were one adult male (LP) with impaired ability to interpret facial expression as a result of severe TBI and 3 age-matched neurologically normal male controls. Stimuli were 18 pictures of facial expressions depicting the six basic emotions (sadness, happiness, anger, surprise, fear and disgust) and 15 pictures of objects. The Tobii 1750 binocular infrared eye tracker (Tobii Technology, Stockholm, Sweden) recorded eye movements as participants viewed stimuli displayed on the eye tracker monitor.

**Results:** LP's pattern of scanning differed significantly from that of the neurologically normal controls. For the controls the majority of fixations fell in the internal facial region bounded by the eyebrows and the mouth. In contrast, LP's scanning was more dispersed and he frequently focussed on external peripheral regions. LP's pattern of scanning when viewing pictures of objects did not differ significantly from that of control participants and there was no increased dispersal of fixations.

**Conclusions:** These results indicate that in some cases impaired visual scanning contributes to impaired interpretation of facial expression after TBI.

Correspondence: *Jacinta Douglas, PhD, Human Communication Sciences, La Trobe University, Kingsbury Drive, Bundoora, VIC 3086, Australia. E-mail: J.Douglas@latrobe.edu.au*

**A.R. RABINOWITZ & P.A. ARNETT. Assessing Motivation in Baseline Concussion Testing.**

**Objective:** Baseline cognitive testing is becoming the gold standard in return-to-play decision-making after sports-related concussion. However, motivation may influence athletes' test performance and complicate interpretation. Research demonstrates that a subset of athletes exhibit better test-performance post-concussion than at baseline, possibly due to suboptimal motivation during baseline testing (Bailey et al, 2006). Empirically-supported techniques for detecting inadequate motivation at baseline may aid in test interpretation and post-concussion decision-making. The present study evaluates a novel approach to assessing motivation during testing.

**Participants and Methods:** Four hundred forty-seven non-concussed college athletes were administered a battery of neuropsychological tests at baseline. For each task, z-scores were calculated using the athlete group as a reference. The standard deviation of these z-scores was used as an index of intra-individual variability (IIV), and the mean was derived as a measure of overall performance. Examiners rated athletes' motivation on a 7-point scale.

**Results:** Controlling for an estimate of Full-Scale IQ, IIV accounted for 23% of the variance in overall test-performance. Athletes who were rated as sub-optimally motivated ( $n=57$ ) showed significantly greater IIV ( $t=2.8$ ;  $p < .01$ ) than athletes who were rated as adequately motivated ( $n=468$ ) and lower overall mean test performance ( $t=4.7$ ;  $p < .001$ ).

**Conclusions:** Results suggest that IIV is related to motivation in healthy college athletes. Athletes who were rated as sub-optimally motivated were more variable in their test-performance than adequately motivated athletes. These results suggest that IIV may be a promising performance-based indicator of motivation during baseline testing.

Correspondence: *Amanda R. Rabinowitz, M.S., Psychology, Pennsylvania State University, 1651 Highlandon Court, State College, PA 16801. E-mail: arr200@psu.edu*

**J. PONSFORD, P. CAMERON, M. FITZGERALD, M. GRANT & A. MIKOCCA-WALUS. Factors Influencing Outcome Following Mild Traumatic Brain Injury – A Prospective Study.**

**Objective:** Mild traumatic brain injuries (mTBI) causes symptoms in the days after injury, which persist in a proportion of cases. There is debate as to the cause of these symptoms, with recent studies suggesting that post-concussional symptoms may be attributable to pain and general trauma rather than brain injury. Few studies have controlled prospectively for these factors. The present study aimed to examine outcome and its predictors in individuals with uncomplicated mTBI and trauma controls.

**Participants and Methods:** Participants were 123 adults with uncomplicated mTBI and 100 trauma controls with minor injuries not involving the head presenting to a hospital Emergency Department (ED). Measures included the Glasgow Coma Scale and Revised Westmead PTA Scale, measures of post-concussive symptoms and cognitive performance (ImPACT), psychiatric state, health-related quality of life, pain and other life stressors. Participants were reassessed on these measures one week and three months post-injury.

**Results:** MTBI patients reported more post-concussional symptoms than controls at acute and one-week assessments and visual memory impairment on ImPACT. By three months both groups had improved significantly, with no group differences in post-concussive symptoms, but persisting deficits in visual memory and more self-reported memory and concentration problems in mTBI participants. At one week post-injury post-concussional symptoms were predicted by presence of mTBI, being female and premorbid psychiatric history. At three months pre-injury physical or mental health problems but not mTBI were the strongest predictors of continuing symptoms, with concurrent anxiety common.

**Conclusions:** It is important to recognize and address risk factors in managing mTBI, which appear to interact with the injury itself.

Correspondence: *Jennie Ponsford, PhD, School of Psychology and Psychiatry, Monash University, Wellington Road, Clayton, Melbourne, VIC 3800, Australia. E-mail: jennie.ponsford@med.monash.edu.au*

**M.P. CHEVIGNARD, A. LAURENT-VANNIER, S. LANCIEN, S. ESCOLANO, M. DE AGOSTINI & P. MEYER. The Effect of Age of Injury on Recovery following Severe Traumatic Brain Injury in Children: Preliminary Results of a Prospective Study.**

**Objective:** The purpose of this study was to study cognitive, functional and academic outcome of children hospitalized for severe traumatic brain injury (TBI) and to determine early predictors of outcome.

**Participants and Methods:** A prospective longitudinal study was designed, including all children consecutively admitted in a single trauma center for severe non-inflicted TBI. Assessment was conducted at 3 and 12 months post-injury, using the Wechsler Intelligence Scales, the Pediatric Injury Functional Outcome Scale (PIFOS), and a structured interview.

**Results:** Preliminary results are reported for 59 children (aged 3-15 years). Mean age at injury was 7.3 years ( $SD=4.8$ ). Mean initial Glasgow coma scale (GCS) score was 6.2 ( $SD=2.3$ ). Twelve children (20.3%) died acutely. Survivors were divided into two groups according to age at injury (less than 6 years and 6 and older). At 3 months post-injury, mean full-scale IQ (FSIQ) was one standard deviation below the norms ( $85.2$ ;  $SD=16.6$ ) in both groups. At 12 months, IQ had significantly improved in the group injured at an older age, whereas this improvement was not evident in the younger group. FSIQ was not correlated to the GCS.

At 12 months, most children had social/emotional (91%) and cognitive difficulties (85%) on the PIFOS; 24% still received physiotherapy and 48% speech therapy; sixty-nine percent of the group was attending a regular school, but one third of them required specific adaptations.

**Conclusions:** Outcome after severe childhood TBI is serious, in terms of mortality and functional outcome. Cognitive and functional impairments have consequences in everyday life and scholastically. Improvement was found at 12 months, but only for the children injured at an older age, with those younger than 6 years at injury exhibiting much less recovery.

Correspondence: *Mathilde P. Chevignard, MD; PhD, Rehabilitation of Children with Acquired Brain Injury, Hopital National de Saint Maurice, 14, rue du Val d'Osne, Saint Maurice 94410, France. E-mail: m.chevignard@hopital-saint-maurice.fr*

**G.J. KINSELLA, B. ONG, J. OLVER, S. PRICE, S. PARSONS & E. HAMMERSLEY. Acute Injury Characteristics and Cognitive Consequences following Mild Traumatic Brain Injury in Older Adults.**

**Objective:** Older adults who experience falls or motor vehicle incidents resulting in traumatic brain injury represent an increasing public health challenge in our aging community and may be at risk of poor cognitive outcome. Consequently, the relationship between acute injury characteristics and three-month cognitive outcome of mild traumatic brain injury (mTBI) in older adults was examined.

**Participants and Methods:** 46 mTBI patients (>65 years, GCS score 13-15; uncomplicated and complicated based on presence of trauma-related neuro-imaging findings) admitted to a hospital trauma service in Melbourne were compared with two control groups - 55 patients with traumatic injury only and 118 healthy community controls. Acute injury information and 3-month post-trauma neuropsychological performances, including prospective memory (remembering to carry out delayed intentions), were investigated.

**Results:** Older adults who presented with trauma-related intracranial pathology on CT scanning were significantly more likely to be impaired in speed of information processing ( $d = 1.00$ ), attention set shifting ( $d = 0.92$ ), and prospective memory ( $d = 1.97$ ). However, even older adults with uncomplicated mTBI and trauma-only injuries were more likely to be impaired, as compared to healthy controls, in prospective memory ( $d = 0.86$  and  $d = 1.12$  respectively).

**Conclusions:** Acute injury characteristics of mTBI significantly increases risk of everyday memory failures for older adults in the early stages following mTBI. The findings also highlight the importance of including a trauma control group in research in this aged population to account for both potential predisposition to traumatic injury and generalised impact of trauma.

Correspondence: *Glynda J. Kinsella, School of Psychological Science, La Trobe University, La Trobe University, Victoria, VIC 3046, Australia. E-mail: g.kinsella@latrobe.edu.au*

**Birch Lecture:  
Cognitive Neuroscience of Dyslexia**

**Speaker: John Gabrieli**

**5:00–6:00 p.m.**

**J. GABRIELI. Cognitive Neuroscience of Dyslexia.**

Reading is essential in modern societies, but many children have dyslexia, a difficulty in reading. The specific nature of the difficulty has both commonalities and differences across languages that vary in the relation of spoken words to written language. Dyslexia often arises from impaired phonological processing, the auditory analysis of spoken language that allows beginning readers to relate the sounds of language to the sights of words. Fluency and accurate perception of rapid, transient information may also be important in learning to read. Behavioral intervention is effective for many, but not all, children, especially at a young age. Neuroimaging has revealed characteristic brain differences in dyslexia, including reduced engagement of left temporo-parietal cortex and altered white-matter connectivity, and also functional plasticity associated with effective intervention. Further, whereas typically developing

children increase the engagement of left posterior cortex in reading, children with dyslexia tend to engage frontal and right-hemisphere regions. Behavioral and brain measures identify infants and young children at risk for dyslexia, and multi-voxel pattern analysis may be helpful in identifying children with dyslexia who are likely to make gains over time versus those children who persist in poor reading. An important question is how cognitive neuroscience approaches to understanding the brain basis of dyslexia may come to influence educational policies and practices that can help children to become successful at learning to read.

Correspondence: *John Gabrieli, PhD, Brain and Cognitive Sciences, MIT, 43 Vassar Street, 46-4033B, Cambridge, MA 02139. E-mail: gabrieli@mit.edu*

**Poster Session 4:  
Assessment/Cross-  
Cultural/Epilepsy/Executive/Language/Subcortical**

6:00–7:15 p.m.

**Assessment/Psychometrics/Methods  
(Adult)**

**E.H. MACIAS, C. RAMOS & E. REYES. Cognitive function of Mexican people: we need more tools.**

**Objective:** Show the results about the BNB in a Mexican sample.

**Participants and Methods:** A sample by 140 healthy subjects between 19 and 60 years old was underwent the Neuropsychological Brief Battery (BNB, by it Spanish capitals). This is a cohort study, having a statistical correlation and comparison between age and sex.

The BNB subtest include a modified version of the Revised Auditory Serial Addition Test (PASAT), the Symbol Digit Modalities Test (SMDT), the Controlled Oral Word Association Test (COWAT), a modified latin version of the Free and Cued Selective Recalling Test (FCSRT).

**Results:** Analyses of covariance revealed a significant overall difference between men and women, almost all subjects with a high education do better performance in the subtests.

**Conclusions:** In the latin american countries there is a limited tools by the cognitive impairment assessment. The educational level is the bounding given on the diversity that it presents. In another hand the aging of Latin American countries forces us to prepare the tools for the attention of the dementia cases. This study prepare us by the study of the cognitive impairment by a short tool that could be more reliable and more ecological than another tools.

Correspondence: *Edgar H. Macias, MSc, Esc. de Psicología, Universidad Autónoma de Coahuila, Unidad Camporredondo Edificio C, Saltillo 25000, Mexico. E-mail: edgarmac@gmail.com*

**B.L. BROOKS, J.A. HOLDNACK & G.L. IVERSON. Base Rates of Low Index and Subtest Scores on the WAIS-IV/WMS-IV in the Standardization Sample.**

**Objective:** Clinicians need information on the base rate of low scores in healthy people across a battery of tests to reduce the likelihood of misdiagnosing cognitive impairment. The purpose of this study is to present comprehensive base-rate tables for the frequency of low scores across the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV) and Wechsler Memory Scale Fourth Edition (WMS-IV).

**Participants and Methods:** Participants were 900 healthy individuals, between 16 and 69 years of age, from the WAIS-IV/WMS-IV standardization sample. The base rates of low scores are calculated for the 10 Indexes and the 20 primary subtest scores.

**Results:** When the 10 Indexes were considered simultaneously, one-half of the sample had at least one Index  $\leq$ 16th percentile and 1 out of 5 people had at least one Index  $\leq$ 5th percentile. When the 20 primary subtest scores were considered simultaneously, over 75% of the sample had one or more subtest scores  $\leq$ 16th percentile and over 40% of the sample had at least one score  $\leq$ 5th percentile. The prevalence of low subtest scores or Indexes increased with fewer years of education and lesser predicted intelligence.

**Conclusions:** Low scores are common in healthy people and the number of low scores varies by the cutoff score used, years of education, and level of intelligence. These base rate tables will facilitate advanced clinical interpretation of the WAIS-IV and WMS-IV.

Correspondence: *Grant L. Iverson, Ph.D., Psychiatry, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2A1, Canada. E-mail: giverson@interchange.ubc.ca*

**M. ENNOK. The Untested Assumptions of Schulte Tables.**

**Objective:** The Schulte Tables test (ST) is an old method for the assessment of concentration and speed of attention. It has been widely used in Soviet and Post-Soviet countries. In spite of its old history and continued use, the psychometric properties of ST have not been researched and the test is not properly normed. Only general interpretation guidelines exist in compendiums. The aim of this study is to test the various assumptions of ST and provide contemporary norms.

**Participants and Methods:** The preliminary sample of this study includes 120 healthy subjects (59 women, 61 men), aged 19-77, with a mean education of 14.45 years. The ST was administered with the instructions presented in Rubinshtein (1970). The test includes five tables (60 by 60 cm) with numbers from 1 to 25 in random order and the task is to point to the numbers in the correct order as quickly as possible.

**Results:** The mean scores of individual tables were all in the proposed range (around 40-42 sec). Also the mean scores of each table were not significantly different from one another. Age and education had a significant effect on the test score while sex had no effect. The test-retest reliability and practice effects are also assessed in a smaller sample of retested subjects.

**Conclusions:** The interpretation of ST should take into account age and education effects on the test scores. Preliminary normative tables for ST are presented.

Correspondence: *Margus Ennok, MSc, Department of Neurology and Neurosurgery, University of Tartu, L. Puusepa 8, Tartu 51014, Estonia. E-mail: margus.ennok@ut.ee*

**E. LOJEK, J. STANCZAK, J. JASTRZEBSKA, K. SEKSCINSKA, E. MATUSZEWSKA, J. SKRZELINSKA, A. MAJOS & M. BIELECKA. Qualitative Performance of the Ruff Figural Fluency Test. A Normative Study.**

**Objective:** Despite the importance of strategy and planning abilities assessment in neuropsychology, very little is known about the psychometric properties of the strategy scores of the Ruff Figural Fluency Test (RFFT). The purpose of the study was to investigate the effects of demographic factors on strategy production in the RFFT. The present research was probably the second after Ross, Foard, Hiott, & Vincent (2003) to examine the psychometric properties of supplemental scores for the RFFT.

**Participants and Methods:** The study was conducted on 465 healthy subjects, aged 16 – 79, seventy subjects were tested twice (mean interval = 6 months). Three raters scored 70 protocols independently. In addition to rotational and enumerative strategies proposed by Ruff (1988), other supplemental indices applied by Ross et al. were also examined.

**Results:** Interrater correlation coefficient was  $r = .99$  for number of strategic clusters. Coefficient of stability for number of strategic clusters was acceptable ( $r = .66$ ) especially after a 6 month interval, but lower in the older subgroup ( $> 54$  years old), even if there was no practice effect. Strategy scores were significantly dependent on demographic factors: higher age and lower level of education were connected with lower strategy scores, men produced more strategies, especially rotational, than women.

**Conclusions:** It is suggested that, among other neuropsychological tools, the RFFT strategy scores can be used as an additional measure of executive functions.

Correspondence: *Emilia Lojek, Ph.D., Psychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: emilia@psych.uw.edu.pl*

**D. TOMCZYK & A. TARNOWSKI. Relationship between atmospheric electricity and psychomotor performance.**

**Objective:** Environmental psychology concludes relationship between electrical disturbances and weak psychomotor performance. The study has been aimed to validation of above thesis. The reaction time of 327 pilots, air force candidates and professional drivers age 18-54, has been correlated with actual atmospheric electricity data.

**Participants and Methods:** Subjects were tested with choice reaction time test to determine their psychomotor coordination and attention. Total choice reaction time has been measured distinguishing decision making time and motor reaction time. The electrical field intensity, positive and negative air conductance registered every 10 seconds served as an indicator of atmospheric electrical state. The circumstances, when intensity oscillated between 0 and 300 V/m, and positive conductance were equal, or at least thrice higher compared to negative conductance were classified as normal. Any other circumstances were classified as abnormal.

**Results:** Postulated relationship between atmospheric electricity and psychomotor performance has been confirmed. Statistical analysis proved strong correlation between atmospheric electricity and decision time ( $p < 0.001$ ) and mediocre relationship between electricity and motor time. The relational increment was 1/6 for decision time and 1/9 for motor time.

**Conclusions:** Disturbed atmospheric electricity leads mostly to mental performance decrement, and also to subtle, but statistically significant decrement of motor performance. The results are important for applied clinical neuropsychology and road safety science.

(Neuropsychological Scientific Group Faculty of Psychology Warsaw University)

Correspondence: *Dariusz Tomczyk, Faculty of Psychology, Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: ins@neuropsychologia.org*

### Assessment/Psychometrics/Methods (Child)

**D.H. BIECHOWSKA, M. WITKOWSKA, I. KACZMAREK & B. STEINBORN. Comparative Analysis of Quantitative and Qualitative Verbal Fluency Performance in Children with Neurological Disorders.**

**Objective:** Although verbal fluency is a frequently used neuropsychological test, little is known about underlying cognitive processes. The authors proposed that two important components of fluency performance are clustering (the production of words within phonemic and semantic subcategories) and switching (the ability to shift between clusters).

**Participants and Methods:** Letter ("K") and semantic ("animal") fluency tests were administered to patients with an epilepsy (EP;  $n = 154$ ), tension headache (TH;  $n = 91$ ), migraine (MI;  $n = 39$ ), tics (TI;  $n = 33$ ), and matched control group (CO;  $n = 127$ ). Tests measuring working memory, naming/lexical retrieval, and semantic knowledge were also obtained.

**Results:** In terms of total number of words produced, controls were superior to the EP, MI and TI subjects, who performed similarly. A similar trend was found in relation to switching and clustering scores. TH patients performed similar to the CO group on semantic fluency, but were impaired relative to controls on all phonemic fluency variables (i.e., total words produced, clustering, switching).

**Conclusions:** Clustering and switching variables were significantly correlated with the number of words generated and therefore were not included in discriminant analysis. Discriminant analysis revealed that the combination of phonemic and semantic fluency may be particularly useful in differentiating healthy children from neurological disorders. In addition, findings suggest that clustering and switching are dissociable fluency components.

Correspondence: *Daria H. Biechowska, Institute of Psychology, University of Gdansk, Pomorska 68, Gdansk 80-343, Poland. E-mail: psydb@ug.edu.pl*

**K. CIOCZEK, A. ZESLAWSKA-FALENCZYK & B. STEINBORN. Cognitive and Emotional Characteristic of Children and Teenagers Suffering from Migraine and Tension-type Headaches.**

**Objective:** The aim of this study is a cognitive and emotional characteristic of children and teenagers suffering from headaches among the patients of The Clinic of Developmental Age Neurology at the Medical University of Karol Marcinkowski in Poznan.

**Participants and Methods:** The participants of this examination was a group of 44 people aged 7 – 18.

24 patients were diagnosed with migraine, whereas 20 were diagnosed with tension-type headache. The diagnosis included the estimation of intellectual functioning with the use of WAIS- R or WISC-R scale. Additionally, to estimate the cognitive functions RAVLT, BVRT, and BVRT were applied. The evaluation of emotional functioning was carried out with the application of: STAI, STAIC and RIBS tests.

**Results:** The data gathered shows that the average IQ among patients suffering from tension-type headache was 111, whereas among patients with migraine it was 115. The participants of both groups achieved better results in non-verbal tests. Additionally, while testing visual memory, 34% of patients with migraine achieved the results above the standard, whereas in the second group such a result applied to 45% of patients. The analysis of STAI test results shows that more patients experiencing elevated situation anxiety and anxiety as such are among the group with tension-type headaches. What is more, only in this group, patients tend to experience emotional problems concerning their family or peer life.

**Conclusions:** This research indicates certain differences in functioning of patients belonging to both groups, however they cannot be fully characterized. Therefore, planning further exploration of this topic on a larger group of patients.

Correspondence: *Katarzyna Cioczek, Master's degree, Oddzial Neurologii dzieci i mlodzi, Szpital Kliniczny nr 2 im. H. Swiecickiego w Poznaniu, Daleka 9/11/15, Poznan 60-124, Poland. E-mail: k.d.cioczek@gmail.com*

**C.B. DE MELLO, M. MUSZKAT, R. NOGUEIRA, A. JACOWSKI, F. VARGENS, B. SANTANNA, S. FELDBERG & B. ORLANDO. A Model of Multidisciplinary Program and Neuropsychological Approach to Brain Damaged Children.**

**Objective:** Children with congenital or acquired brain damage show heterogeneous neuropsychological and behavioral deficits and changing developmental demands with increasing age. In developing countries, the lack of public health services and the low socio-economic level of families poses serious challenges for traditional neuropsychological assessment with several sessions. The aim of this study was to describe a multidisciplinary program especially established for the evaluation of brain damaged children, which main goals are the optimisation of neuropsychological assessment, and support for parents and teachers in the implementation of rehabilitation strategies.

**Participants and Methods:** A sample of 52 brain damaged children, with different kinds of brain damages, was submitted to the program until December 2009. The program includes a multidisciplinary protocol (neurological, neuropsychological, academic and behavioral procedures) implemented in a 5-week period, two 2-hours sessions per week. Cognitive rehabilitation and pedagogical strategies based on assessment findings are discussed with parents and teachers.

**Results:** Results from multidisciplinary assessment showed that working memory, visuoconstructive and executive functions were impaired, while language and perceptual functions were more preserved; isolation and depression as the most challenging behavioral problems; and frequent failure in mathematical performance.

**Conclusions:** Our findings indicate that a multidisciplinary program characterized by a short neuropsychological protocol and school and familial support constitute an adequate approach for evaluating brain damaged children. The results may simultaneously contemplate children, their families and teachers demands, and may be incorporated into public health services and specially useful for low income population.

Correspondence: *Claudia B. de Mello, PhD, Centro Paulista de Neuropsicologia/AFIP, Rua Embaú, 54, São Paulo 04039 -060, Brazil. E-mail: cberlimmello@gmail.com*

### Cross Cultural

**M. LUCAS. Formulating a Novel Training Programme for Neuropsychologists in a Developing Country.**

**Objective:** Neuropsychological practice in our country comprises interested clinicians seeking out their own training and organizing their own, non-official, representative bodies. In 2008 the Health Professions Council of South Africa (HPCSA) approved the implementation of Neuropsychology as a new professional registration category.

WITHDRAWN

Classified as a developing country by the IMF but a middle income country according to the UN, South Africa's infrastructure spans from first and third world contexts. Its strength, and of course weakness, is its diversity and complexity which includes 11 official languages, peoples of European, African, Indian and mixed-race and cultural backgrounds, and strikingly delineated standards of living. The challenge facing training institutions is how to develop programmes that produce competent neuropsychologists in a country with complex needs, narrow perceptions of ignorance about the discipline.

**Participants and Methods:** The SPCS have broadly described education and training guidelines that describe required core competencies. The specific manifestation of such requirements will be gathered through debate and discussion with those universities prepared to consider training in this discipline, other professional bodies, and any other interested bodies.

**Results:** An appropriate scientist/practitioner model will be developed that retains the strengths of current Western-style models while respecting unique national requirements; that uses standardized models of assessment yet accommodates the challenges associated with non-western populations; that develops appropriate models of intervention.

**Conclusions:** This paper will discuss the development of one university training programme, and ask for input and guidance from the audience as part of the developmental process of devising a training programme that recognises a marriage between the neurosciences and applied neuropsychology.

Correspondence: *Marilyn Lucas, PhD, Psychology, University of the Witwatersrand, Private bag 3, Wits, Johannesburg 2050, South Africa. E-mail: marilyn.lucas@wits.ac.za*

#### E. LORENTZEN & K. TROLAND. Cross-Cultural Validation of WAIS-III in Mental Retardation.

**Objective:** The study deals with Wechsler Adult Intelligence Scale/WAIS-III results for people with mental retardation/MR. Test results from Norwegians with MR are compared to test results from an American group of people with MR, as referred to in the WAIS-III manual. The hypothesis is that WAIS-III norms can be used cross-cultural.

**Participants and Methods:** Patients at Department of Adult Habilitation, Oslo University Hospital, with a diagnosis of MR were asked to participate. A total of 39 valid WAIS-III protocols were collected and compared to the US sample using two-tailed one-sample T-test. The effect sizes were calculated using Cohen's d.

**Results:** We found similar results for the Norwegians as for the American group mild mental retardation, F70/ICD-10, for Performance IQ, and the indexes Perceptual Organization and Processing Speed, but the Norwegians received higher scores on Full Scale IQ, Verbal IQ and the index Verbal Comprehension.

**Conclusions:** The reasons for the differences in the results are discussed based upon translation, diagnostic practise, education and the Flynn effect. This cross-cultural validation study indicates, after all, that norms from American tests can be used in Norwegian conditions. The finding is important because it deals with a commonly used intelligence test that is used for diagnosing, and it involves societal and personal conditions. Correspondence: *Eirin Lorentzen, Neuropsychologist, Ullevål, Oslo University Hospital, Kirkeveien 166, Oslo 0407, Norway. E-mail: elorentz@gmail.com*

#### T. NIELSEN & A. GADE. Cross-cultural Neuropsychological Assessment of Elderly Turkish Immigrants – Preliminary Results from a Danish Study.

**Objective:** Focus on issues in cross-cultural neuropsychology is limited in Europe. But as clinical experiences with people from different cultures increase, the limitations of neuropsychological tools to make accurate assessments become evident. The prevalence of disorders affecting the brain increases with increasing age. Cognitive assessment is essential in the evaluation of many of these disorders, especially in the case of dementia.

Immigrants from Turkey and their descendants form the largest ethnic minority in Europe. The elderly Turkish immigrants in Denmark typically come from rural backgrounds, have limited or no schooling and low levels of acculturation. The objective of this study was to validate a test battery that is appropriate for elderly Turkish immigrants.

**Participants and Methods:** Turkish immigrants aged 50 years or older were tested on a neuropsychological test battery compiled of tests described as "culture insensitive" in published literature and that are appropriate for people with low levels of education, including illiteracy. The included tests were generally short, easy to administer and easy to use with an interpreter.

**Results:** Effects of age, education and gender were found on some tests. Our preliminary results do, however, indicate that a number of tests are appropriate for elderly Turkish immigrants in Europe, including the RUDAS, Enhanced Cued Recall, a picture naming learning task, Semantic Fluency, Five Digit Task, Color Trails, Clock Drawing and Clock Reading Tasks and simple copying tasks.

**Conclusions:** We present the test battery with preliminary results. To our knowledge this is the first study to focus on cross-cultural neuropsychological assessment of elderly Turkish immigrants.

Correspondence: *T. Rune Nielsen, MSc, Department of Psychology, University of Copenhagen, Øster Farimagsgade 2A, Copenhagen 1353, Denmark. E-mail: rune.nielsen@rh.regionh.dk*

#### B. VELIU & J. LEATHEM. Methodological and cross cultural barriers in the neuropsychological assessment of refugees.

**Objective:** Evaluate the neuropsychological sequel of torture induced brain injuries and post-traumatic stress disorder(PTSD).

**Participants and Methods:** Comprehensive neuropsychological assessment conducted with a group of refugees with PTSD in addition to traumatic brain injury.

**Results:** The current paper presents the methodological and cross cultural barriers faced during the assessment of 20 tortured and traumatized refugees living in New Zealand. The paper focuses on revealing the difficulties encountered at each stage of assessment. In addition, the results of qualitative analysis of neuropsychological performance are presented to illustrate the influence of cross cultural and educational factors in neuropsychological performance.

**Conclusions:** Use of norm based structured neuropsychological assessment may be not be appropriate for refugees. Recommendations on the improvement of assessment methods are provided.

Correspondence: *Bahrie Veliu, Doctorat of Clinical Psychology, School of Psychology, Massey University, 24 King Street, Miramar, Wellington 6022, New Zealand. E-mail: bveliu@gmail.com*

#### E. MATUTE, M. ROSSELLI, A. ARDILA, G. NAVARRETE & C. YAIRA. Neuropsychological Assessment of Spanish/English Bilingual Children: Preliminary Normative Data.

**Objective:** The purpose of the present research was to provide preliminary normative data for a bilingual population on a comprehensive neuropsychological battery (Evaluación Neuropsicológica Infantil, ENI; Matute, Rosselli, Ardila & Ostrosky, 2007) administered to Spanish-speaking children.

**Participants and Methods:** The performance of 108 Spanish/English bilingual children (age 5 to 14) on the Evaluación Neuropsicológica Infantil- ENI- was assessed.

**Results:** Results indicated that language ability scores were in general lower in the bilingual group, whereas non-verbal and executive functioning abilities scores were similar when compared to normative monolingual performance.

**Conclusions:** Norms by age are expected to be useful when testing other Spanish/English bilingual children in the U.S.

Correspondence: *Esmeralda Matute, Ph.D, Instituto de Neurociencias, Universidad de Guadalajara, Fco. de Quevedo 150, Guadalajara 44130, Mexico. E-mail: ematute@cencar.udg.mx*

#### M. ROMANOWICZ. On the Need for Normativeness in Neurosciences.

**Objective:** We are witnessing a biotechnological revolution. Another revolution, after the neolithic and industrial, which will change the face of humanity and set the course of history. Actually, it is already changing and setting.

**Participants and Methods:** The goal of this poster is to present a philosophical (bioethics and jurisprudence) reflection on the biotechnological revolution. The development of nature sciences – especially the neurosciences – gives rise to substantial abilities to influence human behaviour and creation of psychological conditioning of future generations. These abilities interfere with the nature of man itself and are entangled with moral dilemmas.

**Results:** Neurosciences, along with genetic engineering form the cutting edge of the biotechnological revolution. The abilities to influence mankind, created by these fields of science, are affected by a deficit of normativeness. Currently we experience a pressing need to regulate the tools of biological manipulation. This regulation can take a form of either moral norms or legal norms. Ethical disputes prevent the creation of a coherent bioethical concept, thus the creation of legal norms (bioethical legislation) is necessary. This process is already ongoing: many countries introduce applicable acts, and international law also begins to acquire necessary regulations.

**Conclusions:** Thus in order to reply to the deficit of normativeness, the axiological plane of legal norms has to be established first. The human nature should form the legal reference – this value – for the legislator when looking for legal boundaries. The utilitarian calculus should be rejected.

(Neuropsychological Scientific Group Faculty of Psychology)  
Warsaw University

Correspondence: *Marcin Romanowicz, Faculty of Psychology, Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: ins@neuropsychologia.org*

**M. CHERNER, P. SUAREZ, M. RIVERA MINDT, M. TAYLOR, I. GRANT, L. ARTIOLA I FORTUNY & R. HEATON. Regression-based Norms for the Trail Making Test in Spanish.**

**Objective:** We generated norms for the Trail Making Test in an effort to create appropriate interpretive standards for neuropsychological assessment in Spanish speakers from the US-Mexico borderland.

**Participants and Methods:** The normative sample consisted of 181 healthy native Spanish speakers from the Mexico border regions of Arizona and California, ranging in age from 20 to 55 years ( $M=37.2$ ,  $SD=9.5$ ) and in education from 0 to 20 years ( $M=9.9$ ,  $SD=4.2$ ), with 58% women. A separate validation sample of 33 healthy Spanish speakers included 58% women, and had a mean age of 38 (13) and mean education of 11 (4) years. Trails A and B raw scores were converted to scaled scores to create a distribution with a mean of 10 and SD of 3. Fractional polynomial regression equations were used to determine the contribution of age, education, and sex to Trails A and B scaled scores in order to generate demographically adjusted T-scores ( $M=50$ ,  $SD=10$ ).

**Results:** On average, Trails A scores obtained with the new Spanish language norms increased by 1.0 (.64) scaled score and 3.4 (2.5) T-scores, compared to existing English language norms. For Trails B, scaled scores increased by 1.2 (.54) and T-scores by 5.7 (4.0) on average. As expected, the greatest discrepancies between norms occurred in cases with low education. On Trails A, 28% of the normative sample was categorized as impaired based on the existing English language norms. On Trails B this proportion was 36%. In the validation sample, misclassification of impairment decreased by 9% on Trails A and 12.5% on Trails B. Raw-to-scaled conversions and T-score formulae will be presented.

**Conclusions:** Population-specific norms result in fewer classification errors and add to the assessment tools available for Spanish speakers from the US-Mexico borderland region.

Correspondence: *Mariana Cherner, PhD, Psychiatry, UCSD, 9500 Gilman Drive, Mail Code 0847, La Jolla, CA 92093. E-mail: mcherner@ucsd.edu*

### Drug/Toxin-Related Disorders (Including Alcoholism)

**D. DECUIR, M.K. GINLEY, S. RASKIN, H. TENNEN, C.S. AUSTAD, C.S. FALLAHI, R.M. WOOD, D.C. GLAHN & G.D. PEARLSON. Effects of Binge Drinking Patterns on Cognitive Functions in College Students.**

**Objective:** Binge drinking among college students has been associated with changes in brain function and cognitive impairment, particularly impairment related to executive functions and spatial working memory. In this study, college students were administered measures of impulsivity, cognition, mood, and drinking patterns to determine relationships with binge drinking.

**Participants and Methods:** Binge drinking was defined as a pattern of drinking that brings estimated BAC to 0.08 gram-percent or above. Participants were first year college students ranging in age from 18 to 21 years; 107 women and 235 men. Exclusion criteria: brain injury with loss of consciousness > 24 hrs., concussion with LOC within 30

days, other neurological disorder, or DSM-IV-TR Axis I psychotic disorders (Clinical interview-MINI). Measures administered: MoodEPI, State-Trait Anxiety test, the Balloon Analogue Risk Task (BART), Groton Maze Learning Test, one-back and two-back tests. Groups: never drank; drink but never binge; binged but not in last 30 days; and binged in last 30 days.

**Results:** Consistent with the literature, females were significantly more likely to binge. Females demonstrated significantly more impulsivity on the BART. When comparing binge categories, those who drink but do not binge demonstrated the lowest impulsivity on the BART. On both the one-back and two-back, those who have ever binged showed significantly poorer performance than either drinkers who never binge or nondrinkers. On Groton Mazes, those who binged in the last 30 days made significantly more errors than any other group.

**Conclusions:** These data lend support to the notion that binge drinking is detrimental to cognitive functions, particularly executive functions and spatial learning.

Correspondence: *Sarah Raskin, Ph.D., Psychology, Trinity College, 300 Summit Street, Hartford, CT 06119. E-mail: sarah.raskin@trincoll.edu*

**P. ANDRYSZAK, A. STACHOWIAK, M. ZIOLKOWSKI & E.J. GORZELANCZYK. Relationship between intensity of pain and cognitive performance in patients with chronic pain during opioid and non-opioid analgesics treatment.**

**Objective:** The aim of the study is to evaluate the influence of persistent pain and its treatment on cognitive functioning of patients undergoing chronic analgesic therapy.

**Participants and Methods:** The study group consisted of 83 patients with chronic cancer and non-cancer pain. Depending on the type of analgesic therapy 2 subgroups were distinguished. The patients from group 1.,  $n=40$ , were taking opioids (mean oral morphine equivalent=89mg; mean age $62\pm10$ ). The patients from group 2.,  $n=43$ , were taking non-opioids, (mean age $59\pm9$ ). Each patient was subjected to a clinical interview, pain intensity evaluation by Numerical Rating Scale(NRS), depression and anxiety assessment using Hospital and Anxiety Depression Scale(HADS). The evaluation of cognitive functioning was carried out using Trail Making Test A and B(TMT) and Stroop Color-Word Interference Test(SCWIT).

**Results:** It was found that average pain intensity was significantly higher in group 2. ( $p=0.04$ ). Statistically significant positive correlations were found between pain intensity and time to complete part 2 of SCWIT in group 1. and between pain intensity and time to complete part 1 of SCWIT in group 2. In both groups significant positive correlation between pain intensity and anxiety was found. The time to complete TMT and SCWIT was significantly higher in group 1.

**Conclusions:** Pain intensity was lower in patients treated with opioid analgesics. In both groups higher pain intensity correlated with higher level of anxiety. Pain intensity correlated with the deterioration of verbal working memory in 'opioid' group and with a reduction in speed of reading in 'non-opioid' group. The comparison of patients treated with opioids with those treated with non-opioid analgesics has shown deterioration in psychomotor speed, speed of reading, verbal and visuo-spatial working memory in patients undergoing opioid therapy.

Correspondence: *Paulina Andryszak, MA, Dom Sue Ryder w Bydgoszcz; Roentgena 3, Bydgoszcz 85-435, Poland. E-mail: p.andryszak@domsueryder.org.pl*

**E.J. GORZELANCZYK, K. WLODARCZYK, A. WICHER, Z. RYBLEWSKI, P. ANDRYSZAK, M. ZIOLKOWSKI, S. BIEDRZYCKI, J. SOBCZYK, L. GRODZKI & A. SEK. Speech intelligibility in patients addicted to psychoactive substances in comparison to healthy controls.**

**Objective:** Drug abuse and alcohol dependence leads to some cognitive dysfunctions. This study was undertaken to find relations between addiction and damage of the cortico-subcortical circuits.

**Participants and Methods:** There were examined: forty alcohol dependent patients (age  $44\pm9$  y.), thirty seven drug abusers after or during the detoxication treatment (age  $32\pm9$  y.) and healthy controls (age  $30\pm11$  y.). All patients were examined once, after few minutes minutes of adaptation to the performed.

The subjects have been tested with use of The Polish Sentence Test in order to gather Speech Reception Threshold (STR), the signal-to-noise ratio (SNR). The SNR which represents the ratio of speech and noise leading to at least 50% speech intelligibility.

**Results:** Obtained data revealed that there were no statistically significant differences in the SNR between alcohol dependent patients and drugs abusers. There are found statistically significant differences between healthy controls and examined addicts in both groups.

Healthy controls have lower value of the SNR by 2.7-3 dB in comparison to drugs abusers and alcohol dependent patients. It indicates that healthy controls better understand speech in noise than compared patients.

**Conclusions:** Addiction to psychoactive substances causes damages in the cortico-subcortical circuits, what is indicated by the SNR value. The cognitive functioning in the area of speech intelligibility of addicted patients is worse than healthy controls.

Further studies may enable the use of SNR in speech intelligibility test as a possible marker of psychoactive substances addiction.

Correspondence: *Edward J. Gorzelanczyk, dr hab., Laboratory of Neuropsychology and Psychophysiology, Institute of Psychology, Kazimierz Wielki University, Staffa 1, Bydgoszcz, 85-867, Poland. E-mail: medsystem@medsystem.com.pl*

**M. MICHALAK, P. JASKOWSKI, M. ZIOLKOWSKI & E.J. GORZELANCZYK. Subliminal priming of motor reaction as a marker of neurological diseases? A comparison study on Parkinson's disease patients, alcohol dependent patients, young and elderly controls.**

**Objective:** It is commonly accepted that unconsciously perceived masked priming stimuli can trigger partial activation of motor responses or recognition processes. It has been shown in numerous studies that the compatibility effect (RT<sub>incomp</sub>-RT<sub>comp</sub>) is biphasic as it develops over time: positive (benefits for compatible and costs for incompatible trials i.e. responses are faster when primes and targets call for the same responses) for short prime-target temporal distances and negative (benefits for incompatible and costs for compatible trials) for long ones. Subliminal priming of motor reaction was seldom used in clinical studies with patients suffering from neurological diseases (e.g. Seiss & Praamstra 2004, 2006).

The study was undertaken to see if subliminal priming of motor reaction can be used as a clinical marker of neurological diseases.

**Participants and Methods:** In this research four groups of participants were tested (with the use of subliminal priming of motor reaction): Parkinson's disease patients, alcohol dependent patients, young healthy controls and elderly controls.

**Results:** There were statistically significant differences in: reaction times, percent of correct responses and interaction between Group x SOA x Compatibility.

**Conclusions:** Differences between particular groups (especially alcohol dependent and Parkinson's disease patients) may contribute to better understanding the depth of deficits on perceptual and motor level. Correspondence: *Edward J. Gorzelanczyk, dr hab., Laboratory of Neuropsychology and Psychophysiology, Institute of Psychology, Kazimierz Wielki University, Staffa 1, Bydgoszcz, 85-867, Poland. E-mail: medsystem@medsystem.com.pl*

**E.J. GORZELANCZYK, M. MICHALAK, K. WLODARCZYK, E. LASKOWSKA, E. NOWINSKA, M. ZIOLKOWSKI & M. KADZINSKI. Motor functioning of alcohol and drug dependant patients in comparison to older people.**

**Objective:** The purpose of the study was to evaluate if alcohol and drug dependence affects motor functions.

**Participants and Methods:** There have been examined 25 older patients (50 to 75 years old), 26 alcohol addicted patients and 21 drug addicted patients. The valuation of psychomotor functioning was performed with an experimental method - the original drawing task with usage of a digitizing tablet. It is able to measure different motor parameters of drawing such as mean velocity, instantaneous velocity, pressure (force of drawing), time and distance of drawing. Also tremors during tests are shown and they can be classified.

**Results:** Obtained data shows that mean pressure (force of drawing) is comparable in older people and alcohol dependant patients, but the time of drawing is 20% shorter in older people than in alcohol dependant patients. It has been observed that maximal instantaneous velocity is 23% higher in older people than in drug dependant patients.

**Conclusions:** Alcohol or drug dependant people have wider damages of motor functions.

The original drawing task with usage of a digitizing tablet may be the indicator of the scale of degeneration processes in the dependant patients body.

Correspondence: *Edward J. Gorzelanczyk, dr hab., Laboratory of Neuropsychology and Psychophysiology, Institute of Psychology, Kazimierz Wielki University, Staffa 1, Bydgoszcz, 85-867, Poland. E-mail: medsystem@medsystem.com.pl*

**L. SEGALÀ, G. VASILEV, I. RAYNOV, E. MARTIN, R. GONZALEZ & J. VASSILEVA. Effects of ADHD on Neurocognitive Impulsivity in Heroin Addicts.**

**Objective:** Substance dependent individuals typically show neurocognitive deficits in impulsivity and decision-making. Impulsivity is also a central feature of Attention Deficit Hyperactivity Disorder (ADHD) which commonly co-occurs with substance use disorders. The purpose of the current study was to investigate whether the presence of ADHD exacerbates neurocognitive impulsivity in currently abstinent heroin addicts. The study was conducted in Bulgaria, where patterns of substance use are unique in that polysubstance dependence among heroin users is still relatively uncommon.

**Participants and Methods:** We tested 34 male heroin addicts not concurrently dependent on any other substance. Subjects completed (1) the Iowa Gambling Task (IGT), a measure of impulsive decision-making, and (2) the Stop Signal Task (SST), a measure of inability to inhibit inappropriate motor responses. Participants were classified into ADHD (n=11) and non-ADHD (n=23) groups based on the standard cutoff score of 46 on the Wender-Utah Rating Scale (WURS).

**Results:** Heroin addicts with ADHD displayed more pronounced deficits in decision-making on the IGT [ $F(1,32)=8.15, p<.008$ ], evidenced by greater selections from the disadvantageous decks throughout the task. Conversely, they did not perform more poorly than non-ADHD heroin addicts on the SST.

**Conclusions:** These results indicate that the presence of ADHD does not uniformly exacerbate neurocognitive impulsivity in heroin addicts. Whereas heroin addicts with ADHD demonstrate more impulsive decision-making than heroin addicts without ADHD, they do not show increased psychomotor impulsivity. Identifying the differential effects of ADHD on neurocognitive dimensions of impulsivity may be of clinical significance for relapse prevention and treatment compliance among heroin addicts.

Correspondence: *Laura Segalà, M.S., Psychiatry, University of Illinois at Chicago, 1601 W Taylor St, Chicago, IL 60612. E-mail: lsegala@psych.uic.edu*

**P. WALECKI, W. LASON, S. BIEDRZYCKI & E. GORZELANCZYK. Effect of therapeutic dose of methadone at risk behavior in opioid-dependent individuals in methadone substitution therapy.**

**Objective:** Objective of the study was to assess the propensity for risk behavior in opioid-dependent individuals treated with methadone substitution therapy. The behaviors of people addicted increases tend to risk behavior compared to healthy subjects, it is therefore important to indicate whether the administration of methadone reduces this trend.

**Participants and Methods:** The study involved 33 people. To assess the tendency to the risk behavior Iowa Gambling Task (IGT) test was used. IGT test was conducted twice: before and 1.5 hour after administration of methadone. 32 healthy individuals matched for age and gender were included to the control group.

**Results:** At a similar level was the incidence of risk decisions and safe decisions in the group of addicts before the administration of methadone (49.9 and 50.1) and in the control group (50 and 50). After administration of methadone in a group of addicts and control group incidences of risk and safe decisions were changed. Wilcoxon matched-pairs signed-ranks test shows that a statistically significant change ( $p<0.05$ ) after administration of methadone occurred only in the group of addicts (reduction of risk decisions by 13.47% and increase of safe decisions by 13.42%).

**Conclusions:** After administration of methadone there was statistically significantly decreased tendency to risk behavior, which has reduced the incidence of risk decisions in relation to the safe decision. The results show that in the opioid-dependent individuals treated with methadone substitution therapy a single dose of methadone has an impact on risk behavior as measured by IGT test.



Correspondence: *Piotr Walecki, Jagiellonian University Medical College, ul. Kopernika 7, Krakow 31-034, Poland. E-mail: pwalecki@cm-uj.krakow.pl*

**W. LASON, P. WALECKI, K. WLODARCZYK, S. BIEDRZYCKI & E. GORZELANCZYK. Single dose study of the effect of methadone on psychomotor functions in opioid-addicted individuals on methadone maintenance.**

**Objective:** The aim of this study was to assess the psychomotor function of people treated with substitution therapy in opiate addiction, in particular, evaluation of the functioning area of the cerebral cortex lying at the intersection of lobes: temporal, parietal and frontal lobes and evaluation of eye-hand coordination.

**Participants and Methods:** 28 persons were examined. The study was performed twice, immediately before and about 1.5h after oral administration of a therapeutic dose of methadone, using a custom test implemented by the researchers on a graphics tablet. The aim of the first part of the study was to test the most accurate mapping of geometric shapes by drawing a contour with the dominant hand. In the second part of the study the participants had to put their signatures on the tablet. Specially made software allowed to analyze the parameters of the hand motion: force levels, the time of the task, speed and acceleration of drawing, the amplitude and frequency of hand tremors.

**Results:** The task of drawing the figures for the spectrum of trembling deviation observed slight tremors reduced mean amplitude of the primary component (1Hz), while increasing the mean amplitude for the components from 2Hz to 16Hz. In the signature task observed a significant reduction in the mean amplitude of tremors in the middle of the component analysis (5Hz to 9Hz). The task of drawing the figures for the spectrum force levels observed significant changes in the range: 2Hz to 5Hz and 7Hz to 16Hz.

**Conclusions:** A single dose of methadone in opioid-addicted individuals reduces the dominant hand tremors, particularly in the basic frequency, which indicates improvement in psychomotor function.

Correspondence: *Piotr Walecki, Jagiellonian University Medical College, ul. Kopernika 7, Krakow 31-034, Poland. E-mail: pwalecki@cm-uj.krakow.pl*

## Epilepsy/Seizures

**A. BALA, A. WNUK, A. RYSZ & A. MARCHEL. Lateralization of Cognitive Functioning in Patients with Right- and Left-Hemispheric Epilepsy.**

**Objective:** The study was performed to check whether there are differences in the cognitive functioning of patients with right- and left-sided epilepsy, resistant to pharmacological treatment. Study is planned in relation to the theory of lateralization of cognitive functions in the brain, according to which the left hemisphere (dominant) is responsible primarily for verbal functions, and the right for non-verbal.

**Participants and Methods:** Wada Test was used to determine which hemisphere is dominant for speech. The study included subjects with left-sided dominance. Two groups were studied with first consisting of patients with left-hemispheric epilepsy and the second with right-hemispheric epilepsy. Each group consisted of 20 subjects, both male and female, aged 20-45 years. Verbal Scale from Wechsler Adults Intelligent Scale - Revised (WAIS-R) as well as Luria Memory Words Test were used in order to evaluate verbal (left-hemispheric) functioning. In relation to nonverbal (right-hemispheric) functioning there were administered Non-Verbal Scale from WAIS-R and Rey-Osterrieth Complex Figure. All of the subjects were recruited from the Clinic of Neurosurgery of the Medical University of Warsaw.

**Results:** Group of patients with left-sided hemispheric dominance and left hemispheric epilepsy has achieved lower results in tests investigating verbal functions than subjects with right hemispheric epilepsy, while the second group has shown reduced performance in non-verbal tests.

**Conclusions:** Both investigated groups have shown lower results in administered tests. Research has demonstrated that there are differences in the pattern of cognitive functioning among patients with left- and right-hemispheric epilepsy.

Correspondence: *Aleksandra Bala, Faculty of Psychology, Warsaw University, ul. Stawki 5/7, Warsaw 00-183, Poland. E-mail: aleksandra.bala@gmail.com*

**E. BENNETT & E. MELDRUM. Psychological Intervention With a Child Experiencing Reflex Anoxic Seizures: A Case Report.**

**Objective:** We describe the case of a ten-year old girl who experienced anoxic seizures in response to medical instruments and settings. The girl was referred to psychology and received around fifteen weekly sessions of therapy. We summarise the key strategies and principles of the intervention and outline the positive impact of the work on both the girl and her family.

**Participants and Methods:** Intervention utilised an integrated approach and involved psychoeducation about anxiety, graded exposure to feared stimuli (e.g. blood pressure monitors), family work, and the use of narrative therapy techniques. It particularly focused on enhancing the girl's ability to cope with triggers and the reduction of unhelpful avoidance behaviours.

**Results:** By the end of the initial treatment phase, the girl was able to have her blood pressure taken by a nurse, tolerate medical settings and watch procedures on the television. Despite increased contact with triggers, she had not experienced any seizures since starting therapy. Both the girl and her parents reported large reductions in anxiety about seizures and increases in their belief in her ability to cope. Standardised measures reflected a fall in the girl's anxiety and depression levels, and in her mother's parenting stress levels.

**Conclusions:** In this case, psychological intervention offered effective support in the management of anoxic seizures. Techniques can be used to reduce the frequency of seizures, to enhance self-efficacy and to lower family anxiety levels. Medical professionals should consider referring children experiencing reflex anoxic seizures and their parents for psychological intervention and support.

Correspondence: *Emily Bennett, University of Nottingham, 43 Mona Street, Beeston, Nottingham NG9 2BY, United Kingdom. E-mail: lwxeb4@nottingham.ac.uk*

**A. JAVURKOVA, J. KOTASKOVA, B. KAJUKOVA & P. MARUSIC. Relationship between Speech Dominance and Functional Memory Reserve in Temporal Lobe Epilepsy Patients.**

**Objective:** Intracarotid anesthesia procedure (Wada test) is used preoperatively to assess for lateralization of speech and memory functions. The aim of study was to compare performance of patients with typical and atypical, i.e. right or bilateral, speech dominance in temporal lobe epilepsy (TLE) patients.

**Participants and Methods:** Preoperatively we tested 216 patients – candidates of epilepsy surgery; age 7 to 64 years; 130 left-sided; 86 right-sided TLE. Intracarotid amobarbital/methohexital procedure was performed on one day in both sides with testing of language functions and presentation of ten items. Free recall and recognition were then assessed and functional reserve at the contralateral side, i.e. with injection ipsilateral to TLE, calculated. Functional reserve was classified as sufficient (7-10 recognized items), borderline (6 items) or insufficient (0-5 items). Functional capacity was calculated as outcome after second injection, i.e. into hemisphere contralateral to epilepsy focus.

**Results:** We found atypical speech in 35 left-sided, and 8 right-sided TLE patients. Left-sided patients with typical speech dominance showed significantly lower functional reserve and higher functional capacity than right-sided patients or than left-sided patients with atypical speech dominance. Left-sided patients also had more frequently (25% vs. 10%) insufficient memory reserve and were more frequently left without having surgery.

**Conclusions:** Left-sided TLE patients with typical speech dominance show low functional memory reserve and high memory capacity. Left-sided TLE patients with atypical speech dominance have memory distribution in relation to epilepsy focus similar in comparison to right-sided patients.

Correspondence: *Alena Javurkova, Psychology, University hospital FNMI, FNKV, V Uvalu 85, dep. 16, Prague 5- Motol 150 00, Czech Republic. E-mail: alena.javurkova@post.cz*

**S. SHAVEL-JESSOP, S.E. AYLETT, W.P. MANDY & P.M. RANKIN. Beyond IQ: Cognitive Profiles in Children and Young People with Complex Epilepsy and Intellectual Disability.**

**Objective:** It is well known that epilepsy is a heterogeneous disorder and in those with intact intellectual function, its different variables can have relatively specific effects on cognition and learning. There is a

paucity of scientific investigation, however, into the effects of epileptic variables in young people with intellectual disability (ID), who frequently have the most complex medical and learning needs. This study examined executive function, everyday memory, and social communication abilities in young people with focal and generalised complex epilepsy, to explore cognitive profiles beyond general intellectual ability in these groups.

**Participants and Methods:** A number of ecologically valid neuropsychological measures were used to compare the general intellectual ability, everyday memory, executive function, and social communication abilities of a group of young people with complex focal epilepsy and mild-to-moderate ID (ages 12-22 years, mean IQ 61.76) to an age- and IQ-matched group with complex generalised epilepsy (ages 12-23 years, mean IQ 57.24).

**Results:** Face-to-face neuropsychological testing and examination of medical variables found no significant differences between the groups. Utility analyses demonstrated that standardised neuropsychological measures were used to good effect in these groups, identifying meaningful cognitive strengths and weaknesses across domains.

**Conclusions:** Results suggest that the classification of epilepsy as focal or generalised did not appear to differentially affect cognitive outcomes. Clinical and research implications are discussed, highlighting potential for applications to the clinical management of young people with complex epilepsy, and to future empirical investigations.

Correspondence: *Sara Shavel-Jessop, DClinPsy, Developmental Cognitive Neuroscience Unit, University College London Institute of Child Health and Great Ormond Street Hospital for Children NHS Trust, 30 Guilford Street, London WC1N 1EH, United Kingdom. E-mail: sara.jessop@gmail.com*

### Executive Functions/Frontal Lobes

**M. ALVAREZ GUERRA, X. MUNTANER CASINO, C. GALISTEO L. VEIGA, M. LARROSA PADRÓ & M. JODAR VICENTE. Verbal fluency in postmenopausal fibromyalgia patients without depression.**

**Objective:** Fibromyalgia (FM) is a chronic pain syndrome characterized by widespread pain and stiffness, multiple tender points, and fatigue. Patients with FM frequently have subjective cognitive complaints. Several studies demonstrated that the cognitive deficits in fibromyalgia not differed than the deficits observed in depressed patients. While memory and speed processing deficits have been frequently reported, few studies are focused on executive functions. We studied the performance in semantic and phonetic fluency in a group of FM patients without depression, and previously to receive pain treatment.

**Participants and Methods:** Subjects: 23 FM postmenopausal women, with ages between 49 and 68 (mean:56.4). All of the patients were recruited by rheumatologists according to the American College of Rheumatology criteria. Patients with Beck Depression Scale <9, and without pharmacological treatment, participated in this study. Other exclusion criteria: presence of neurological conditions, psychiatric disorders, systemic diseases, and scores < 8 (scalar score) in the Vocabulary subtest of the Wechsler Intelligence Test. Material: Verbal fluency capacity was assessed with the FAS and for the semantic fluency task patients had to produce orally as many words as possible of a semantic category: animal naming (Lezak, 2004).

**Results:** The fibromyalgia patients obtained impairment scores in the FAS, compared to normative data of the Spanish population. (Mean: 29.48, sd: 11.8). In the animals naming task the performance of FM patients was not altered.

**Conclusions:** Verbal phonetic fluency performance is altered in FM independently of depression and medication.

This executive deficit could be in the basis of the verbal learning deficits reported in FM.

Correspondence: *Merce J. Vicente, PhD., Neurology, Hospital de Sabadell, Servei de neurologia, Hospital de Sabadell Parc tauli, 1, Sabadell, 08208, Spain. E-mail: merce.jodar@uab.cat*

**A. CHUDERSKI & T. SMOLEN. Neurobiologically Plausible Computational Model of Proactive and Reactive Modes in Executive Control of Stroop-like Interference.**

**Objective:** A general executive control (EC), active in most of cognitive tasks, may stem from an interaction of top-down biasing in dor-

solateral prefrontal cortex (dlPFC) and conflict and risk monitoring in anterior cingulate (ACC). EC relying on dlPFC is probably proactive (anticipatory, using cues) but cognitively expensive. EC relying on ACC might be reactive (correctory, item-specific) but effortless. The study presents a development of a new symbolic-subsymbolic computational architecture (DUCCA) aimed at modeling both these neurocognitive mechanisms.

**Participants and Methods:** DUCCA simulates the interactions between dlPFC and ACC in relatively complex cognitive tasks and provides quantitative predictions of corresponding behavioral effects. So far, DUCCA generated hypotheses on prefrontal activity and its behavioral consequences in Stroop-like tasks and the simulated patterns of activity were fit to data present in fMRI literature.

**Results:** DUCCA replicated the Gratton effect (increased control after incongruence), effects of practice and of task difficulty on decrease in Stroop interference, and a complex pattern of individual differences in Stroop. These effects resulted from different dynamics of simulated underlying neural mechanisms. In general, model's increased pre-trial activity in dlPFC resulted in reduced error and time Stroop interference. The higher pre-trial dlPFC activity was, the higher post-trial ACC activity could be noticed. Similar patterns can be found in some published fMRI research.

**Conclusions:** The proposed architecture is a preliminary work on a formal description of how the brain switches between proactive and reactive modes of control. The model points out the role of dlPFC and ACC dynamics in the operation of the control of cognition.

Correspondence: *Adam Chuderski, Ph.D., Jagiellonian University, al. Mickiewicza 3, Krakow 31-120, Poland. E-mail: achud@emapa.pl*

**G. PLUCK, S. SARKAR, K. HYUK-LEE, S.A. SPENCE & R.W. PARKS. Frontal Lobe Function and Childhood Traumatic Events in a Sample of Individuals with Complex Psychosocial Problems.**

**Objective:** To assess the contribution of childhood traumatic events to frontal lobe related neuropsychological function in a sample of individuals with complex psychosocial problems.

**Participants and Methods:** A sample of 69 socially excluded individuals was recruited from homeless hostels, free meal services and an alcohol dependency residential centre. They completed three assessments of frontal lobe function, the Wisconsin Card Sort Test, the Similarities Task of the Wechsler Abbreviated Scale of Intelligence and the Frontal Systems Behavior Scale. They also completed the Childhood Trauma Questionnaire which measure 5 forms of negative events; emotional abuse, emotional neglect, physical abuse, physical neglect and sexual abuse.

**Results:** Overall, 59/69 (85%) of the sample reported experiencing at least low to moderate levels of trauma as children. Total FrSBe scores were significantly positively correlated with both emotional abuse ( $r=.345, p=.005$ ) and emotional neglect ( $r=.253, p=.042$ ). The Similarities Task was significantly negatively correlated with both sexual abuse ( $r=-.241, p=.046$ ) and physical neglect ( $r=-.255, p=.034$ ). For each of the four significant correlations, the direction indicated that greater neuropsychological impairment was associated with greater severity of childhood trauma. However, there were no significant correlations between childhood trauma and Wisconsin Card Sort Test performance.

**Conclusions:** In this enriched sample of individuals with complex psychosocial and neuropsychological problems, we found significant associations between frontal lobe function and childhood traumatic events. This suggests that for some individuals with current problems in adulthood, such as substance abuse and homelessness, neuropsychological impairments may have distal antecedents.

Correspondence: *Graham Pluck, PhD, Academic Clinical Psychiatry, University of Sheffield, The Longley Centre, Norwood Grange Drive, Sheffield S35 1SG, United Kingdom. E-mail: g.pluck@sheffield.ac.uk*

**H. KAFADAR. Wisconsin Card Sorting Test and Raven Standart Progressive Matrices Test: A Latent Variable Analysis.**

**Objective:** Wisconsin Card Sorting Test and (WCST) Raven Standard Progressive Matrices Test (RSPM) are the most frequently used tests in neuropsychology literature. WCST is known as an executive function test, RSPM is known as general ability test or the test that measures psychometric g factor. The studies carried out on these tests focus on the

detection of features which are measured by these tests. It is thought that expressing the relationship between psychometric *g* factor and executive functions will contribute to the understanding of executive functions and general ability factor. In this study, the relationship between two tests is tried to be analyzed by Structural Equation Model (SEM) and considering the relationship between two tests; the relationship of cognitive processes that are measured by tests is tried to be understood.

**Participants and Methods:** 175 healthy subjects which are university students involved into the research.

**Results:** In the study significant correlation coefficients are obtained between WCST and RSPM. Total correct and total fault, total perseverative respond, total perseverative error and total nonperseverative fault number on WCST and duration and total points of RSPM are included into SEM analysis. SEM results are found to be  $X^2 = 22.45$ ,  $P < 0.21$ ,  $DF: 22$ ,  $RMSEA = .14$ ,  $CFI = .99$ .

**Conclusions:** The finding that WCST and RSPM measure similar features is of a quality that supports the relationship between executive functions and general ability. As an executive function test WCST is about mental flexibility, reasoning, abstract thinking, concept learning, perseveration etc.; RSPM as a general ability test is about analytical mind processes such as perception, describing relation, relative interpretation. In the light of findings taken from SEM; cognitive processes that are calculated by these two tests are seen to be closely related with each other.

Correspondence: *Hatice Kafadar, Ph. D, Psychology, Abant İzzet Baysal University, Abant İzzet Baysal University Faculty of Science and Art, Department of Psychology, Gölköy Campus, Bolu 14280, Turkey. E-mail: haticekafadar@yahoo.com*

#### S. FRISCH, S. FÖRSTL & A. LEGLER. Assessment of Multitasking Deficits in an Everyday Life Task.

**Objective:** Among others, Shallice & Burgess (1991) have shown that common psychometric tests fail to assess crucial aspects of executive functioning in everyday-life situations, such as initiating and monitoring parallel actions in low-structured environments (multitasking). We present a cooking task in order to assess executive function impairments in brain damaged patients in every-day life situations. In contrast to previous accounts (Chevignard et al., 2008), we emphasized the multitasking idea by instructing subjects explicitly to prepare two components of a meal at the same time.

**Participants and Methods:** A sample of brain-damaged patients (stroke, TBI) was compared to healthy controls. Subjects' performance was rated independently by two observers on the basis of different behavioral criteria.

**Results:** Patients explored less and were less successful in monitoring their actions. Correcting errors was less efficient. Furthermore, they performed the task more often in a serial rather than in a parallel fashion which was why it took them longer to complete the task. In the patient sample, we observed a strong correlation between performance in the cooking task with the BADS total score as well as with the score in the BADS Six Elements Task. However, performance in the cooking task was not correlated with executive tasks which do not imply multitasking abilities, such as fluency measures or a construction task (Link's cube).

**Conclusions:** Cooking provides a valid testing ground to assess everyday life executive deficits following brain damage. Furthermore, it seems to measure specific multitasking abilities which are not captured by most of the standard tests in clinical neuropsychology.

Correspondence: *Stefan Frisch, PhD, Cognitive Neurology, University Clinic Leipzig, Liebigstrasse 16, Leipzig 04103, Germany. E-mail: frisch@cbs.mpg.de*

#### A. LUNDEQUIST, B. BÖHM, Z. NAGY, B. VOLLMER & A.C. SMEDLER. Executive dysfunction in young adults born preterm - neuropsychological test results and structural brain correlates.

**Objective:** Preterm children appear to develop a different neurobehavioral organization from children born at term, and executive function (EF) has repeatedly been cited as an area of specific weakness. Likewise, neuroimaging studies have shown that the majority of very preterm infants display structural abnormalities, including white matter injury and volumetric differences (Nagy et al., 2003, 2009). Based on the analysis of the effects of lesion in adults, Stuss & Alexander (2007) have

proposed a theoretical model, relating discrete categories of EF to regions within the frontal lobes. These EF categories and their coarse frontal localizations are: Executive cognition – dorsolateral prefrontal cortex (DLPFC), Behavioral / emotional self regulation – Ventral prefrontal cortex (VPFC) and Energization- superior medial frontal gyrus. The aim of this study was to identify preterm young adults' strengths and weakness in terms of EF categories, and investigate their brain structural correlates.

**Participants and Methods:** As a part of the longitudinal Stockholm Neonatal Project, 62 preterm and 38 term children were administered the Delis-Kaplan Executive Function System (D-KEFS) and behavioral self-reports (YSR and SDQ) as indices of EF at age 18. To investigate structural brain correlates, T1 and T2 weighted and diffusion weighted magnetic resonance images have been collected using a 1.5 T scanner.

**Results:** Results showed that preterm children had deficits primarily in Executive cognition and Energization, and less so in Behavioral self-regulation, with the extremely preterm children, born GA 23-28, having the most marked deficits also when controlling for overall cognitive level. Structural brain correlates are presently analyzed and preliminary findings will be presented.

**Conclusions:** A theory-based and interdisciplinary approach promotes our understanding of executive dysfunction in preterm children.

Correspondence: *Aiko Lundequist, Ph.D candidate, Woman and Child Health, Karolinska Institutet, Astrid Lindgren Children's hospital, Q2:07, Stockholm 171-76, Sweden. E-mail: aiko.lundequist@ki.se*

#### D. BOELEN, L. FASOTTI & J.M. SPIKMAN. Script Generation in Patients with Executive Impairments.

**Objective:** Neuropsychological studies have shown that patients with frontal lobe damage may exhibit deficits in performing everyday activities. One account of the source of such deficits is that they reflect an impairment of action knowledge structures used for the representation of events, or scripts. Not only patients with frontal lobe damage, but also patients with damage outside the frontal lobes may exhibit executive impairments. This raises the question whether patients with executive problems, not necessarily resulting from damage to the frontal areas, show impairments in script generation.

**Participants and Methods:** Eighty-one patients with chronic acquired brain injury, referred for outpatient rehabilitation and diagnosed with a 'dysexecutive syndrome', were asked to describe how to perform 8 everyday activities. These scripts were an adaptation of Dritschel's Everyday Description Task (1998). The task was also administered to 103 healthy control subjects. The number of relevant and irrelevant steps of each script was counted. An action was considered relevant if it led to the stated goal. Irrelevant actions were repetitions, actions placed in an incorrect temporal sequence, and intrusions.

**Results:** T-tests showed that healthy controls evoked significantly more relevant actions, whereas the patients evoked significantly more irrelevant actions. The ratio (irrelevant/irrelevant+relevant) was also significantly different, indicating that patients have more problems with generating action scripts of everyday activities.

**Conclusions:** Patients with executive problems resulting from brain damage not restricted to the frontal lobes, showed impairments in script information processing. The apparent problems in action-knowledge activation might be underlying to the problems that these patients have in executing complex everyday activities.

Correspondence: *Danielle Boelen, MA, Research, Education & Development, St. Maartenskliniek, Hengstdal 3, Nijmegen 6522 JF, Netherlands. E-mail: d.boelen@maartenskliniek.nl*

#### S. IWANSKI, J. SENIOW, M. LESNIAK & A. CZLONKOWSKA. Attention deficits in Wilson's disease patients.

**Objective:** Wilson's disease (WD) is a rare genetic disorder in which copper is accumulated in various organs, especially the liver and the brain. Pathology is observed in basal ganglia (BG) and other subcortical and cortical structures. Neurological, psychiatric and cognitive-behavioural signs are frequently found in this population. To date a detailed analysis of disturbances of specific components of attentional system is lacking.

We aimed to evaluate various components of attention in patients with neurological form of WD (WDN) and with asymptomatic form (WDA) and to assess correlations between attentional processes and brain lesions.

**Participants and Methods:** Sustained, selective, and divided attention as well as attentional switching were examined using The Test of Everyday Attention (TEA). Two experimental groups included 26 WDN and 26 WDA patients were compared with 35 healthy controls.

**Results:** Abnormal performance was found in all components of attention in up to 62% of the WDN patients. Additionally, 19% of WDA patients performed poorly in sustained attention test.

Neurological state was significantly correlated with selective and divided attention scores. However, in a motor control task neurological signs did not prove to affect performance in motor-dependent TEA subtests.

In a subgroup of neurological subjects with relatively isolated BG pathology comparing to patients without damage to BG abnormalities in attentional switching were more frequent.

**Conclusions:** Attentional deficits are a part of a clinical picture in WD. The most affected processes include selective attention, divided attention, working memory and attentional switching. Abnormalities of the latter one might be related to changes within BG.

Correspondence: *Szczepan Iwanski, 2nd Dept. of Neurology, Institute of Psychiatry and Neurology, 9 Sobieskiego Str., Warsaw 02-957, Poland. E-mail: iwanski@ipin.edu.pl*

**M. LEVAV, D. TAL-JACOBI, Y. RASSOVSKY & A. BREZNER. Executive Function Assessment of Children Affected with Posterior Fossa (PF) Tumors in the Chronic Stage.**

**Objective:** PF tumors are associated with cognitive, motor and language disabilities in children. At the chronic stage of the tumor those children are at risk of developing educational, psychological and behavioral difficulties. Studies reported severe neurocognitive deficiencies in attention, memory and processing speed. The axonal connection between frontal brain structures and the cerebellum raises the hypothesis of the possible effects of PF on executive functions.

**Objective:** To assess executive functions of these children following Adele Diamond's model and its components: working memory, inhibition and attention abilities.

**Participants and Methods:** 25 children, 12 with PF (8 males, mean age 11.8, SD=2.8; 7 astrocytoma, 5 medulloblastoma) and 13 controls (6 males, mean age 9.4; SD=2.6). Assessments were performed at least one year post-treatment. Raven Matrices and the WISC 95 Vocabulary subtest were used to assess cognitive level. Executive function was assessed with a battery of computerized tests and subtests from the WMTB-C and TEA-CH. Three indexes were built to perform comparisons between groups: 1 Working Memory: (Digit Span; Backward digit recall; Block Recall), 2 Inhibition: Reaction time (Flanker Fish; Hearts & Flowers) and 3 Attention: Commissions RT, Total RT, % commissions, Hit rate, % omissions (ACPT; VCPT).

**Results:** Children treated for PF tumors scored lower in all measures. They were impaired in working memory ( $z=-1.2$ ;  $p<0.001$ ); and inhibition scores were lower than those in the control group with significant longer reaction time. No age and gender differences were observed.

**Conclusions:** PF tumors affect neuropsychological function and more specifically, on executive functions. These outcomes require further investigation.

Correspondence: *Miriam Levav, PhD, Ped Rehabilitation, Tel Hashomer Medical Center, Ramat Gan, Tel Aviv no zipcode, Israel. E-mail: mlevar@gmail.com*

**H. OKUNIEWSKA, A. MARYNIAK & A. ONDRUCH. The effects of age on Stroop interference in clinical vs healthy groups of children.**

**Objective:** The Stroop task is widely used to assess attentional dysfunction due to a frontal or fronto/parietal deficit and is also thought to be related to the maturation of prefrontal cortex. The study aimed to prove a diagnostic usefulness of the Polish Names and Colours Interference Test (TINiK) in clinical setting and to investigate the pattern of performance on four TINiK subtasks according to the type of brain damage (focal or diffuse) and age of the patients.

**Participants and Methods:** Total of 105 subjects (59 female, 46 male), aged 11-18 were divided into two groups: children aged 10;4-14;6 and adolescents aged 14;7-17;10 within every diagnostic category: healthy (H - 35), heterogenous focal brain damage (BD - 34) and cardiac arrhythmia (CA - 36). TINiK is composed of four cards/conditions: reading color names, naming color bars, interference color-word naming and switching between reading and interference naming. The number of correct responses in 60 sec. time limit for each tasks was collected.

**Results:** A discriminant analysis using the four basic TINiK scores was able to significantly differentiate the BD from H group (91.4%) and from CA group (63.9%). H group significantly outperformed both clinical groups. H and CA groups show improvement of performance systematically with age on all TINiK subtasks although at the different level. The BD group reveals merely nonsignificant developmental improvement especially among the adolescence period.

**Conclusions:** TINiK has acquired a strong neuropsychological validation. Developmental improvement in interference control may undergo a hampering influence from various neuropathological mechanisms which are still to recognize.

Correspondence: *Hanna Okuniewska, Faculty of Psychology, University of Warsaw, Stawki 5/7, Warszawa 00-183, Poland. E-mail: haniaok@psych.uw.edu.pl*

**Z. KLYSZEJKO, T. RUTKOWSKI, A. SZMALEC & M. OLSZANOWSKI. "Does Conflict Monitoring Theory account for the control mechanisms involved in dual tasking?"**

**Objective:** The current study investigates the mechanisms underlying the control of interference during dual-task coordination. Partially inspired by the Conflict Monitoring Hypothesis (Botvinick et al., 2001), we test the assumption that interference during dual-tasking is resolved by a top-down adaptation mechanism which is responsible for behavioral adjustments in the prioritization of the coordinated tasks.

**Participants and Methods:** In a series of two experiments, we provide evidence for the operation of such an adaptation mechanism by demonstrating that the amount of dual-task interference is a function of the probability of previously encountered single- versus dual-task events. In Experiment 1 we investigate if the same executive function is present in a conflict task, as a Stroop task, as in a dual task. This was done by manipulating the probability of interference in both tasks; 15 participants were tested. The goal of Experiment 2 was to extend the results from Experiment 1 to a dual task with a memory task as a primary task. We wanted to explore if interference and probability effect are similar when participants have to be continuously processing information. 18 subjects were tested in this experiment.

**Results:** First experiment: Interference x Probability  $F(1,14)=33.44$ ;  $p<0.001$ ;  $\eta^2 = .75$ ,  $F(1,14)=60.05$ ;  $p<0.001$ ;  $\eta^2 = .81$ .

Second experiment:

Interference x Probability:  $F(1,17)=15.12$ ;  $p<0.01$ ;  $\eta^2=0.47$ .

**Conclusions:** We conclude that dual-task interference shows strong similarities to the so-called Stroop-like types of cognitive interference in the way suboptimal performance is dealt with by the cognitive system.

Correspondence: *Zuzanna Klyszejko, Psychology, Warsaw School of Social Sciences and Humanities, Marymoncka 34c/7, Warsaw 01-513, Poland. E-mail: zklyszejko@gmail.com*

**P. WOLSKI & D. ASANOWICZ. Spatial Attention Affects the Size and Lateral Asymmetry of the Poffenberger Effect.**

**Objective:** Simple manual reactions to laterally presented light flashes take 3-4 milliseconds longer when the subjects use their contralateral than their ipsilateral hands. Known as Poffenberger effect or Crossed - Uncrossed Difference (CUD) this effect has been widely believed to reflect the time needed for interhemispheric transfer of information and be of structural origin. There is some evidence however, suggesting that dynamic factors might be important in CUD, too. We wanted to test for that possibility by changing stimulus location uncertainty in a simple reaction time CUD study.

**Participants and Methods:** Because the CUD effects are very small, we took a very large number of RT measurements: each of the 12 subjects completed 18 experimental sessions of 512 trials each. With more than a 100 thousand RT measurements overall, our experiment is one of the biggest and most statistically powerful CUD studies. We used blocked presentation condition with no location uncertainty, a randomized presentation condition in which the stimuli are equally likely to appear in either visual field; and an intermediate condition with 25% uncertainty.

**Results:** We observed a significantly shorter CUD of only 1.2 ms in the blocked condition with no stimulus location uncertainty and more typical values of 3-5 ms in conditions in which the side of stimulus presentation was 50% or 75% certain

**Conclusions:** Our results suggest that the CUD does not have purely structural origin, and that dynamic, attentional factors play a role in it. The pattern of asymmetries concurs with the notion of the right hemisphere dealing with unexpected stimuli better than the left.

Correspondence: *Piotr Wolski, dr hab., Institute of Psychology, Jagiellonian University, Al. Mickiewicza 3, Krakow 31-120, Poland. E-mail: piotr.wolski@uj.edu.pl*

### Language and Speech Functions/Aphasia

**B. DANILUK, A.R. BORKOWSKA & A. KALISZEWSKA. Right Hemisphere Language Abilities in Patient with Corpus Callosum Total Agenesis – a Case Study.**

**Objective:** The aim of the study was language and communication difficulties description in patient with corpus callosum agenesis.

**Participants and Methods:** The case of 16-year-old boy with corpus callosum total agenesis and Arnold-Chiari disease is presented. During prenatal period, atypical brain development was diagnosed in obstetric sonography. Inharmonious psychomotor development was recognized in early childhood. Wechsler Scale results suggested higher than average intelligence. Full neuropsychological assessment was applied in the study, including The Polish version of the Right Hemisphere Language Battery (RHLB-PL).

**Results:** Total score in RHLB-PL suggested language and communication impairment. The greatest problems were observed in the field of behavioral self-control and discourse abilities. The patient had difficulties in the sphere of the discourse maintaining and resisting from production of unconnected topics, comments and inappropriate remarks. Other features of the contact were: lack of the eye contact and excessive gesture usage.

In the Humour test the patient couldn't choose the correct punchline of jokes. It is worth noticing, that the dissociation between relative high level of written metaphores analysis abilities and low level of Picture Metaphores perception and explanation occurred. The patient didn't have any problems in single Word perception, as well as his interpretations of written metaphors were faultless. His scores in Linguistic Prosody was average.

**Conclusions:** Despite of lack of structural changes in the brain cortex, patient MJ with corpus callosum agenesis presented high number of deficits typical of right hemisphere-damaged patients. It is possible to explain that fact in the context of interhemispheric transfer disorders, especially when complex material was processed.

Correspondence: *Beata Daniluk, Ph.D., Clinical Psychology and Neuropsychology, Institute of Psychology, University of M. Curie-Skłodowska, Plac Litewski 5, Lublin 20-080, Poland. E-mail: beata.daniluk@wp.pl*

**A.M. PAWELCZYK, E. LOJEK, J. RABE-JABLONSKA, T. PAWELCZYK, M. RADEK & B. GODLEWSKI. Communication functioning of a patient with a cancer in the right frontal lobe before and after surgery.**

**Objective:** Despite lots of evidence on communication disorders after right hemisphere (RH) damage, there is still little data showing the course of changes of these abilities during the disease. The aim of the present study was to show the communication skills of a patient with a cancer in the RH before and after surgery.

**Participants and Methods:** The subject was a 41-years old, right handed, woman who had been suffering from left hemifacial pain for several months before admission. No other neurological deficit was revealed. CT scan showed the presence of parasagittal meningioma localized in the 1/3 of the superior sagittal sinus of the frontal area of the RH. There were no signs of neglect or aphasia in this case. The patient was tested 3 days before and 30 days after the surgery using the Right Hemisphere Language & Communication Battery (RHLB-PL). The patient showed significant disorders of humor and metaphor appreciation and explanation, linguistic and emotional prosody and discourse in the baseline assessment. Repeated evaluation indicated the improvement of metaphor appreciation emotional prosody and discourse. There were still disorders of humor appreciation, metaphor explanation and linguistic prosody in this patient after the surgery.

**Results:** The results of this case study suggested that the impairment of language and communication abilities specific for the RH could be an important sign of the RH pathology even without the presence of evident neurological dysfunctions. Moreover, some of these neurocognitive disorders, but not all, can improve due to the treatment.

**Conclusions:** There is a strong need to diagnose language and communication disorders in RHD patients as well as to provide an appropriate neuropsychological rehabilitation.

Correspondence: *Agnieszka M. Pawelczyk, PhD, Department of Affective and Psychotic Disorder, Medical University, Czechoslowacka Street 8/10, Lodz 92-216, Poland. E-mail: agnieszka.pawelczyk@umed.lodz.pl*

**N. OGAWA, Y. NISHIO, Y. SUZUKI, S. KANNO, Y. TANAKA, H. KIKUCHI, K. ICHIKAWA & E. MORI. Disorder of Phonological Processing in Logopenic Progressive Aphasia.**

**Objective:** Logopenic progressive aphasia (LPA), a clinical syndrome recently proposed as the third variant of progressive aphasia is characterized by fluent but sparse spontaneous speech, defective sentence (but preserved word) repetition and short digit span. Our aim is to characterize linguistic features in LPA.

**Participants and Methods:** Two subjects were with LPA, 56-year-old right-handed man and 75-year-old right-handed woman. In both patients repetition of long-syllable words was defective in addition to sentence repetition impairment.

To examine the effect of syllable number on span and repetition performances, we administered 1) a word span task with words of varied length and; 2) a word repetition task including 6-7 syllable words, which are uncommon in English but common in Japanese. 3) A lexical judgment task was given to examine whether their phonological lexicon was preserved. 4) To examine lexical effects on repetition performance was compared between word repetition and non-word repetition.

**Results:** We found that 1) the performance of word span became worse as the number of syllable was increased; 2) the ability of repeating long-syllable words was defective; 3) the performance on the lexical judgment task was preserved, and; 4) repetition of real words better than that of non-words.

**Conclusions:** The present results suggest that the linguistic deficit in LPA is characterized by a defective phonological processing and preserved phonological lexicon.

Correspondence: *Nanayo Ogawa, MA, Tohoku university, 2-1 Seiryomachi Aoba-ku, Sendai 980-8575, Japan. E-mail: ogawa-nana@umin.ac.jp*

**M. SZUPICA-PYRZANOWSKA, L. OBLER & G. MARTOHARDJONO. Explaining Agrammatism – Morphology vs. Phonology.**

**Objective:** Failure to supply inflection is common in agrammatic aphasics, who instead resort to bare verb forms or substitute verbal endings (Arabatzis & Edwards, 2002; Bastiaanse & Thompson, 2003; Menn & Obler, 1990; Wenzlaff & Clahsen, 2004). Among attempts to explain the absence of inflection in mandatory contexts are competing morphological (Kehayia et al., 1990; Thompson et al., 2002; Lee and Thompson, 2005; Miceli & Caramazza, 1988) and phonological accounts (Kean, 1979; Centeno, 1996; Meth, 1998; de Mornay Davies et al., 2006). In the present study we asked: What contributes more to the inflectional problems encountered by patients with agrammatic aphasia: morphology or phonology?

**Participants and Methods:** To test this, we administered an elicited production task to seven non-dysarthric and non-apraxic English-speaking agrammatic aphasics (mean age 58.1 years, range 42-70 years, at least 1 year post-onset). In the experimental task, we varied either the morphological or the phonological complexity of the environment of the inflectional morpheme.

**Results:** A repeated-measures ANOVA revealed that in the production of inflection morphological constraints (morpheme number  $p=.002$ , morpheme type  $p=.014$ , stem status  $p=.05$ ) play a far greater role in the omission of inflection than phonological conditions (syllable number  $p=.474$ , suffix syllabicity  $p=.496$ , sonority type  $p=.058$ ). However, error analysis indicates that phonology is used as a compensatory strategy to preserve inflection.

**Conclusions:** Morphology, we conclude, is not lost in aphasia but rather computational resources available in aphasia are not sufficient to fully process it, recommending cognitive rehabilitation strategies.

Correspondence: *Malgorzata Szupica-Pyrzanowska, PhD, CUNY Graduate School and University Center, 365 Fifth Ave., New York, NY, NY 10016. E-mail: malgosia.szupica@gmail.com*

### S. KISELEV & I. VOLIK. Cognitive Abilities in Preschool Children with Problem in Grammar Understanding.

**Objective:** The goal of research was to investigate the influence of cognitive abilities on the development of understanding grammatical structures in preschool children. We propose that weakness in understanding of complex grammatical structures can have relation with deficit in different cognitive abilities in different period of child development.

**Participants and Methods:** The sample consisted of 46 4-years-olds, 46 5-years-olds, and 45 6-years-olds. We used the computerized version of neuropsychological assessments for assessing cognitive abilities. It includes the subtests from Luria's verbal neuropsychological technique and NEPSY.

**Results:** We have revealed that problem in grammar understanding has relation with deficit basically in language abilities in children of 4 and 6 years of age, and with deficit in executive functions in children of 5 years of age.

**Conclusions:** This research has shown that there is change in the set of weaknesses that accompany problem in grammar understanding in children in the age period from 4 to 6. The obtained results have shown that it is necessary to take into consideration the age of children in the investigation of children with specific language impairment.

Correspondence: *Sergey Kiselev, Ph.D., psychology, Ural State University, Lenina ave., 51, Ekaterinburg 622083, Russian Federation. E-mail: eskisa@rambler.ru*

### B.E. PASTUSZEK-LIPINSKA. Melodic Intonation Therapy in Poland.

**Objective:** Melodic intonation therapy (MIT) uses melodic and rhythmic components to help patients with aphasia and speech developmental apraxia in speech recovery/development. To examine the method in Polish patients we developed a research study. The main aim of the study will be to use the method, carefully follow each patient's performance and try to add some additional components to the already existing protocol to enhance efficiency of the method and speed up the recovery process.

**Participants and Methods:** Twenty five participants will be recruited among patients with non-fluent aphasia with left-side brain injuries/strokes. The patients will be recruited in close cooperation with neurologists and neuropsychologists. Program by Helm-Estabrooks et al. (1989, 2004) will be adopted to Polish and used in treatment protocols. Some new findings on the effectiveness of inner rehearsals and auditory-motor feedback training will also be used (Norton et al., 2009). Participants will take part in an intensive therapeutic program. Namely each person will participate in both individual sessions (3 times per week during 9 months) and in group sessions (to better deal with the problem they suffer from by direct contact with other people). Children with speech developmental apraxia will participate in additional rhythmic lessons with clapping hands and singing.

**Results:** The expected results are as follows. In adults we expect improvement in speech fluency, perception, production and comprehension, as well as self-esteem and self-confidence. In children we expect improved speech perception, production, social behavior and integration.

**Conclusions:** Different methods have been currently in use to improve functioning of people suffering from aphasia and apraxia. MIT seems to be a promising method that might be helpful for people with aphasia/apraxia. In the project we tend to improve awareness about the method as it seems to be a good option for those who cannot e.g. use computer programs.

Correspondence: *Barbara E. Pastuszek-Lipinska, PhD, School of English, Adam Mickiewicz University, al. Niepodleglosci 4, Poznan 61-874, Poland. E-mail: energin@wp.pl*

### B.E. PASTUSZEK-LIPINSKA. Music Education Affects Speech Processing.

**Objective:** While it is well documented that the human brain is a dynamic rather than a stable system, there are still relatively few data answering the question of whether the plasticity of neural circuits is accompanied by changes in behavior. Several factors may influence neural circuits.

One of those factors seems to be music education and training, which alters the organization of the auditory and somatosensory cortices in humans. Thus, the question of the behavioural effects of sensory experience requires more attention and examination.

The main aim of the study was to examine whether music lessons and related auditory and manual training exert an impact on foreign language speech processing and therefore on second language acquisition at least at sounds level.

**Participants and Methods:** The processes were examined through an imitation study in which 106 speakers with different music background (53 musicians – 10-12 years of music education, and 53 non-musicians, aged from 15 to 69 years, with a mean age of 32 (median 28); 37 males and 69 females) were asked to repeat as accurately as they could stimuli in several foreign languages. All productions were recorded and then analyzed.

Listening tests with native speakers, phonetic and acoustic analyses and a set of statistical analyses provided evidence that music lessons significantly influenced speakers' performance in the study.

**Results:** In all tests musicians outperformed participants without musical background 65.53% of musicians' and 46.55% of non-musicians' productions were rated as correct.

**Conclusions:** These results confirm the positive impact of music lessons on human language processing and provide one of the first evidence that involvement in music results in better foreign speech processing as well in timing and "internal clock" regulation even after many years from the musical practice.

Correspondence: *Barbara E. Pastuszek-Lipinska, PhD, School of English, Adam Mickiewicz University, al. Niepodleglosci 4, Poznan 61-874, Poland. E-mail: energin@wp.pl*

### S. AMENTA & M. BALCONI. Comprehension of Irony in Social Situations: New Evidences from P200 and "Pragmatic-Semantic" P600 ERP Effects.

**Objective:** To understand ironic meanings, the interaction of verbal and non verbal information within a situational social context is necessary. The analysis of situational cues, including contextual and emotional on verbal cues, is considered crucial for the understanding of ironic intention and connected implied meanings (Utsumi, 2000; Wakiyama, 2007). However, previous ERP studies did not focus on such interactive dimension with the exception of the prosodic component (Cornejo et al., 2007; Regel et al., 2009; Balconi & Amenta, 2007, 2008).

**Participants and Methods:** In this study we aimed to investigate irony elaboration by providing subjects with socially relevant contextual cues. Through auditory stimulation, enforced by iconic representation of the situational context, we studied ERP responses to ironic and non-ironic remarks. 20 subjects explored 50 scripts where the final remark could reach either an ironic or a non-ironic effect.

**Results:** ERP responses were analyzed as a function of prosody and type of sentence. Waves morphology indicated a clear P200 component followed by a P600-effect. ANOVA performed on peak amplitudes indicated that P200 and P600 increasing for ironic sentences were statistically significant.

**Conclusions:** Our data indicate that emotional components of prosody are early processed and influence the interpretation of upcoming information, as evidenced by the P200 effect indicating an early categorization of ironic sentences as hedonically negative (Carretié et al., 2001; Alexandrov, 2006). On the other side, cognitive costs required to integrate multiple information (iconic, verbal, prosodic) into a coherent representation of discourse are evidenced by the increase of pragmatic-P600 effect in ironic condition (Kuperberg, 2007).

Correspondence: *Simona Amenta, Department of Psychology, Catholic University of Milan, via Nirone, 17, Milan 20123, Italy. E-mail: simona.amenta@unicatt.it*

### A. MARZECOVÁ, L. KRIVÁ & Z. WODNIECKA. Multilinguals' Performance on Phonemic and Semantic Fluency: an Interplay of Language and Executive Functioning.

**Objective:** The question of interplay between language and executive functioning has been intensively debated in current research on bilingualism. Verbal fluency test is a clear-cut example of the interplay as it relies both on linguistic resources and executive control. Each of these factors is influenced by bilingualism, with executive control being en-

hanced in bilinguals and the verbal performance somewhat hampered. So far, however, studies on verbal fluency in multilinguals have been limited to individuals who speak only two languages and the analysis of performance in both languages has been seldom reported. In present study the performance of multilinguals on verbal fluency tests was contrasted across three languages.

**Participants and Methods:** Young adult multilinguals (N=35, mean age= 26) speaking Slovak (native language-L1), Czech (L2) and English (L3) participated in the study. Two verbal fluency tests (phonemic and semantic) were administered in three languages. Furthermore, we employed the Lateralized Attention Network Test (LANT) as a nonlinguistic measure of executive functioning.

**Results:** Preliminary results show that multilinguals differed in self-rated language competency: they were most proficient in their L1, less proficient in their L2 and least proficient in English. Accordingly, their performance in fluency tasks differed across the languages. In semantic fluency test, participants scored highest in L1 and lowest in L3. On phonemic fluency test, however, the performance was significantly better in L1 than in L2 and L3 that did not differ from each other.

**Conclusions:** The results are discussed in light of recent evidence on bilingual performance in verbal fluency tests.

Correspondence: *Anna Marzecová, M.A., Institute of Psychology, Jagiellonian University, Mickiewicza 3, Kraków 31-120, Poland. E-mail: anna.marzecova@gmail.com*

**F.A. KLIEMANN, M.P. FERREIRA, A. MAZZOLA, N.P. FERREIRA, F. AESSE & V.D. VAITSES. Translocation of language area in patients with left hemisphere tumor and Functional Magnetic Resonance Image.**

**Objective:** Translocation of language functions to homologous areas of the right hemisphere has been known to happen in children up to five years old. Recently it has been reported in adult patients with left hemisphere tumors. Functional MRI and intrasurgical cortical and subcortical stimulation are the most adequate tools to study this subject. Our objective was to study activation of right hemisphere language and executive areas with a protocol of three paradigms for language in patients with left and right tumors.

**Participants and Methods:** Fifteen patients with brain tumors (9 left, 6 right) were studied with a protocol including three tests of language: auditive (verb generation), visual (picture naming) and reading. Eight patients also had transsurgical cortical stimulation, 3 had subcortical stimulation and 4 had electroencephalography. Functional MRI were examined in the "Image Center", Hospital Moinhos de Vento and surgery was performed in the "Institute of Neurosurgery", Hospital São José.

**Results:** Several aspects were examined in the functional activation: age of the tumor, grade of malignity, size and location. The most conclusive correlation with activation of the right frontal areas was with age of the tumor; however, the size of this study does not allow statistical conclusions. Activation of the dorsolateral frontal area (BA 46) is more probably related to executive and not to language function, and may induce to incorrect conclusion.

**Conclusions:** Our data do not confirm translocation of language functions to the right hemisphere in adult patients with brain tumors. Bold steal, related to perfusion and circulation of the tumor, is probably the cause of non-activation of left hemisphere (Broca's area).

Correspondence: *Frederico A. Kliemann, Professor, Internal Medicine, Universidade Federal RS, Avenida Independência 1211, 307, Porto Alegre 90035-075, Brazil. E-mail: frederico.arthur@terra.com.br*

**J. SZEWCZYK. The N400 Component Does Not Reflect Post Lexical Access Integration Difficulty - an Event-Related Potential Study in Polish Using Repetition Priming.**

**Objective:** For over 30 years the N400 event-related potential has been used as a valuable tool tapping upon semantic processing. It is still unclear though, whether in sentential contexts its amplitude reflects facilitation of lexical access by the prior semantic context, or post-access integration difficulty. The present study was aimed to resolve this issue.

**Participants and Methods:** 16 healthy young adults silently read 180 short stories in Polish. One third of the stories contained a semantic violation at the position of the direct object in the stories' final sentence. Before the presentation of the final sentence, in half of the items, participants were shown information that a specific noun will appear in the upcoming final sentence, leading to a form of repetition priming.

The critical test involved comparing the ERP patterns elicited by primed word introducing a semantic violation against ERP patterns of primed word congruent with the prior context, and unprimed word introducing a semantic violation.

**Results:** Results showed that unprimed semantic violation led to the standard N400-P600 pattern, whereas primed semantic violations elicited no N400 component (relative to congruent nouns), and a very early positivity.

**Conclusions:** This indicates that the N400 component reflects rather facilitated lexical access (in the case of primed semantic violation by priming, in case of unprimed congruent word by prior semantic context), rather than post-access integration difficulty.

Correspondence: *Jakub Szewczyk, MA, Jagiellonian University, Ingardena 6/60S, Krakow 30-050, Poland. E-mail: jakub.szewczyk@uj.edu.pl*

**F. ANZAKI, Y. SUZUKAMO, T. KONDO, M. TATENO, Y. OUCHIDA, Y. TAKEDA & S. IZUMI. Left Superior Temporal Gyrus Injury May Play a Role in Auditory-Verbal Short-term Memory Disturbance.**

**Objective:** Phonological paraphasia (PP) is often associated with cortical and subcortical white matter injuries in the left inferior parietal lobe. PP and repetition disorder may be associated with auditory-verbal short-term memory (STM) deficit (Warrington et al, 1977). However there're some PP without auditory-verbal STM deficit. We analyzed the relationship between speech features and brain lesions in patients with PP.

**Participants and Methods:** Thirty patients with PP and 8 with various types of aphasia underwent naming, repetition and auditory-verbal STM tests [digit span (DS), letter span (LS)] that we designed. Lesions in the left cerebral hemisphere were evaluated using magnetic resonance imaging or computed tomography and correlated with speech features.

**Results:** All except 1 patient with PP exhibited subcortical white matter lesions in the left supramarginal gyrus (SMG). PP incidence and performance in auditory-verbal STM tests were correlated (DS:r = -0.501, LS:r = -0.621). Some patients exhibited better auditory-verbal STM than the average for Japanese aphasic patients'. Left superior temporal gyrus (STG) injuries were milder in patients with better performance in LS tests; subcortical white matter injuries in the left angular gyrus (AG) were milder in patients with better performance in DS tests (p < 0.05 for both).

**Conclusions:** Subcortical white matter lesions in the left SMG were common in patients with PP. PP exacerbated with increased severity of STM disorders. The presence of left STG lesions and subcortical white matter lesions in the left AG correlated with auditory-verbal LS disorder and auditory-verbal DS disorder, respectively.

Correspondence: *Fumiko Anzaki, MA, Rehabilitation Medicine, Tohoku University, 2-1 Seiryō-cho, Aoba-Ku, 1-5-15 Kita-senzoku, Oota-Ku, Tokyo, Sendai-city 980-8575, Japan. E-mail: anzaki@ss.ij4u.or.jp*

**D. RODRÍGUEZ SALGADO & C. OTERO DADÍN. Fluency Measures across the Diurnal Cycle of Testosterone in Healthy Young Men and Activational Effects of Gonadal Hormones.**

**Objective:** In the present study we investigated performance on tests of verbal and figural fluency across the diurnal cycle of testosterone of healthy young men, and the possible modulatory role of testosterone and estradiol serum levels on it.

**Participants and Methods:** Sixteen healthy young men were tested with fluency tests counterbalanced at two individual sessions, once during the morning (high testosterone phase) and once during the afternoon (low testosterone phase). Serum estradiol and testosterone levels were obtained during the morning.

**Results:** Results of the ANOVA of repeated measures on fluency scores revealed that phonemic fluency performance was significantly better during the afternoon than the morning [F (1,14) = 4.85; p=.045]. Asymmetrical carryover effects were found for Category fluency [F (1, 14)= 8.893, p=.010] and Figural fluency [F (1, 14)= 12.585, p=.003] tests, with greater enhancement in performance during the morning when tasks were first encountered during the afternoon. There was also a significant effect of order of testing on figural fluency performance (F(1,14)=5.323, p=.037): men who initially perform it during the afternoon obtained the best scores.

Both testosterone ( $r=-.625$ ;  $p=.036$ ), and estrogen ( $r=-.668$ ,  $p=.025$ ) levels correlated negatively with performance on the phonemic fluency test during session 1. In session 2 estrogens levels ( $r=.714$ ,  $p=.036$ ) and estrogens/testosterone ratios ( $r=.886$ ,  $p=.004$ ) correlated positively with performance on the figural fluency score.

**Conclusions:** Taken together the results suggest that there are significant changes in performance of fluency measures across the diurnal cycle of testosterone in healthy young men, and reveal activation influences of gonadal hormones on fluency performance.

Correspondence: *Dolores Rodríguez Salgado, University of Santiago de Compostela, Campus Sur, Santiago de Compostela 15782, Spain. E-mail: dolores.rodriguez@usc.es*

### Motor Function / Motor Disorders / Spinal Cord

**Y. NAKAGAWA, M. OTSUKI, Y. TATEZAWA & H. YOSHIDA. A new apraxia? -a specific impairment of hand movements when reaching and grasping tools, with normal manipulation after grasping-**

**Objective:** Ideational apraxia (apraxia of single tool use) is regarded as a selective dysfunction of the system for single tool manipulation. This system generally does not include the process before manipulating tools such as reaching and grasping. It still remains uncertain whether the dysfunction of the system for reaching and grasping without impairment of tool manipulation could be dissociable. The similar symptom showing inability of reaching and grasping tools with intact manipulation after grasping has reported by Denny-Brown (1958) as a case of repellent apraxia or avoiding reaction, however with no further description. We present the striking sample of this pattern.

**Participants and Methods:** The patient is a 69 year-old right-handed woman with cerebral infarction in the left parietal lobe and corpus callosum. She had no paresis, no sensory impairment with Wernicke's aphasia and left hand apraxia on pantomiming. She showed no object agnosia, no unilateral spatial neglect. However, she could not use her right hand and we investigated her right hand disabilities by the tasks of reaching, grasping, and manipulating tools.

**Results:** She could reach or grasp none of 8 tools. In contrast, once an examiner manually pressed each tool into her hand, she could normally manipulate the all tools.

**Conclusions:** Our patient's pattern of impairment indicates that there can be two possible distinct systems for organizing hand movements on tool manipulations: one is a system for organizing reaching and grasping (non-specific to tool) movements, and the other is a system for organizing tool-specific movements after grasping, and they could show double dissociation.

Correspondence: *Syushtsugu Nakagawa, Health Sciences University of Hokkaido, Kanazawa 1757, Ishikari 061-0293, Japan. E-mail: poverame@ca3.so-net.ne.jp*

**S. MARTÍNEZ-HORTA, J. PAGONABARRAGA, C. GARCÍA-SANCHEZ, G. LLEBARIA, R. FERNANDEZ-DE BOBADILLA, A. GIRONELL, B. PASCUAL-SEDANO & J. KULISEVSKY. The Neuropsychological Correlates of Apathy in Parkinson's Disease.**

**Objective:** To assess the neuropsychological correlates of apathy in non demented/depressed Parkinson's disease (PD) patients to understand the implication of distinct frontal-subcortical circuits on PD apathetic syndrome.

**Participants and Methods:** Prospective controlled study of thirty-six demographically and clinically matched patients with idiopathic PD fulfilling diagnostic criteria for PD, without cognitive impairment ( $CRD < 0.5$ ) nor depression ( $HADS-D < 11$ ) characterized as apathetic ( $N=18$ ) or non apathetic ( $N=18$ ) by the Starkstein Apathy Scale ( $\geq 14$ ) that performs an extensive neuropsychological assessment of global cognition, executive functions, attention, memory and behaviour.

**Results:** Group differences analyzed with independent two-tailed t-tests for continuous variables revealed more pronounced cognitive impairment on apathetic patients (DRS-Total score;  $p=0.04$ ), specifically affecting verbal memory (RAVLT-Trials 1 to 5,  $p=0.01$ ), delayed free recall (RAVLT;  $p=0.0001$ ) and executive functions with higher preservative errors (WCST;  $p=0.01$ ), set maintenance errors (WCST;  $p=0.007$ ) and less categories completion (WCST;  $p=0.002$ ). Surprisingly, the Iowa Gambling Task (IGT) was significantly better performed by apathetic patients across trials (IGT;  $p=0.0001$ ).

**Conclusions:** Our results evidences a pattern of more pronounced cognitive impairment on apathetic group characterized as memory and executive dysfunctions that mainly affects learning, delayed free recall, set shifting and new rule generation. In contrast, reward processing seems to be intact.

Although these may suggest prominent implication of dorsolateral-PFC-subcortical circuits rather than orbitofrontal-PFC-subcortical and mesocortico-limbic circuits on the development of apathy in the early stages of PD, what does this prominent better IGT performance exactly means must be discussed as a limbic system dysfunction implication.

Correspondence: *Saül Martínez-Horta, Neurology, Sant Pau's Hospital, Sant Antoni Maria Claret, 167, Barcelona 08025, Spain. E-mail: smartinezho@santpau.cat*

**S. MARTÍNEZ-HORTA, J. PAGONABARRAGA, M. MARTÍNEZ-CORRAL, C. GARCÍA-SANCHEZ, G. LLEBARIA, A. GIRONELL, R. FERNANDEZ DE BOBADILLA, B. PASCUAL-SEDANO & J. KULISEVSKY. Neurophysiological and Neuropsychological Evidence of Striatal-dependent Over-inhibition in Apathetic Parkinson's Disease Patients.**

**Objective:** To assess the underlying mechanisms of apathy development in Parkinson's disease (PD) by neuropsychological and neurophysiological correlates of response inhibition, and their distinct related basal ganglia pathways, in PD using event-related brain potentials (ERPs).

**Participants and Methods:** Prospective controlled study of 32 PD treated patients in "on" condition with ( $n=16$ ) and without ( $n=16$ ) apathy as assessed by the Starkstein apathy Scale. Patients with previous surgery for PD, cognitive impairment ( $CDR \geq 0.5$ ) or depression ( $HADS-D \geq 11$ ) were excluded.

The DRS and IGT, WCST and FSBS assessed global cognition and executive functions respectively.

A Go/Nogo task was used to obtain the N2-Nogo and P3-Nogo, two well known ERPs linked to response inhibition.

**Results:** Apathetic patients were more cognitively impaired as reveals DRS ( $p=0.04$ ).

Apathetic patients performs less categories completion ( $p=0.002$ ) and higher set maintenance errors ( $p=0.007$ ) on WCST.

Surprisingly apathetic patients performs the IGT extremely better than non apathetic patients across trials ( $p=0.0001$ ).

During Go/Nogo task apathetic patients performs less errors ( $p=0.03$ ) and faster responses ( $p=0.02$ ).

Apathetic patients showed higher amplitudes in the N2-Nogo ( $p=0.01$ ) and in the P3-Nogo ( $p=0.001$ ).

Significant correlations were found between ERPs amplitudes and neuropsychological performance between groups.

**Conclusions:** Behavioural and neurophysiological over-inhibition was observed for apathetic patients linked to more prominent executive dysfunction. As well as nigrostriatal-DA system impairment are linked to the observed N2-Nogo augmentation, it's reasonable to assume that same nigrostriatal-DA system disturbance which enhances this acute over-inhibition may play a crucial role on apathy in PD by a signalling deficit across frontal-subcortical circuitry.

Correspondence: *Saül Martínez-Horta, Neurology, Sant Pau's Hospital, Sant Antoni Maria Claret, 167, Barcelona 08025, Spain. E-mail: smartinezho@santpau.cat*

**L. GAWRYS, A. PILACINSKI, E. PIATKOWSKA-JANKO, P. BOGORODZKI, T. WOLAK, M. FALKIEWICZ, A. FRIEDMAN, J. SIENKIEWICZ, D. KOZIOROWSKI, P. JANIK, Z. JAMROZIK, L. KROLICKI, R. ANDRYSIAK, R. KULINSKI, L. KACZMAREK & I. SZATKOWSKA. Neural Bases of Executive Dysfunction in Parkinson's Disease.**

**Objective:** Motor symptoms of Parkinson's disease (PD) often go together with cognitive deficits among which executive dysfunction and working memory impairments are notably well described.

As opposed to motor symptoms of the disease the physiological origins of cognitive deficits are not well understood. In the present study we used functional magnetic resonance imaging (fMRI) in order to identify the functional anatomy of cognitive impairment in PD.

**Participants and Methods:** First of all, 22 patients and 10 matched control subjects completed the Wisconsin Card Sorting Test (WCST) - a standard clinical measure of executive function. Based on the WCST



results PD patients were divided into two groups: patients without executive deficits (PD-; n=12) and patients with executive function impairment (PD+; n=10). Secondly, all three groups (PD-; PD+ and control) underwent fMRI during performance of the 2-Back working memory task.

**Results:** We compared activation patterns during the 2-Back task and found that both groups without impairments (control group and PD-) displayed a higher level of activation within the precuneus in the left hemisphere when contrasted with patients with deficits (PD+). Simultaneously, in the cognitively impaired group the frontopolar cortices in both hemispheres were revealed to be more activated when compared with patients without deficits.

**Conclusions:** We put forward the hypothesis that, observed in PD+ group, a reorganized pattern of activation with decreased activity in the superior parietal lobule and overactivity in the frontopolar cortex were neural bases of executive dysfunction.

Correspondence: *Ludwika Gaurys, Nencki Institute., 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: lgaurys@nencki.gov.pl*

#### A. KUDLICKA, L. CLARE & J.V. HINDLE. **Methodological Challenges in Researching Executive Dysfunction in Parkinson's Disease: Systematic Review.**

**Objective:** Impairment of executive function (EF) is described as a distinctive characteristic of cognitive impairment in Parkinson's disease (PD). However, studies provide inconsistent findings with regard to prevalence, pattern and severity of executive dysfunction. The aim of the systematic review was to characterise the profile of executive impairments in PD and identify potential issues contributing to inconsistency of results.

**Participants and Methods:** Articles were identified through searches of PsychInfo, Medline, Science Direct, CINAHL and the Cochrane Library using the search terms Parkinson's disease (title/key words) combined with: cognitive impairment, dysexecutive or executive (abstracts). The review was limited to studies that investigated EF as the central variable in non-demented PD patients, and were published in English-language peer-reviewed journals between 1990 and 2010.

**Results:** A total of 70 studies met the inclusion criteria. Few studies were based on any theoretical formulation of EF, although most incorporated some arbitrary classification of subcomponents. Numerous measures were inconsistently linked to a large number of subcomponents; there was a tendency to draw conclusions about overall EF irrespective of the specific tests used.

**Conclusions:** Reliability of findings appears to be affected by methodological issues as well as the complex nature of PD and EF. Considerable confusion results from the tendency to base the studies on a vague definition of EF, without a coherent, theory-based classification of EF subcomponents. This means that conclusions about overall EF are drawn from the results of single tests, there is a plethora of different terms arbitrarily referring to different subcomponents of EF, and measures are interpreted inconsistently.

Correspondence: *Aleksandra Kudlicka, MSc, School of Psychology, Bangor University, Adeilad Brigantia, Bangor University, Bangor LL57 2AS, United Kingdom. E-mail: pspa16@bangor.ac.uk*

#### M. HUA, R. WU & M. HUA. **Theory of Mind in Patients with Parkinson's Disease.**

**Objective:** Theory of Mind (ToM) refers to the ability to infer people's thought, intention, or emotion. It is crucial for human social interaction and helpful in explaining people's behavior. Prefrontal cortices play an important role in this function based on both brain imaging and lesion studies. In light of the primary neuropathology of Parkinson's disease (PD) involving frontal system, patients with this disease would be expected to evidence deficit in ToM. However, few studies on this issue have been explored, and moreover the point of whether ToM is independent of executive function remains uncertain. The present study was thus to examine these issues.

**Participants and Methods:** Forty early non-demented PD patients and 40 normal control subjects were employed in this study. Both subject groups were matched in age, level of education, and verbal IQ. Each subject received ToM, executive function, and verbal IQ tests. Subjects with major systematic and psychiatric illnesses were excluded.

**Results:** Our PD patients' performance on the ToM tasks was significantly poorer than their normal counterparts. Correlation analysis revealed that patients' performance score of ToM were significantly associated with that of executive function. However, it is not the case for normal controls.

**Conclusions:** Based on the results, it appears that early PD patients evidenced dysfunction of ToM and required more psychological abilities than normals to generate ToM. We suggest that our findings might be instrumental in terms of developing medical care program for the patients. However, further investigation on this issue is needed.

Correspondence: *Mau-Sun Hua, Department of Psychology, National Taiwan University, No.1, Sec.4, Roosevelt Road, Taipei, 10617 Taiwan, Taipei 10617, Taiwan. E-mail: huams@ntu.edu.tw*

#### **Multiple Sclerosis/ALS/Demyelinating Disorders**

##### M. JÓDAR, M. ALVAREZ, X. MUNTANER, M. VIGUERA & G. RIBERA. **Graphia as Atypical Onset of Dementia in a Patient with Amyotrophic Lateral Sclerosis.**

**Objective:** Amyotrophic lateral sclerosis (ALS) with dementia is characterized by frontal neurological symptoms, and located atrophy in fronto-temporal lobes. Behavioural changes and impairment of executive functions have been described as the onset of a progressive fronto-temporal dementia in these patients. Few recent studies have suggested that probably agraphia symptoms are frequently present among the cognitive deficit in bulbar onset ALS patients with dementia.

We report the case of a patient with bulbar-onset ALS, who showed a progressive agraphia, as atypical onset, previously to develop a more generalized frontal dementia.

**Participants and Methods:** A 64 year-old man diagnosed of bulbar onset ALS with anarthy, hyperreflexia predominantly on the right side and with masseteric reflex. A completed neuropsychological assessment, including abstract reasoning, visual planning and language comprehension, was administrated.

**Results:** We did not found deficits in executive functions, verbal and reading comprehension, arithmetic and visuoperceptive or visuocognitive deficits. However, the patient presented omissions and substitutions in spontaneous writing and through dictation, but he did not show errors in the writing copy. 4 months after the first neuropsychological assessment, the patient began to show frontal behavioural signs and cognitive frontal dementia.

**Conclusions:** Agraphia symptoms can be observed, as atypical onset, in patients with bulbar onset ALS

In patients with bulbar onset ALS, agraphia signs could indicate dysfunctions of the fronto-temporal circuits involved in language functions. Moreover this agraphia deficit could appear previously to the behavioural and frontal cognitive symptoms usually observed.

Correspondence: *Mercè J. Vicente, PhD., Neurology, Hospital de Sabadell, Servei de neurologia, Hospital de Sabadell Parc tauli, 1, Sabadell, 08208, Spain. E-mail: merce.jodar@uab.cat*

##### R. BALDWIN, P. VESEY & P. MADDISON. **An Absence of Hemispheric Disconnection Features Following Corpus Callosum Involvement in a Case of Acute Demyelinating Illness.**

**Objective:** To report the case of a rare acute cognitive presentation following an episode of acute demyelinating illness, with corpus callosum involvement.

**Participants and Methods:** A 19-year-old female University student presented with acute onset of lethargy, headache and neck pain, as well as progressively worsening ataxia, dyspraxia and cognitive impairment (working-memory, orientation and attention.) Neuropsychological investigation included assessments of pre-morbid functioning, attention, memory, executive functioning and visuospatial abilities. A range of experimental tests were performed to help identify any hemispheric disconnection features. She was seen again 9 months after the initial illness to qualitatively assess progress and recovery and will be reviewed 12 months post onset.

**Results:** Brain MRI revealed extensive white matter changes in the corpus callosum. Spinal fluid oligoclonal bands were negative, with no evidence of ongoing CNS inflammation. She was treated with high dose steroids for an acute demyelinating encephalomyelitis (ADEM) type illness. Initial neuropsychological testing showed positive results, whilst some impairment in verbal fluency, verbal recall and subtle low-level attentional difficulty was noted. Experimental tests showed no hemispheric disconnection features associated with damage to the corpus callosum. Qualitative follow-up indicated good recovery, including a return to social activities and studying, although with some ongoing difficulties in these domains.

**Conclusions:** Despite extensive white matter lesions in and around the corpus callosum, interhemispheric communication appears to remain intact. There is literature to suggest that disconnection syndromes may be surprisingly mild unless anatomical disconnection is close to total loss. Here we present a case in which the positive outcome and recovery would support this finding.

Correspondence: *Patrick Vesej, Clinical Psychology & Neuropsychology, Nottingham University Hospitals NHS Trust, Queens Medical Centre, Derby Road, Nottingham NG72UH, United Kingdom. E-mail: patrick.vesej@nuh.nhs.uk*

**P. KULISTAK, P. RIDZON, R. RUSINA & M. BUNCOVA. Amyotrophic Lateral Sclerosis (ALS) and the Degree of Cognitive Impairment.**

**Objective:** When diagnosing dispensarised patients with ALS, we examined their cognitive functioning. We expected impairment in the tested areas, with the impairment being more profound in patients with the bulbar version of ALS than in patients with the limb version. We expected additional impairment in supposed alternative of fronto-temporal lobar degeneration (FTLD) in ALS.

**Participants and Methods:** According to the version of the disease, the experimental group (N=55) was divided into two subgroups – bulbar group (N=22) and limb group (N=32). The control group (N=21), which consisted of neurologically and psychiatrically intact participants, was matched on sex, age and education. We used a battery of neuropsychological tests that were suitable to this type of disease. Furthermore, SPECT was employed to assess the probability of FTLD.

**Results:** When compared with the control group, both experimental subgroups were impaired on the observed cognitive functions, with patients with the bulbar version of the ALS being more impaired than patients with the limb version. Statistically reliable differences were found in the perception of visuospatial material, attention, memory, speech, and capacity and speed of information processing. However, the results of executive measures differed according to the method used, and are thus not conclusive. Significant impairment of the executive functions was found in patients with supposed FTLD in ALS.

**Conclusions:** In comparison with the control group, both bulbar and limb subgroup of patients with the ALS form of motoric neuron degeneration were characterised by partially impaired cognitive functioning. Profound impairment of cognitive functioning was found in patients with FTLD in ALS.

Correspondence: *Petr Kulistak, Dept. of Neurology, Videnska 800, Prague 4 14059, Czech Republic. E-mail: petr.kulistak@volny.cz*

**E. VAN DER HULST, S. ABRAHAMS & T.H. BAK. The Specificity of Cognitive Deficits in Amyotrophic Lateral Sclerosis.**

**Objective:** The traditional view of Amyotrophic Lateral Sclerosis (ALS) as a disease affecting only the motor functions has recently undergone a radical transformation. Some studies have suggested that ALS is almost invariably associated with cognitive deficits or even dementia. Our study examined a broad range of cognitive functions in ALS patients. To unearth subtle cognitive impairments, a battery was used which included reaction time measurement.

**Participants and Methods:** Twenty-three ALS-patients were compared to 22 healthy controls (HCs) matched for age, education and sex and administered a neuropsychological battery of tests. This included tests of Audio Visual Information Processing (AVIP) and semantic association for Objects and Actions (O&A), as well as knowledge of Action Sequencing (AS). Both reaction times (RTs) and error rates were recorded.

**Results:** MANOVAs revealed significantly longer RTs and more errors ( $p < .018$ ) for ALS-patients than for HCs on AS, while both groups displayed equally long RTs and amount of errors ( $p > .163$ ) on O&A. Taking out the possible influence of motor slowing, basic motor speeds were then subtracted in all three conditions, yielding cognitive decision times (CDTs). ALS patients exhibited longer CDTs on AS than HCs ( $p = .022$ ), whereas CDTs for O&A were equal across groups ( $p > .237$ ). There were no differences in RTs and errors between patients and controls on AVIP ( $p > .233$ ).

**Conclusions:** ALS patients performed remarkably well on several tests, including an audiovisual information processing test of considerable difficulty. Deficits were confined to highly specific cognitive domains, in particular action sequencing.

Correspondence: *Egberdina-Józefa van der Hulst, MSc, Psychology - Human Cognitive Neuroscience, University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, United Kingdom. E-mail: dina.jozefa@ed.ac.uk*

**M. PINO, B. GUILLAUMET DURO, J. BATLLE NADAL, J. AYALA & M. TORRENTE TORNÉ. Cortical dementia in Multiple Sclerosis: implication for rehabilitation and caregivers.**

**Objective:** Cognitive impairment prevalence in Multiple Sclerosis (MS) is estimated ranging between 40-65%. The more frequent cognitive impairment profile in MS resembles the subcortical dementia description of impaired recent memory, sustained attention, verbal fluency, conceptual reasoning and visuospatial perception (Cummings, 1986; Rao et al., 1991). However, although less frequent, cognitive impairment with severe amnesia and other “cortical” functions affected has also been described (Zarei, 2006). We discuss the better cognitive rehabilitation therapies in such “cortical” cases, i.e. cognitive stimulation and reality orientation.

**Participants and Methods:** We present a 55-year-old man, school teacher, with gait disturbances and cognitive deterioration for the last 2 years. Previous diagnoses were diabetes and epilepsy. The neurological study conclude he was affected by MS.

**Results:** The results of the two neuropsychological assessments are shown in Table 1. Results reflects anomia for phonological and semantic problems, temporal disorientation, basic attention deficits with distractibility, severe memory problems for encoding impairment and rigidity, and executive deficit, i.e. verbal fluency, problem solving and cognitive flexibility. Unawareness and emotional indifference was also observed. Family interview using the Multiple Sclerosis Neuropsychological Questionnaire (MSNQ) reveals emotional and cognitive changes in almost all the items assessed.

**Conclusions:** 1) Different cognitive profiles also in the same pathology implies different rehabilitation approaches. 2) In cortical MS the best cognitive rehabilitation option should be dementia recommended therapies, i.e. the stimulation cognitive and reality orientation therapy 3) Family counselling is recommended.

Correspondence: *Maria Pino, Xarxa Sanitaria i Social Santa Tecla, C/ Joan Fuster, s/n, Tarragona 43007, Spain. E-mail: mpino73@gmail.com*

**SATURDAY MORNING, JULY 3, 2010**

**Symposium 9:  
Use of Clinical Neurophysiology in Patients with  
Psychiatric Diagnosis**

**Chair: Lukasz Konopka**

**8:30–10:00 a.m.**

**L.M. KONOPKA. Use of Clinical Neurophysiology in Patients with Psychiatric Diagnosis.**

**Symposium Description:** Recent advances in neuroimaging techniques provide opportunities for in-depth assessments of the brain

activity patterns in patients presenting with psychiatric symptoms. It is becoming clear that understanding neurophysiologic substrates of disorders will enhance our understanding of the disease processes as well as provide for more precise diagnostic descriptors. This symposium will focus on noninvasive, clinically friendly methods involving quantitative EEG analysis. We will address the issue of electrical activity pattern identification, interpretation and model building in variety of disorders, such as: schizophrenia, psychosis, post traumatic stress disorder, attention deficit disorder and dementia.

1) Subpopulation of patients in clinically defined categories: qEEG and SPECT imaging based studies. Presented by: Lukasz M Konopka Ph.D., The Chicago School of Professional Psychology, Chicago IL, USA.

2) Measures of synchronization and their relation to cognitive processes and disorders. Presented by: Milan Palus Ph.D., Institute of Computer Science, Academy of Sciences of the Czech Republic

3) Modeling dreaming and psychosis: EEG studies of lucid dreaming. Presented by: Ursula Voss, Ph.D., JW Goethe-Universität Frankfurt, Bonn, Germany

4) EEG complexity, dissociation and schizophrenia. Presented by: Petr Bob Ph.D., Center for Neuropsychiatric Research of Traumatic Stress & Department of Psychiatry, First Faculty of Medicine, Charles University, Prague, Czech Republic

Correspondence: *Lukasz M. Konopka, PhD, Clinical Psychology, The Chicago School of Professional Psychology, 325 N.Wells Str, Chicago, IL 60610. E-mail: lkonopka@thechicagoschool.edu*

#### P. BOB. EEG Complexity, Dissociation and Schizophrenia.

**Objective:** The purpose of this study is to investigate that mental disorganization, dissociation, and splitting in patients diagnosed with schizophrenia are related to functional fragmentation of neural subsystems. Digital EEG will be used to evaluate complexities of EEG patterns as related to the abnormal EEG patterns.

**Participants and Methods:** Digital EEG methodology was used to study patients diagnosed with schizophrenia. The resulting EEG patterns were correlated to the presenting clinical symptoms/features.

**Results:** As predicted functional fragmentation of neural subsystems found in schizophrenia could be linked to psychological dissociation and splitting in agreement with the QEEG data variables.

**Conclusions:** The results of this study suggest that mental disorganization, dissociation, and splitting in schizophrenia could be explained by pathological changes in brain complexity that can be assessed using quantitative EEG techniques.

Correspondence: *Lukasz M. Konopka, PhD, Clinical Psychology, The Chicago School of Professional Psychology, 325 N.Wells Str, Chicago, IL 60610. E-mail: lkonopka@thechicagoschool.edu*

#### M. PALUS. Measures of Synchronization and Their Relation to Cognitive Processes and Disorders.

**Objective:** Synchronization of oscillatory phenomena in brain electrical activity plays an important role for cognitive processes. We investigate whether changes in level of synchrony are related to severity of symptoms of cognitive disorders such as schizophrenia.

**Participants and Methods:** Digital EEG data was acquired in normal volunteers as well as patient populations. Nonlinear analysis of data was employed. Analysis was focused either on long-range synchronization of EEG oscillatory phenomena or on complexity of EEG signals involving local synchrony.

**Results:** We demonstrate that levels of local synchronization reflected in complexity of EEG activities of cortical sites are related to psychometric measures of epileptic-like symptoms; and values of long-range synchronization correlate with positive and negative schizophrenia symptoms (PANSS) when considering EEG recordings of patients suffering by paranoid schizophrenia.

**Conclusions:** In this paper approaches for measuring local and long-range synchrony in brain electrical activity are presented as new analytical tools allowing to measure correlation of the brain physiology with cognitive processes and disorders.

Correspondence: *Lukasz M. Konopka, PhD, Clinical Psychology, The Chicago School of Professional Psychology, 325 N.Wells Str, Chicago, IL 60610. E-mail: lkonopka@thechicagoschool.edu*

#### U. VOSS. Modeling Dreaming and Psychosis: EEG Studies of Lucid Dreaming.

**Objective:** The purpose of this study is to explore lucid dreaming by means of quantitative EEG. Lucid Dreaming is a rare but natural condition in which subjects dream and observe their dreams at the same time.

**Participants and Methods:** Digital EEG methods are used to investigate the electrophysiological correlates of lucid dreaming in comparison to non-lucid dreaming and quiet waking.

**Results:** Results show lucid dreaming to be a hybrid state that shares features of waking with those of REM-sleep dreaming. Slow frequencies (up to 12 Hz) are similar to REM-sleep dreaming while higher frequencies are wake-like.

Lucid dreaming is accompanied by increased activation and coherence in the frontal parts of the brain. Frontal activation and coherence increases are strongest in the gamma frequency band (35 - 45 Hz). This frequency band is known to be relevant for conscious cognition.

**Conclusions:** Our understanding of the brain mechanisms underlying REM sleep is significant, it is possible to construct working hypotheses about the neurobiological genesis of hallucinations and delusions. The empirical results are enlightening with respect to an emerging model of waking and altered states of consciousness, like dreaming and psychosis. Correspondence: *Lukasz M. Konopka, PhD, Clinical Psychology, The Chicago School of Professional Psychology, 325 N.Wells Str, Chicago, IL 60610. E-mail: lkonopka@thechicagoschool.edu*

### Paper Session 5: Dementia/Stroke/Vascular Disorders

Moderator: Emilia Lojek

8:30–10:00 a.m.

A. HAYASHI, H. NOMURA, R. MOCHIZUKI, A. OHNUMA, T. KINPARA, K. OHTOMO, Y. HOSOKAI, T. ISHIOKA, K. SUZUKI & E. MORI. Neural bases of Kanji writing impairment in Japanese patients with mild Alzheimer's disease.

**Objective:** We examined writing ability and regional cerebral blood flow (rCBF) by using single photon emission computed tomography to investigate the neural bases of writing impairment in mild Alzheimer's disease (AD).

**Participants and Methods:** Fifty-two patients and 22 healthy controls performed a dictation task that was consisted of 50 two-character Kanji words. Writing errors in the writing task were classified into 3 patterns: a) non-response errors, b) phonologically plausible errors, and c) other errors. Mann-Whitney U test was used to examine the group effect on the writing errors. The relationships between the writing errors and rCBF were examined with covariate-only design matrices, using the multiple regression model in SPM 5. Possible confounding effects of age, sex, Alzheimer's Disease Assessment Scale, and education were regressed out by entering these variables into the model.

**Results:** The numbers of all writing errors were significantly larger in the AD group than in the controls. The total score of writing errors was negatively correlated with rCBF in the left inferior parietal lobule, and the number of non-response errors was negatively correlated with rCBF in the inferior parietal lobule, posterior middle and inferior temporal gyri, and posterior middle frontal gyrus in the left hemisphere. No region correlated with the number of phonologically plausible errors and that of other errors.

**Conclusions:** Mild AD had an impairment in Kanji writing with a large amount of non-response errors, which can be interpreted as deficits of retrieving and retaining morphological Kanji-character images. The hypoperfused cortical regions correlated with the non-response error in AD are consistent with the lesions, which reportedly produce agraphia in patients with focal lesions. Damages to those regions may affect a series of the process from retrieving Kanji representation to activating kinesthetic memory for writing, causing dysfunction of neural network for processing Kanji-character form.

Correspondence: *Atsuko Hayashi, Doctor, Graduate School of Medicine, Tohoku University, 2-1 Seiryomachi, Aoba-ku, Sendai 980-8575, Japan. E-mail: a-hayashi@mail.tains.tohoku.ac.jp*

#### A. NORDLUND. Vascular disease, AD-biomarkers and Cognition in MCI – Additive or Synergetic Effects?

**Objective:** To study the cognitive profiles of three groups diagnosed with Mild Cognitive Impairment (MCI), one with vascular disease (MCI-vas), one with Alzheimer-typical biomarkers (MCI-bio) and one with both vascular disease and Alzheimer-typical biomarkers (MCI-vasbio).

**Participants and Methods:** One hundred and eighty-two subjects (MCI-vas=52, MCI-bio=84, MCI-vasbio=46) diagnosed with MCI were examined with a comprehensive neuropsychological test battery of 20 tests comprising the cognitive domains speed/attention, memory, visuospatial function, language and executive function.

**Results:** The groups did not differ significantly in terms of MMSE score or education, MCI-vasbio subjects were slightly older. MCI-vas and MCI-bio performed quite similarly on the test battery, whereas MCI-vasbio tended to perform generally more poorly than the other groups. The only significant differences between MCI-vas and MCI-bio were recorded on memory tests, MCI-vas performing better. MCI-vasbio performed significantly more poorly than either, or both the other groups, on tests within all cognitive domains, with the most clear-cut differences on an executive test.

**Conclusions:** Considering the small differences between MCI-vas and MCI-bio, vascular disease alone does not seem to be associated with a specific cognitive profile, whereas Alzheimer typical biomarkers seem to be mainly associated with poorer memory performance. The combination of vascular disease and Alzheimer-typical biomarkers, on the other hand, seems to be associated with more severe cognitive deficits. The question of the traditional dichotomy between Alzheimer's disease and vascular dementia is raised, as is the question of whether the pattern is caused by additive or synergetic effects. The differences in executive functions are interpreted in terms of synergetic effects.

Correspondence: *Arto Nordlund, Institute of Neuroscience and Physiology, Sahlgrenska Academy, Wallingstagen 6, Molndal 431 41, Sweden. E-mail: arto.nordlund@neuro.gu.se*

**B. SCHMAND, A. RIENSTRA, P.E. SPAAN, G. WALSTRA, J. VAN CAMPEN & P. EIKELENBOOM. Neuropsychology Beats Neurochemistry in Search for Alzheimer Biomarkers.**

**Objective:** Alzheimer's disease (AD) is caused by abnormal deposition in the brain of amyloid-beta (aBeta) and tau proteins, which form plaques tangles causing cell death. This is thought to be a process that extends over many years. If aBeta levels in cerebrospinal fluid (CSF) are low and tau levels are high, then the subject is probably developing AD. CSF assessment is becoming increasingly popular in neurology and geriatrics for early AD diagnosis.

Contrary to what is generally thought, CSF abnormalities are not detected before the first amnesic symptoms of AD arise (Schmand et al. *Psychological Medicine*, 2010). Another recent finding is that CSF assessment is predictive in early onset AD, but loses its diagnostic power in late onset AD (Bouwman et al. *Neurobiology of Aging*, 2009). We evaluated how memory tests do in this respect.

**Participants and Methods:** We present data on four different memory tests (Rey's Auditory Verbal Learning Test, CAMCOG, Enhanced Cued Recall, and Verbal Paired Associate Learning) in four different population-based and clinical samples of patients with AD (combined N=427) or Mild Cognitive Impairment (N=381) and age and education matched healthy controls (N=608).

**Results:** The memory tests discriminate young and old AD and MCI patients very well from healthy elderly. This is not an artefact of dementia severity.

**Conclusions:** Memory tests are more sensitive to MCI and AD than CSF biomarkers, especially in older patients, who form the vast majority of AD patients. CSF and other biomarkers may serve to increase diagnostic specificity.

Correspondence: *Ben Schmand, PhD, Psychology & Neurology, University of Amsterdam, Roetersstraat 15, room 608, Amsterdam 1018WB, Netherlands. E-mail: b.schmand@amc.uva.nl*

**M. CROSSLEY, P. CORNEY, J. POOCK, N. HAUGRUD, M.E. O'CONNELL & D. MORGAN. Introducing a Clinical Dual Task to Facilitate Diagnosis in Early Stage Alzheimer's Disease: Modification of an Experimental Paradigm.**

**Objective:** Performance during experimental dual-tasks differentiates normal older adults from individuals in early-stage Alzheimer's Disease (AD), and demonstrates the effects of normal aging and dementia on attentional and executive functions. A dual-task paradigm modified for a clinical setting was evaluated for its diagnostic utility and explanatory power.

**Participants and Methods:** Normal older adults (N=20, MMSE = 29.0) and early stage AD patients (N=12, MMSE = 24.1), completed a series of 15s single- and dual-task trials of unimanual finger-tapping and simple and complex counting (i.e., forward by 1's, and backwards by 2's from 70, respectively). Proportional decrement scores measured level of interference during dual-task tapping trials and were analyzed with repeated measures ANOVA.

**Results:** Normal and clinical groups performed equivalently during single task tapping and simple counting, but AD patients generated fewer digits during complex counting tasks. Interference during dual task tapping trials was significantly greater for the clinical vs the normal group during both simple (31.6% vs 15.2%) and complex (73.5% vs 41.5%) dual-tasks. Decrement scores during complex dual tasks were highly correlated with the MMSE and with measures of executive functioning, but not with measures of memory. In contrast, simple dual task decrements were significantly correlated with speeded categorical and confrontational naming.

**Conclusions:** Experimental dual-task paradigms can be modified for use in clinical settings to facilitate early diagnosis of Alzheimer's Disease. Results support the hypothesis that interference during complex, but not simple, dual task performance is related to prefrontal executive functioning.

Correspondence: *Margaret Crossley, PhD, Psychology, University of Saskatchewan, 9 Campus Drive, Saskatoon, SK S7N 5A5, Canada. E-mail: margaret.crossley@usask.ca*

**E. ZAWADZKA & L. DOMANSKA. Relationship between Emotional and Social Competence in Stroke Patients with Different Insight into Cognitive Abilities.**

**Objective:** Patients with limited insight into their cognitive deficits may manifest problems in social and emotional functioning which interfere with therapeutic work. The aim of the study was the estimation of the relationship between social competence and emotional functioning of stroke patients.

**Participants and Methods:** The tested patients (n=36) formed two groups: with inadequate and adequate insight into memory abilities. Two methods were administered to classify the patients: Rey Auditory Verbal Learning Test and the experimental task demanding subjective valuation of memory abilities. The social competence was tested by means of modified version of KKS (Maczak, 2001). Two forms of it were used: the subjective form and the observational one. STAI and NBAP were used to assessed emotional functions. Using STAI anxiety as state and trait was evaluated. Using NBAP (a self-report version and an observational version) the following dimensions were assessed: indifference, inappropriateness, depression and mania in context of pre-morbid status ('before') and current functioning (during the illness, 'now').

**Results:** Significant correlations between all examined aspects of social competence (i.e. behaviour in close interpersonal contact situations, in situations of social exposition, in situations demanding assertiveness) and selected dimensions of emotional functioning were confirmed in the group of inadequate insight into cognitive function. These correlations were observed both in self-report assessment and in relatives' evaluations. No significant correlations were found in the group of adequate insight into cognitive function.

**Conclusions:** In patients with inadequate insight into memory abilities social competence is related to emotional state. Thus, therapeutic work focusing on patients' emotional problems may increase these patients' sense of social competence and improve social functioning in situations of close interpersonal contact, social exposition and assertiveness.

Correspondence: *Ewa Zawadzka, dr, Zaklad Psychologii Klinicznej i Neuropsychologii, Instytut Psychologii UMCS, Pl. Litewski 5, Lublin 20-080, Poland. E-mail: zawadzka.ewa@poczta.umcs.lublin.pl*

**K.Y. HAALAND, J. RINEHART, M. DANIELS, L. STAPP & J. ADAIR. Hand Preference Influences Arm Use After Unilateral Stroke.**

**Objective:** Previously we demonstrated that hand preference influences arm use in stroke patients after left or right hemisphere damage (LHD, RHD). We now examine whether arm use is associated with performance on instrumental activities of daily living (IADLs).

**Participants and Methods:** Three groups of right handers [healthy control group (N=37), RHD (N=22), LHD (N=22)] performed IADLs; bilateral wrist accelerometers quantified arm use (just right, just left, or both arms). The two stroke groups were matched demographically and on degree of hemiparesis and lesion volume.

**Results:** After RHD, the right arm was used most frequently, but arm use was not significantly associated with functioning. After LHD, use

of left arm only and both arms together were most common, and better functioning was associated with higher use of both arms together or the right arm only and lower use of the left arm only. However, in both stroke groups, better right hand psychomotor performance was associated with better functioning.

**Conclusions:** Although pattern of arm use varied after LHD or RHD, arm use pattern was not consistently associated with quality of IADLs. However, the psychomotor results suggested that the dominant right arm is more important for IADLs, even when the right arm is not paralyzed. Correspondence: *Kathleen Y. Haaland, melidan2000@aol.com, 7005 Pioneer PL NW, Albuquerque, NM 87120. E-mail: melidan2000@aol.com*

### Paper Session 6: Aging/MCI

Moderator: Gordon Chelune

8:30–10:00 a.m.

**T. HATTA, K. YOSHIZAKI, K. KATOH, A. IWAHARA, E. ITO, N. NAGAHARA, T. HATTA & J. HATTA. Age-related difference in hemisphere function: Evidences from the Yakumo-study.**

**Objective:** The aim of this study was to investigate the developmental change of cognitive abilities that related to the left and the right hemisphere using data of the Yakumo cohort study. Special concerns were the sex-related changes and the developmental declining curves on cognitive abilities of middle and upper-middle aged healthy people.

**Participants and Methods:** Three hundred seventy-seven healthy community dwellers whose aged were from 40 to 89 years old participated in this study. They were given NU-CAB (Nagoya University Cognitive Assessment Battery) and other health examinations. Participants were free from any sign of dementia, neurological disease or psychiatric problems at the testing time. Among NU-CAB, Logical memory test, Money road test and letter fluency test data were analyzed to examine age-related hemisphere developmental change.

**Results:** All cognitive abilities decline as a function of aging. Sex-related difference was revealed that the performance of right hemisphere related test (Money road test) begun to decline earlier in women than men while the left hemisphere related test performance (Logical memory and Letter fluency test) decline earlier in men than women.

**Conclusions:** It was found that the left and the right hemisphere function declines with aging but different changing curves. The relation between aging and hemisphere functions will be discussed.

Correspondence: *Takeshi Hatta, Ph. D., Health Sciences, Kansai University of Welfare Sciences, 7-7-1, Hiyoshidai, Takatsuki 569-1022, Japan. E-mail: hatta@fukusi-kagk-u.ac.jp*

**G. SANCHEZ-BENAVIDES, B. GÓMEZ-ANSÓN, M. QUINTANA, S. DE SOLA-LLOPIS, R. MANERO, G. CUCURELLA & J. PEÑACASANOVA. Executive disturbances in Mild Cognitive Impairment are related to frontal lobe cortical thinning.**

**Objective:** Mild cognitive impairment (MCI) is considered a transitional state between normal aging and Alzheimer disease. Most of the MCI subjects present disturbances in multiple neuropsychological domains, including executive function. This study aimed at exploring frontal lobe cortical thinning in MCI and its relationship to executive performance.

**Participants and Methods:** Twenty-three MCI patients and 30 elderly controls underwent MRI and neuropsychological assessment. Cortical thickness was measured by means FreeSurfer in frontal and cingulate Regions of Interest (ROI). Executive performance was assessed using the Trail Making Test (TMT) part A and B, and the Tower of London (TOL).

**Results:** MCI showed a thinning of the cortex in the left frontal lobe and left posterior cingulate gyrus ( $p < 0.05$ ). Partial correlations within the MCI group after controlling for age revealed significant ( $p < 0.05$ ) correlations between MRI measures and executive outcomes. The TMT-A correlated to cortical thickness in the frontal lobe as a whole (-0.47) and in other concrete ROI such as the left frontal pole (-0.46), the left pars orbitalis (-0.46), and the right rostral middle frontal region (-0.43). The TMT-B and thickness in the right frontal pole also

showed a significant correlation (-0.42). The TOL total movements score (-0.47), solving time (-0.50), and number of rules violation (-0.40) were correlated to thickness in the left frontal pole, and solving time was also correlated to the right rostral middle frontal gyrus thickness (-0.44).

**Conclusions:** In conclusion, thinning of frontal lobe cortex observed in MCI is associated to impaired performance in multiple components of executive domain.

Correspondence: *Gonzalo Sanchez-Benavides, IMIM-Hospital del Mar, Aiguader SS, PRBB, Barcelona 08003, Spain. E-mail: gsanchez1@imim.es*

**U. JHA, J. FOSTER, B. BROWN, K. ELLIS, G. SAVAGE, D. DARBY, N. LAUTENSCHLAGER, P. MARUFF, C. SZOEKE, K. TADDEI, V. WARD, M. RODRIGUES, R. LACHOVITZKI, M. RIMAJOVA, N. LENZO, A. CAMPBELL, C. ROWE, V. VILLEMAGNE, T. TADDEI, J. LUI, C. MASTERS, D. AMES & R. MARTINS. Subjective Memory Complainers in the AIBL cohort: Hypervigilance amongst the Worried Well, or Individuals at Increased Risk of Alzheimer's Disease?**

**Objective:** The significance of subjective memory complaints in older adults is controversial. We sought to clarify this issue via the Australian Imaging, Biomarker and Lifestyle (AIBL) study (Ellis et al., 2009).

**Participants and Methods:** The relationship in the AIBL cohort was examined between memory complaints, neuropsychological capacity, mood, diagnostic status and brain amyloid deposition (measured via PIB PET). This cohort comprises 1112 participants aged over 60 years studied i) at baseline and ii) 18 months later. We focused here on the comparison between healthy controls with memory complaints (MCs:  $n=318$ ) vs. those healthy controls not reporting memory difficulties (NMCs:  $n=311$ ).

**Results:** PIB PET analysis showed no significant difference in the proportion of NMCs and MCs above a designated threshold of brain amyloid deposition. However, when compared with NMCs, there was a trend for a higher proportion of MCs at baseline to convert to the clinical diagnostic category of Mild Cognitive Impairment (MCI) 18 months later at follow-up. Furthermore, neuropsychological differences were observed at baseline between subjective memory complainers (MCs) and non-complainers (NMCs) with respect to confrontation naming and semantic fluency (controlling statistically for anxiety and depression scores and estimated premorbid intellectual capacity).

**Conclusions:** These findings have important implications for how we should conceptualize memory complaints in otherwise healthy individuals over the age of 60. More specifically, the findings are valuable when considering the relative significance of subjective memory complaints vs. objective neuropsychological and neuroimaging findings when seeking to identify those at increased risk of age-related cognitive change.

Correspondence: *Jonathan Foster, Edith Cowan University, 270 Joondalup Drive, Joondalup, WA WA 6027, Australia. E-mail: j.foster@ecu.edu.au*

**S. KONSZTOWICZ, H. XIE, A. NYQUIST, A. BASSETT, L. FINCH, N. MAYO & L. KOSKI. Geriatric Rapid Adaptive Cognitive Evaluation (GRACE): Development of a Brief, Adaptive Test to Quantify Cognitive Ability in the Elderly.**

**Objective:** To develop a global cognitive assessment test for the elderly that is adaptive, meaning that performance (pass vs. fail) on one item determines the difficulty of the next item presented. The specific aim of this study was to evaluate whether adaptive administration influences how test-takers respond to individual items (reliability), and to validate a stopping and scoring rule by comparison with a gold standard, the Montreal Cognitive Assessment (MoCA).

**Participants and Methods:** Previously, we Rasch-analyzed combined items from the Mini-Mental State Exam and MoCA to develop the GRACE item hierarchy, i.e., ranking and quantification of the difficulty of each item. This item-set was administered adaptively to 137 geriatric patients screened for cognitive impairment at the McGill University Health Centre, followed by administration of remaining items to allow calculation of MMSE and MoCA total scores. From our clinical database, we extracted demographic information and individual item

responses of this sample and of 188 patients who took the original MMSE and MOCA. Reliability of response patterns across the two administration methods was evaluated using Kendall's Tau. Correlation coefficients were used to identify the best match in total score between the adaptive test and the MoCA.

**Results:** Overall test performance was not influenced by administration method ( $F=1.08$ ,  $p=0.39$ ) and a strong positive correlation was found between the adaptive and original tests ( $r=+0.84$ ). Validity of the scoring system was demonstrated by strong correlations with the MoCA total score.

**Conclusions:** The GRACE may be used as a single measurement tool to rapidly quantify cognition in patients suspected of cognitive impairment. Further work will seek to validate the GRACE as a measure of ability at the extremes of the cognitive spectrum.

Correspondence: *Susanna Konzstowicz, Bsc. Neuroscience, Neurology & Neurosurgery, McGill University, Royal Victoria Hospital, R4.75, 687 Pine Avenue West, Montreal, QC H3A1A1, Canada. E-mail: sue.konzstowicz@mail.mcgill.ca*

### P.E. SPAAN & C.V. DOLAN. Cognitive Decline in Normal Ageing and Early Alzheimer's Disease: A Continuous or Discontinuous Transition?

**Objective:** A longstanding debate in dementia research has been whether normal ageing and Alzheimer's Disease (AD) are extremes that lie along the same continuum (continuity view), or whether AD is categorically different from normal ageing (discontinuity view). We have tested these hypotheses by means of a structural equation modeling approach.

**Participants and Methods:** A computerized battery of 17 test measures, reflecting episodic memory, fluency, naming, processing speed and executive functioning was administered to a group of 43 AD and 37 amnesic Mild Cognitive Impairment patients (of whom 21 had converted to AD at 1.3-year-follow-up; MMSE:  $M=24.8$ ,  $SD=2.5$ ), and a group of 80 matched non-demented controls (MMSE:  $M=28.9$ ,  $SD=1.0$ ). Multigroup Confirmatory Factor Analysis (LISREL 8.80) was performed to examine the invariance of a 5-factor model across the two groups.

**Results:** Invariance analyses showed that the model has adequate configural invariance across the two groups (RMSEA=.06), but neither metric nor strong factorial invariance ( $p < .001$ ). This indicates that the neuropsychological tests measure fundamentally different cognitive processes in normal ageing than in early AD.

**Conclusions:** Qualitative rather than merely quantitative differences in cognitive functioning seem to exist between normal ageing and very early AD. These results provide evidence against the continuity hypothesis and in favour of the discontinuity hypothesis. We argue that only a latent variable approach testing for measurement equivalence may have revealed structural differences in neuropsychological test performance. This outcome has important implications for the selection of optimal procedures of early AD assessment, particularly at very old age. Correspondence: *Pauline E. Spaan, PhD, Psychonomics/Clinical Neuropsychology, University of Amsterdam, Roetersstraat 15, Amsterdam 1018 WB, Netherlands. E-mail: P.E.J.Spaan@uva.nl*

### W. MILBERG, E. LERITZ, D. SALAT, V. WILLIAMS, D. ZADE & R. MCGLINCHEY. Metabolic Regulation, Vascular Risk and the Neuropsychology of Aging.

**Objective:** The object of this study is to show that normal variations in metabolic regulation and vascular risk factors have specific consequences on brain structure and function. This effects are typically not examined in the normal aging literature.

**Participants and Methods:** Participants are healthy community dwelling adults ranging from 50-87 who participated in two prospective studies designed to examine how risk factors for a variety of cognitive disorders impact cognitive function and neural structure in healthy populations.

Participants were characterized with an extensive battery of neuropsychological tests, high resolution structural MRI, analysis of blood pressure, glucose, lipids, cardiac function, and Apoe4.

**Results:** Vascular risk was divided into three main areas: blood pressure, lipids, and blood glucose. Each factor was found to correlate with a specific pattern of cortical thickness, fractional anisotropy, and re-

gional volumes. In addition, risk factors appear to have a moderating effect on the relationship between cognition and brain structure. Data also supported that Apoe4, a genetic risk factor for Alzheimer's Disease had a synergistic effect on how vascular risk affected these structural parameters.

**Conclusions:** These data suggest that normal variations in vascular risk factors have specific structural consequences on brain structures in otherwise healthy adults. In addition, these data suggest that cognitive aging is directly influenced by variations in normal physiology and metabolic regulation.

Correspondence: *William Milberg, Ph.D, GRECC, VA Boston Healthcare, 150 S. Huntington Avenue, Boston, MA MA. E-mail: william\_milberg@hms.harvard.edu*

## Invited Address: Neuropsychology At Work in MCI and Dementia

Speaker: **Andreas U. Monsch**

10:30–11:30 a.m.

### A. MONSCH. Neuropsychology At Work In MCI And Dementia.

Current concepts of the diagnoses of Mild Cognitive Impairment (MCI) and dementia continue to be discussed in the literature. A critical step in this process is the need to reliably assess change from a previous level of cognitive functioning, in order to establish criteria for the possible presence of neurodegenerative disorders such as Alzheimer's disease (AD) or MCI. These criteria imply that repeated neuropsychological assessments take place and/or that informants' should be considered. The ability to interpret consecutive longitudinal neuropsychological assessments in elderly individuals requires in-depth knowledge of both normal age-associated cognitive change and early signs of neurodegenerative diseases.

Correspondence: *Andreas Monsch, PhD, Dept. of Geriatrics, University Hospital Basel, Schanzenstrasse 55, Basel 4031, Switzerland. E-mail: andreas.monsch@unibas.ch*

## Symposium 10: Cognitive Functions in Psychiatric and Somatic Diseases - Diagnosis and Therapy

Chair: **Irena Krupka-Matuszczyk**

11:45 a.m.–1:15 p.m.

### A. BORKOWSKA & I. KRUPKA-MATUSZCZYK. Cognitive functions in psychiatric and somatic diseases - diagnosis and therapy.

**Symposium Description:** The symposium covers the problem of cognitive functioning in patients with psychiatric diseases like schizophrenia and bipolar disorders and in somatic conditions which may affect the brain function. The somatic disorders include cariosurgical pre and postoperation states and hepatic infections. In the psychiatric states also the impact of antipsychotics and antidepressants will be discussed. The problem of diagnosis including the use of neuropsychological assessment and other diagnostic tool will be covered. Also the therapeutic issues will be discussed concerning the proper implications for treatment and rehabilitation.

Correspondence: *Irena Krupka-Matuszczyk, Department of Psychiatry and Psychotherapy, Medical University of Silesia, Ziolowa 45/47, Katowice 40-635, Poland. E-mail: psychiatria@gcm.pl*

### K. KRZYSTA, I. KRUPKA-MATUSZCZYK, M. KRZYSTANEK & A. KLASIK. The efficacy of selected antipsychotics and thymoleptics in cognitive improvement in schizophrenia and depression.

**Objective:** Cognitive disorders in schizophrenia embrace a number of spheres like processes of thinking and memory, and attention of the suffering patients.

Studies on second generation antipsychotic treatment done so far proof that they are highly effective in the improvement of the above disorders. In subjects suffering from depression we observe neuropsychological deficits concerning attention, psychomotor speed, executive functions. The cognitive improvement during antidepressive treatment probably goes along with the phenomenon of neuroplasticity.

The purpose of this study was to verify the influence of olanzapine and amisulpride on the cognitive improvement in subjects suffering from schizophrenia and on the cognitive improvement in depressive subjects treated with tianeptine.

**Participants and Methods:** Method. The examination embraced patients with the diagnosis of schizophrenia one day before the neuroleptic treatment with olanzapine or amisulpride, after 28 days, after 60 days, after 3 and 6 months of the treatment. Respectively depressive patients treated with tianeptine were examined in the same intervals.

The computer version of the Vienna Test System (COGNITRON, RT and SIGNAL) was used for the assessment.

**Results:** Results. In the examined cognitive functions including attention, memory, reaction time an improvement was observed both in the schizophrenic patients treated with olanzapine and amisulpride and in the depressive patients treated with tianeptine.

**Conclusions:** Conclusions. The above results confirm the reports on the efficacy of olanzapine and amisulpride in the improvement of cognitive functioning in schizophrenia. The positive impact of tianeptine on cognitive functions depression can confirm the hypothesis of the neuroplasticity hypothesis.

Correspondence: *Irena Krupka-Matuszczyk, Department of Psychiatry and Psychotherapy, Medical University of Silesia, Ziolowa 45/47, Katowice 40-635, Poland. E-mail: psychiatria@gcm.pl*

**K. KRZYSTA, A. WOZNICA, L. KRZYCH, A. PAWLAK, J. SKARYSZ, Z. EYSMONTT, I. KRUPKA-MATUSZCZYK, A. BOCHENEK & M. CISOWSKI. The correlation between intensity of anxiety and depression and selected cognitive functions – before and after coronary artery bypass surgery.**

**Objective:** In patients undergoing coronary-artery bypass surgery (CABG) the presence of cognitive functions deficits is frequently observed. This procedure is also associated with a danger of appearance of depression and anxiety. As the above symptoms may coexist, the purpose of this study was to observe the presence of depression and anxiety symptoms before and after the operation, and their impact on the cognitive functioning of operated patients.

**Participants and Methods:** It included 50 subjects in whom the intensity of depression was assessed with the use of the Beck Scale (BDI), and the anxiety as state and trait was assessed with the use of STAI scale on 1 day before the operation and on 5-7 days after the operation. At the same time cognitive functions were assessed with the use of Vienna Test System (VTS).

**Results:** The change of intensity of anxiety and depression and most of the analysed cognitive functions, except learning ability, was statistically significant. However the correlation of depressive and anxiety symptoms with the cognitive deficits achieved the level of significance only with the reference to attention disorders.

**Conclusions:** The achieved results show a considerable independence of the cognitive functions examination from the present emotional state in examined patients.

Correspondence: *Irena Krupka-Matuszczyk, Department of Psychiatry and Psychotherapy, Medical University of Silesia, Ziolowa 45/47, Katowice 40-635, Poland. E-mail: psychiatria@gcm.pl*

**M. JARACZ & A. BORKOWSKA. Decision Making, working memory and executive functions in schizophrenia and bipolar disorder.**

**Objective:** Schizophrenia and bipolar affective disorder are related to significant decline in cognitive functioning. Neuropsychological studies indicate that deficit of working memory and executive functions are also present in remission of above disorders. Up to date, few studies have addressed the issue of decision making efficacy in remission of bipolar disorder and schizophrenia. The aim of the study was to assess decision making, working memory and executive functions in remission of schizophrenia and bipolar disorder.

**Participants and Methods:** The study included 30 patients with bipolar affective disorder, currently in remission, 30 patients with schizophrenia, currently in remission. The control group was matched regarding sex, age and years of education.

**Methods:** Depressive symptoms were assessed using HAM-D scale, manic symptoms were assessed using YMRS scale, schizophrenic symptoms were assessed using PANSS scale.

Decision making was assessed using Iowa Gambling Task (IGT) in Polish language version. Working memory and executive functions were assessed with Wisconsin Card Sorting Test (WCST) and Trail Making Test (TMT). Statistical analysis was provided with SPSS 15.

**Results:** Results: There were significant differences between all groups concerning the number of perseverative errors, non-perseverative errors, percent of conceptual level responses and number of cards used to complete first category in WCST test, performance time in part A and B of TMT test. Post-hoc analysis revealed that both groups of patients performed worse in all above tests, compared to the healthy group.

**Conclusions:** Schizophrenic patients needed more time to complete both parts of TMT test, compared to bipolar patients. No differences were found regarding the IGT test.

Correspondence: *Irena Krupka-Matuszczyk, Department of Psychiatry and Psychotherapy, Medical University of Silesia, Ziolowa 45/47, Katowice 40-635, Poland. E-mail: psychiatria@gcm.pl*

**W. DROZDZ, A. BORKOWSKA, D. DYBOWSKA, D. KOZIELEWICZ & W. HALOTA. Cognitive functions and mood disorders in patients with chronic hepatitis C before and during antiviral therapy.**

**Objective:** Studies on neuropsychological performance of chronic hepatitis C (CHC) patients treated with with interferon- $\alpha$  plus ribavirin (IFN+RBV) has yielded contradictory results. However, the possible influence of affective disorders on cognitive functioning has been rarely addressed. The purpose of the study was an assessment of the prevalence of mood disorders and their possible associations with cognitive dysfunctions in CHC patients before and after three month treatment with IFN+RBV.

**Participants and Methods:** One hundred CHC patients aged 18-60 years without decompensated liver function and without an organic or a psychotic disorder were assessed with the ICD-10 criteria for mood disorders and with the Hamilton Depression Rating Scale, the Stroop Test and the Trail Making Test. Clinically significant mood disorders were present in 18% patients at the enrolment.

**Results:** Three-month therapy with IFN+RBV resulted in emerging mood disorders in additional 25% patients and did not influence cognitive performance. However, CHC patients who had been diagnosed with idiopathic depression at the enrolment exhibited at the second assessment significant worsening of verbal working memory as compared to patients with interferon- $\alpha$  induced mood disorders. Patients without depressive symptomatology both before and after IFN+RBV therapy remarkably improved on tasks of psychomotor speed and verbal working memory at the second testing. This may point to the practice effects.

**Conclusions:** Clinical and neuropsychological differences may suggest distinct pathogenesis of idiopathic and IFN-induced mood disorders. The presence of affective disorders may be an important factor that should be controlled in neuropsychological studies in CHC patients on antiviral therapy. Correspondence: *Irena Krupka-Matuszczyk, Department of Psychiatry and Psychotherapy, Medical University of Silesia, Ziolowa 45/47, Katowice 40-635, Poland. E-mail: psychiatria@gcm.pl*

### Symposium 11: Contemporary Challenges towards Clinical Neuropsychology - Expanding Research Areas

Chair: Danuta Kadzielawa

11:45 a.m.–1:15 p.m.

**D. KADZIELAWA, H. ULATOWSKA, A. KERTESZ, R. STEELE, M. GONTARCZYK & K. JODZIO. Contemporary Challenges towards Clinical Neuropsychology - Expanding Research Areas.**

**Symposium Description:** During the symposium there are going to be presented the works being both the result of empirical research

conducted over several years and theoretical analyses and considerations. Broad spectrum of the discussed problems cover processes of verbal communication, consciousness, executive functions both in the context of processes occurring in the aging brain and brain dysfunctions. The authors present data reflecting the current stage of the knowledge concerning brain mechanisms of cognitive processes, and propose new modified ways in neuropsychological disorder diagnosis and therapy.

One of the presentations explains terminological and diagnostic controversies relating to different variants primary progressive aphasia in the light of recent neuroimaging and neuropathological findings.

The authors of another presentation propose to expand consciousness (arousal) disorder classification upon description of specific disorders in being aware of own cognitive, motor, and perceptive deficits which are considered as anosognosia and dissociation and disconnection syndrome.

The next paper is meant as a try to evaluate diagnostic utility of The Wisconsin Card Sorting Test as a measure of executive function impairments in stroke survivors. The authors join the discussion on accuracy of methods applied in neuropsychological diagnosis.

Another paper will present the results of research into communication abilities in elderly individuals basing on complexity in life narratives. The influence of conditions (brain condition, cognitive reserve, life experience) on the abilities will be discussed.

The authors of another presentation propose using the computer programs supporting neuropsychological rehabilitation of persons in chronic aphasia.

The variety of problems discussed at the symposium reflects contemporary attitude towards both knowledge integration and exchange of experience from neuroscience disciplines.

Correspondence: *Danuta Kadzielawa, Prof., Neuropsychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: dankakadz@gmail.com*

#### H. ULATOWSKA. Communication in the Aging Brain.

**Objective:** The presentation is based on our investigations of narrative performance in healthy and neurologically impaired elderly individuals, conducted over several decades.

**Participants and Methods:** The topic selected is 'Integrative Complexity in Life Narratives of the Elderly' which shows how these individuals organize and synthesize information related to their life experiences.

**Results:** There exists empirical evidence on the association between chronological age and the complexity of narrative structure. Life narratives have the power to structure perceptual experiences, organize memory and sequence the very events of life. Integrative complexity, as a cognitive construct, can characterize the structure of an individual's thought in the genre of life narratives. This is evident in highly generative elderly individuals who have distinguished themselves with their commitment to promoting the next generation and leaving behind their legacy. In order to illustrate this life narratives of two octogenarians, who produced multiple level representations of autobiographical memories through images of events and emotions, are discussed. These representations required utilization of a wide range of cognitive and linguistic abilities in order to produce integrative complexity.

**Conclusions:** Considering the advanced age of those individuals and also brain damage as a result of a stroke in one of them, the concepts of cognitive reserve as well as the gains resulting from their rich experiential base are discussed. These are possible explanations of individual differences in cognitive aging, as reflected in their narrative production.

Correspondence: *Danuta Kadzielawa, Prof., Neuropsychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: dankakadz@gmail.com*

#### M. GONTARCZYK, B. DANILUK & A. HERZYK. The Proposition of the Neuropsychological Classification of Conscious and Unconscious Processes Disorders.

**Objective:** "The Galileo and the Lavoisier of psychology will be famous men indeed when they come, as come they some day surely will, or past successes are no index to the future". (James, 1892, 468)

James's idea, referring to the state of psychological knowledge about consciousness is often cited by contemporary researchers of brain and psyche, querying whether the Galileo and the Lavoisier of the psychol-

ogy of consciousness have already appeared or not. In spite of enormous knowledge acceleration, research technology and discovering and explaining the essence of conscious and unconscious processes, we still express quite large uncertainty about these phenomena, although studies of consciousness have long clinical tradition, connected with descriptions of patients with mental disorders.

**Participants and Methods:** In clinical neuropsychology brain conditionings of conscious and unconscious processes disintegration are still being searched, as a basis for emerging and forming of many neuropsychological syndromes.

**Results:** To create clearer sight of the search, we propose a modified classification of neuropsychological syndromes, which takes into consideration various categories

of conscious and unconscious processes disintegration – from global and deep to selective ones of very diverse nature and paradoxical symptoms (from LIS – "I am unconscious but aware", throughout anosognosia and dissociation syndromes – "I do not know, that I know", to disconnection syndromes – "Two minds in one brain").

**Conclusions:** We hope, that our proposition will be helpful in deeper studying and better understanding of the nature of symptoms with very complex clinical picture that often causes troubles in proper differentiation and diagnosis.

Correspondence: *Danuta Kadzielawa, Prof., Neuropsychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: dankakadz@gmail.com*

#### R. STEELE. Computer Interaction Design: Contributions to Aphasia Rehabilitation.

**Objective:** In recent decades, researchers have made important progress understanding how underlying neurological structures and functioning can shape human responses to stimuli, in ways often neither obvious nor under conscious control. Concurrently, computers have increasingly provided opportunities to manipulate stimuli presented through multimodal output displays, under program control, to coordinate and otherwise modulate them purposefully.

**Participants and Methods:** In computer science, the field of 'interaction design' is concerned, in part, with integrating findings and insights from these disparate domains to for benefit of computer application users. One area where combination has proved unexpectedly fruitful is the remediation of speech-language-communication disorders of persons with acquired aphasia following stroke.

**Results:** In this presentation, we discuss lessons learned from the rehabilitation of persons in chronic aphasia using the Lingraphica Speech Generating Device – an icon-based, highly interactive, and stimulating rehabilitation technology designed specifically for persons with aphasia. Some of its interactions are designed to redirect and focus attention, while simultaneously raising users' arousal levels. Others are designed to cause the 'mirror neurons' in the CNS of users to become activated in support of independent functional utterance of word or phrase. Still others aim to strengthen the coordination of distinct sequential aspects of cerebral word processing.

**Conclusions:** To show benefits, we turn to outcome studies documenting significant additional improvements in chronic patients following this rehabilitation, regardless of previous courses of therapy, aphasia diagnostic categories, severity levels at intake, or times post-onset. Unprecedentedly, many are reassigned to less severe aphasia diagnostic categories by discharge.

Correspondence: *Danuta Kadzielawa, Prof., Neuropsychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: dankakadz@gmail.com*

#### A. KERTESZ & M. HARCIAREK. Primary Progressive Aphasias: Past, Present, and Future.

**Objective:** Frontotemporal dementia (FTD), formerly known as Pick's disease, has become recognized as a distinct and relatively common entity typically characterized by varied behavioral symptoms and/or a progressive language disorder often described in the literature as primary progressive aphasia (PPA). Nevertheless, progressive aphasia may also appear early in the course of Alzheimer's disease (AD) and at least a subset of patients clinically diagnosed with PPA turn to have the AD pathology on autopsy.

**Participants and Methods:** Thus, the main purpose of this presentation is to better understand characteristic clinical features of three dif-



ferent variants of PPA: 1) progressive non-fluent aphasia (PNFA), often characterized by apraxia of speech and deficits in processing complex syntax, 2) semantic dementia (SD), with relatively fluent albeit empty and perseverative speech as well as semantic memory deficits and marked pragmatic disturbances, and 3) logopenic progressive aphasia (LPA), characterized by slow, hesitant speech as well as impaired syntactic comprehension, naming and working memory.

**Results:** The diagnostic and overlapping features of these three variants of PPA will be described. In addition, the clinical picture of PNFA, SD, and LPA will be discussed in the light of recent neuroimaging and pathological findings. Also, controversies regarding the terminology (e.g. semantic dementia vs. semantic aphasia vs. primary transcortical sensory aphasia with agnosia), diagnosis (e.g. the role of neuroimaging in differential diagnosis of PPA), genetics, and therapeutic interventions will be discussed.

**Conclusions:** Lastly, directions for future research will be proposed.  
Correspondence: *Danuta Kadzielawa, Prof., Neuropsychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: dankakadz@gmail.com*

#### **K. JODZIO & D. BIECHOWSKA. Executive Function Deficits in Acute Stroke: Evidence from the Wisconsin Card Sorting Test.**

**Objective:** The present study intends to evaluate the diagnostic utility of the Wisconsin Card Sorting Test (WCST) as a measure of executive function impairments in ischaemic stroke.

**Participants and Methods:** Forty-four patients who had recent unilateral stroke participated in the study.

**Results:** The overall accuracy of the WCST in classifying stroke survivors as having executive disorders was poor. Nevertheless, statistical analysis revealed its negative predictive power to be greater than positive predictive power, i.e. normal scores on the WCST reliably indicated the absence of executive disorders in 8 or more out of 10. Performance on the WCST is clearly influenced by severity of the executive disorders. Namely, patients with severe impairment of executive functions performed more poorly on the WCST than patients with lesser impairment or those with no impairment at all, the latter group's results being indistinguishable. In addition, this study highlights a three-factor solution to the WCST which accounted for 90.3% of the variance. Finally, an analysis using MANOVA revealed a relatively weak effect of lesion location on the WCST performance. In particular, with respect to all test scores there is only one significant interaction between the site and side of lesion, i.e. the number of categories achieved was significantly smaller after damage to the frontal lobe on the left than on the right side, whereas the laterality effect was not significant after non-frontal lesions.

**Conclusions:** In conclusion, in order to ascertain the cerebral substrates of post-stroke executive dysfunction there is a need to apply more accurate tests than the WCST.

Correspondence: *Danuta Kadzielawa, Prof., Neuropsychology, University of Warsaw, Stawki 5/7, Warsaw 00-183, Poland. E-mail: dankakadz@gmail.com*

### **Paper Session 7: Cancer/Tumors/Toxic Exposure**

**Moderator: Janusz Rybakowski**

**11:45 a.m.–1:15 p.m.**

#### **E. BENNETT, M. ENGLISH, A. STARZA-SMITH & M. RENNOLDSON. Predicting Parenting Stress in Caregivers of a Child with a Brain Tumour.**

**Objective:** Parents of children diagnosed with brain tumours are likely to face many ongoing stressors and challenges. However, parenting stress has been little investigated in this population. The current study aimed to identify potential factors that may contribute to parenting stress in these caregivers.

**Participants and Methods:** The study was cross-sectional and recruited participants from a clinical database at a specialist children's hospital. Parents of children diagnosed with a brain tumour were sent questionnaires, which measured factors related to stress. Stress levels were measured using the Parenting Stress Index – Short Form (PSI/SF). Correlation analysis and multiple linear regression were used to examine associations between parenting stress and coping styles, locus of control, child disability, and time since diagnosis.

**Results:** Thirty-seven parents participated and, of these, 51% were experiencing clinically significant level of stress. The mean stress level of parents in the study was significantly higher than PSI/SF norms ( $t = 4.7, p < .001$ ). Regression analysis revealed that external locus of control and coping by accepting responsibility accounted for 67% of the variance in parenting stress. Other styles of coping, child behaviour problems and time since diagnosis were not predictive of stress levels.

**Conclusions:** There was a high prevalence of parenting stress in caregivers of children with a brain tumour. An external locus of control and coping by accepting responsibility increase the likelihood of elevated levels of stress. Results emphasised the importance of ongoing support for parents. Intervention might helpfully be centred on strategies to increase parents' internal locus of control.  
Correspondence: *Emily Bennett, University of Nottingham, 43 Mona Street, Beeston, Nottingham NG9 2BY, United Kingdom. E-mail: lwxeb4@nottingham.ac.uk*

#### **K. GEHRING, N.K. AARONSON, M.J. TAPHOORN & M.M. SITSKOORN. The Results of a Randomized Controlled Trial on Cognitive Rehabilitation in Patients with Primary Brain Tumors.**

**Objective:** Patients with a glioma (primary brain tumor) may live free from neurological symptoms for years. During this period, many of them experience cognitive deficits. This randomized controlled trial evaluated the effects of a cognitive rehabilitation program in glioma patients.

**Participants and Methods:** 140 Patients with both subjective and objective cognitive symptoms were randomized to an intervention group or to a waiting-list control group. The intervention incorporated both computer-based attention retraining, and strategy training for attention, memory and executive functioning. The program consisted of 6 weekly, individual 2-hour sessions plus homework. Both groups completed a battery of neuropsychological tests, and questionnaires on cognitive functioning, fatigue, quality of life and community integration at baseline, following completion of the program, and at 6 month follow-up.

**Results:** Doubly multivariate repeated measures ANOVA's indicated that, at immediate post-treatment, statistically significant intervention effects were observed on subjective cognitive functioning and its perceived burden. At 6 month follow-up, the intervention group performed significantly better than the control group on tests of attention and verbal memory and reported less mental fatigue. Additional logistic regression analyses investigated, on the individual patient level, the characteristics that optimized the effects of the cognitive rehabilitation. Whereas higher education was associated with improvement in both study groups, younger age was associated with specific intervention-related improvement.

**Conclusions:** As this is, to our knowledge, the first controlled trial of cognitive rehabilitation in glioma patients, replication of the results is required. Adaptations to the program may increase its effectiveness among older participants.

Correspondence: *Karin Gehring, MSc, Tilburg University, Warandelaan 2, PO Box 90153, Tilburg 5000 LE, Netherlands. E-mail: k.gehring@uvt.nl*

#### **B. SANTINI, A. TALACCHI, S. SAVAZZI & M. GEROSA. Cognitive Effects of Tumor and Surgical Treatment in Glioma Patients.**

**Objective:** The quality of life in brain tumor patients is an emerging issue and has prompted neurosurgeons to reconsider the need for cognitive assessment in the course of treatment. In particular, to date there has been a lack of comprehensive neuropsychological assessment performed preoperatively and in the acute postoperative period.

**Participants and Methods:** We examined functional domains in 29 patients with glioma: intelligence, executive functions, memory, language, praxis, gnosis and mood state in order to establish the effect of tumor and surgery on cognition.

**Results:** At baseline, using test- and domain-based criteria, 79% and 38% of patients, respectively, were impaired, the former related to tumor factors such as edema ( $p < 0.05$ ), larger size ( $p < 0.05$ ) and higher grade ( $p = 0.001$ ). Verbal memory, visuospatial memory and word fluency were the most frequently affected functions, partly associated with

depression. Postoperatively, again using test- and domain-based criteria, 38% and 55% of patients, respectively, were unchanged, 24% and 21% improved, and 38% and 24% worsened; normal patients were 24% and 62%, respectively. The extent of removal did not influence the outcome. Improvement involved previously impaired functions and was correlated with high-grade tumors. Worsening regarded executive functions related to tumor size and was partly explained by radiological findings on postoperative MRI.

**Conclusions:** This preliminary study, focusing on the effects of tumor and surgery, showed that tumor significantly affects cognitive functions, mainly due to the mass effect and higher grading. Surgical treatment improved the functions most frequently affected preoperatively and caused worsening of executive functions after operation, leaving the overall cognitive burden unchanged, and capable of being improved prospectively. Correspondence: *Barbara Santini, psychology, Department of Neurological Sciences and Vision, University of Verona, Piazzale Stefani 1, Verona 37126, Italy; E-mail: barbara.santini@univr.it*

**K.J. VEARNCOMBE, M. ROLFE, N.A. PACHANA, M. WRIGHT & G. BEADLE. The Cognitive Effects of Chemotherapy-induced Menopause in Early Breast Cancer.**

**Objective:** Chemotherapy-induced (or chemical) menopause has been postulated to be one of the mechanisms underlying cognitive dysfunction after chemotherapy, although this has not been thoroughly investigated. Therefore, the current study aimed to evaluate the effect of different menopausal states on cognitive functioning in women recently diagnosed with early breast cancer.

**Participants and Methods:** The neuropsychological performance of 122 breast cancer patients scheduled to receive chemotherapy was assessed via a comprehensive battery pre-chemotherapy, one month and six months post chemotherapy. Demographic, treatment, and psychological information was also collected at each time point.

**Results:** Women were divided into three different types of menopausal status (pre-, chemical, and post-menopausal) and cognitive performance was examined using linear mixed modeling (controlling for age, estimated intellectual functioning, use of adjuvant endocrine treatment and depression). One significant interaction between time and menopausal group was found,  $F(4,129) = 3.044$ ,  $p = 0.02$ , with chemically menopausal women treated with endocrine treatment ( $n=35$ ) performing significantly worse than chemically menopausal women who did not receive endocrine treatment ( $n=6$ ) on an abstract reasoning task. Specific decline in the verbal memory domain was evident after chemotherapy in all groups, with declines in both verbal learning,  $F(2,140) = 10.82$ ,  $p < 0.001$  and delayed verbal memory,  $F(2,141) = 31.32$ ,  $p < 0.001$ . All other areas of cognitive functioning were stable or improved over time, presumably due to practice effects.

**Conclusions:** Although chemotherapy administration may result in specific verbal memory difficulties, the current study found little evidence to suggest that chemical menopause adversely affects cognitive functioning.

Correspondence: *Katharine J. Vearncombe, PhD, Psychology, University of Queensland, 50 Tucker St, Chapel Hill, Brisbane, QLD 4069, Australia. E-mail: k.vearncombe@psy.uq.edu.au*

**L.J. WOODWARD, C. SPENCER, N. WEISENFELD, R. WATTS & S. WARFIELD. Prenatal Methadone Exposure and Infant Brain Tissue Volumes: Does Dose Matter?**

**Objective:** Despite the widespread use of methadone in the treatment of opiate addicted women during pregnancy, its effect on fetal brain growth and development is not known. This paper examines relations between maternal pregnancy methadone dose and quantitative MRI measures of infant cerebral tissue volumes at birth.

**Participants and Methods:** As part of a prospective longitudinal study of the neurodevelopmental consequences of prenatal methadone exposure, an unselected sub-sample of 49 methadone exposed (ME) and 30 comparison infants underwent a structural MRI scan. These scans were analyzed quantitatively to generate for each infant the volume of cerebral cortical gray matter, subcortical gray matter, unmyelinated white matter, myelinated white matter and cerebrospinal fluid. Extensive information was also available concerning maternal pregnancy health, other drug use, nutrition, methadone dose and infant perinatal characteristics based on clinic records, maternal interview, random maternal urine samples throughout pregnancy and infant meconium toxicology at birth.

**Results:** Mean methadone dose levels in the exposure group ranged from 6-195 mg/day (mean=62.6). Increasing maternal methadone dose was associated with decreases in absolute cerebral tissue volumes of cortical gray matter ( $p=.03$ ), subcortical gray matter ( $p<.0001$ ), unmyelinated white matter ( $p=.02$ ) and total cerebral tissue ( $p<.0001$ ). Associations between maternal methadone dose and cerebral volumes of subcortical gray matter ( $p=.03$ ), myelinated white matter ( $p=.06$ ) and total tissue ( $p=.005$ ) persisted after covariate adjustment for the effects of gestational age at birth, pregnancy nutrition and other drug use. In contrast, associations between maternal methadone dose and cerebral volumes of cortical gray matter ( $p=.20$ ) and unmyelinated white matter ( $p=.10$ ) were attenuated.

**Conclusions:** Methadone maintenance may impact not only fetal growth but also cerebral structural development. Higher doses are associated with increased neurological risk for the infant.

Correspondence: *Lianne J. Woodward, PhD, Psychology, University of Canterbury, PB4800, Ilam, Christchurch 8140, New Zealand. E-mail: lianne.woodward@canterbury.ac.nz*